State of Illinois
Illinois Department of Natural Resources

The Drought of 2012

A Report of the Governor's Drought Response Task Force

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Illinois Department of Commerce & Economic Opportunity
Pat Quinn, Governor

Illinois Commerce Commission

Illinois State Water Survey
Prairie Research Institute

Northwest Water Planning Alliance

USGS

US Army Corps of Engineers®

University of Illinois Extension

East Central Water Consortium • Kaskaskia Regional Water Supply Committee

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FOREWORD

The Drought of 2012 in Illinois as described in this report was an outgrowth of several years of drought in the southwest which began to expand north and easterly to encompass much of the Midwest. That drought continues to be problematic in states to the west and north of Illinois.

Several meteorologic and hydrologic conditions contributed to the drought in Illinois. These conditions are described and the resultant impacts are identified. Quantifying the impacts in useful metrics has been elusive.

This report serves to define the policy and technology issues which arose during the Drought of 2012 and to explain some limitations in governmental responses to those policy and technological issues.

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INTRODUCTION

The Governor's Drought Response Task Force is activated with the Governor's approval when drought conditions warrant a unified statewide approach. This task force was activated on June 19, 2012 by the State Water Plan Task Force with the approval of the Governor's Office.

Numerous droughts have occurred in Illinois with the most significant occurring in the 1930's, 1950's 1988, 2007, and in 2012. Following the Drought of 2007, the State Water Plan Task Force developed and published a report entitled "State of Illinois, Drought Preparedness and Response Plan " and includes recommendations for future preparations for drought. These recommendations have been partially implemented.

Governmental response to drought conditions is of critical importance to those directly affected by drought. Agricultural producers, public water supply users, and industrial users depend on the availability of water to maintain the state's economy and to sustain our standard of living. When the water supplies become limited as occurs during drought, restricted usage and competition for usage become common problems for agency administrators who are tasked with managing the waters of Illinois. These problems affect secondary impacts, such as water quality (temperature, dissolve oxygen, nutrient concentrations), aquatic sustainability, exports, jobs, and economic vitality. Each drought is unique and presents different challenges to government, and offers new opportunities to re-look at the administrative processes in place to respond to drought.

This report purports to document the Drought of 2012 and its effects, and to identify those areas where further planning and preparation for future drought should occur. Planning and preparation will be discussed based on the water supply presently available, the demand for that supply, and the need to plan for the expected conflicts between supply and demand.

CONDITIONS LEADING UP TO THE DROUGHT

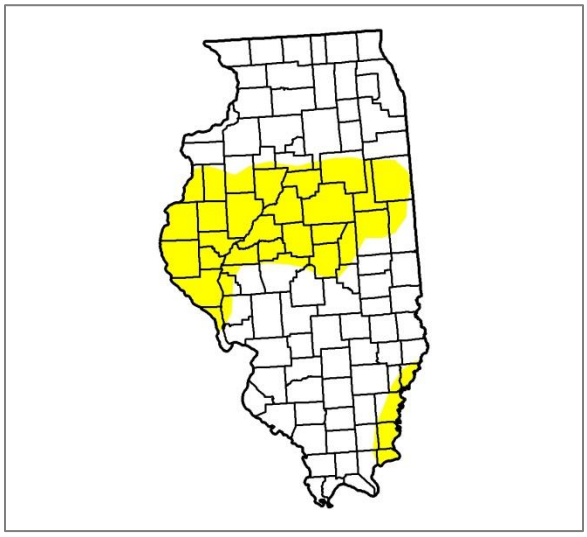
Drought conditions persisted in portions of the southwestern states for several years leading up to 2012, with Texas being a focal point for those conditions. In 2010 and 2011, the drought conditions in the southwest spread slowly northward. Illinois meteorological conditions in the fall of 2011 were trending toward dry in the southern most counties, while central Illinois counties were experiencing below normal precipitation. The winter of 2011 to 2012 produced little snowfall across Illinois, and was warmer than most winters in Illinois. Spring conditions allowed for planting of crops with high expectations. Spring precipitation was well below normal, raising fears of drought.

PROGRESSION OF THE DROUGHT

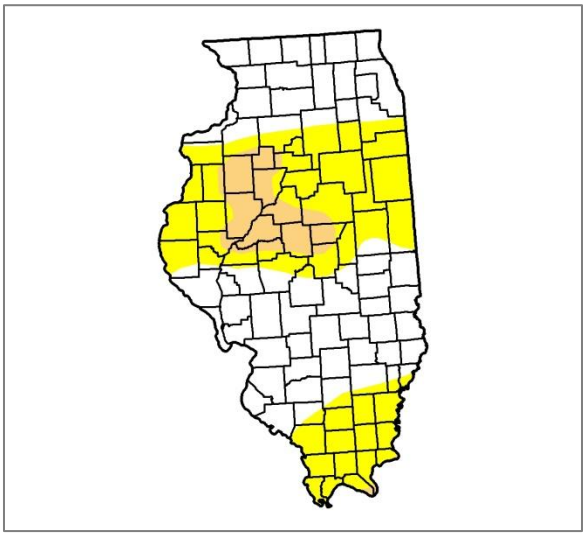
The National Drought Monitor reports drought conditions based on precipitation in terms of percent below normal. When considering Illinois, the National Drought Monitor shows a progression of the drought from south to north, with the drought conditions in southern Illinois having begun in the fall of 2011, progressively worsening across southern Illinois into March of 2012 with central Illinois showing moderate drought, then extending to eventually covering all Illinois counties by July 2012. August and

September rainfalls moderated drought conditions across much of south central Illinois, while drought conditions persisted throughout most of Illinois. By December 2012, drought conditions were again worsening across most of Illinois. The progression of the Drought is shown in Figure 1 and depicts drought conditions from April thru December 2012.

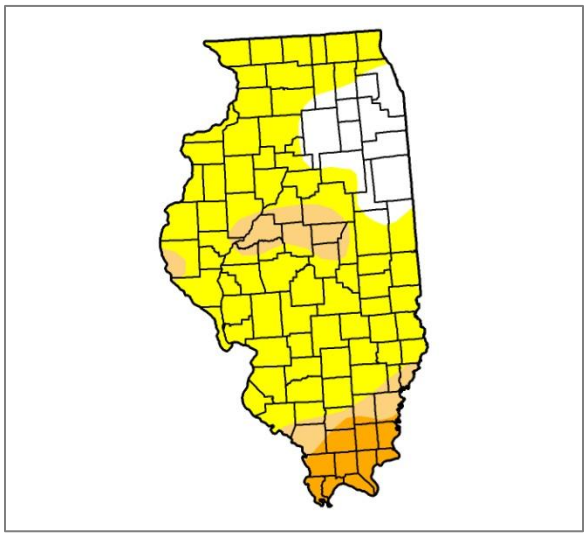
Figure 1. Monthly Drought Monitor



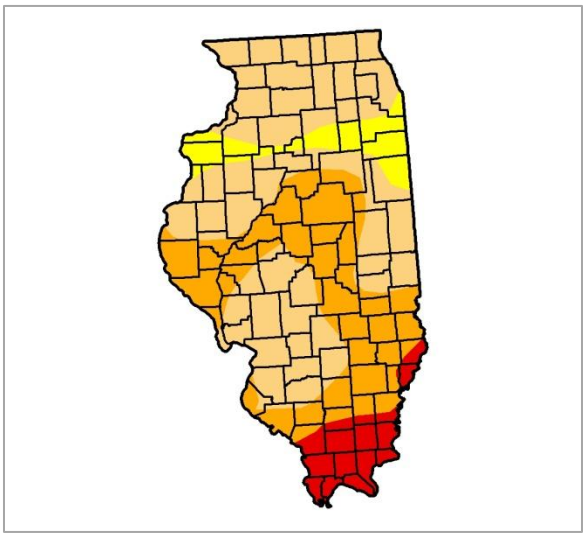
April 3, 2012



May 1, 2012

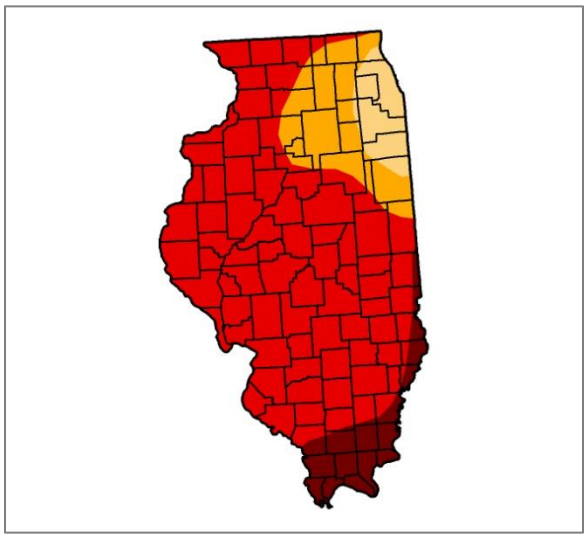


June 5, 2012

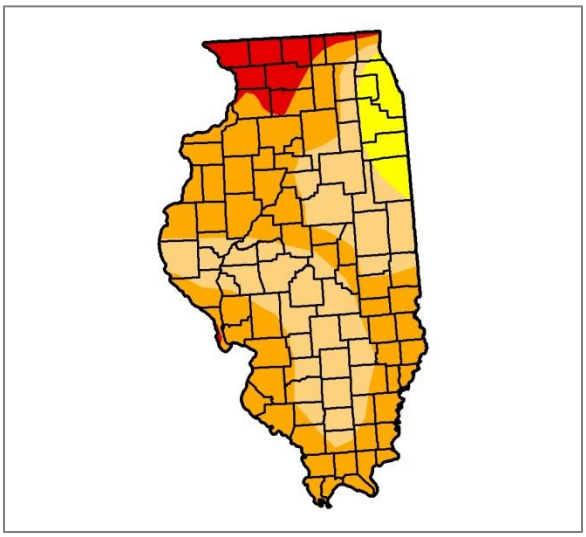


July 3. 2012

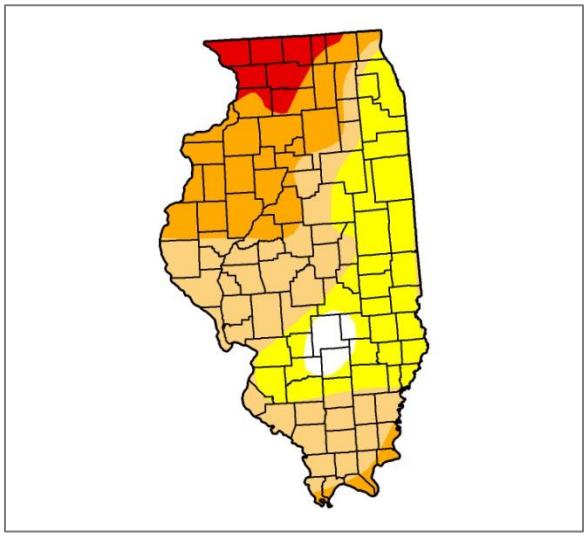
Figure 1. Monthly Drought Monitor continued



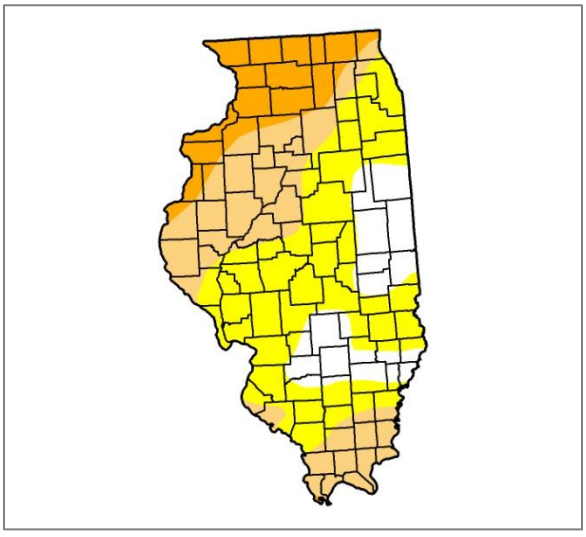
August 7, 2012



September 4, 2012

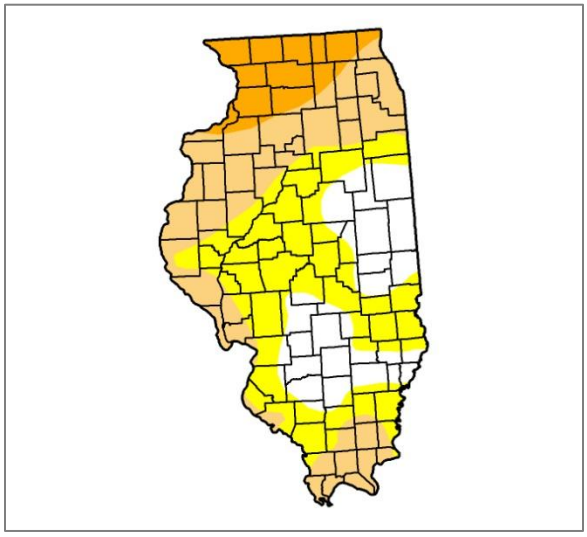


October 2, 2012



November 6, 2012

Figure 1. Monthly Drought Monitor continued



December 4, 2012

PRECIPITATION

Figure 2 shows the statewide average monthly precipitation departure for 2012. Generally dry conditions prevailed from January to April with slowly growing deficits by the end of April. However, the core months of the 2012 drought were May, June, and July, when deficits grew substantially. August was close to normal while September and October were above normal due to rains from the remains of Hurricane Isaac over Labor Day weekend and other systems. However, dry conditions returned in November, slowing the rate of recovery from summer conditions. (Drought Update 12/17/12)

The Drought Update of 12/17/12 states "The statewide average precipitation for January 1 to December 17 was 28.1 inches, 8.0 inches below normal. In fact, the lack of precipitation in November and early December has caused precipitation deficits to increase across the state. Figure 3 shows the distribution of precipitation deficits across the state since January. Significant portions of the state are still 12 to 20 inches below normal on precipitation. Meanwhile, areas east of St. Louis and north of Champaign are at or near normal precipitation, erasing the significant deficits accumulated earlier in the year."

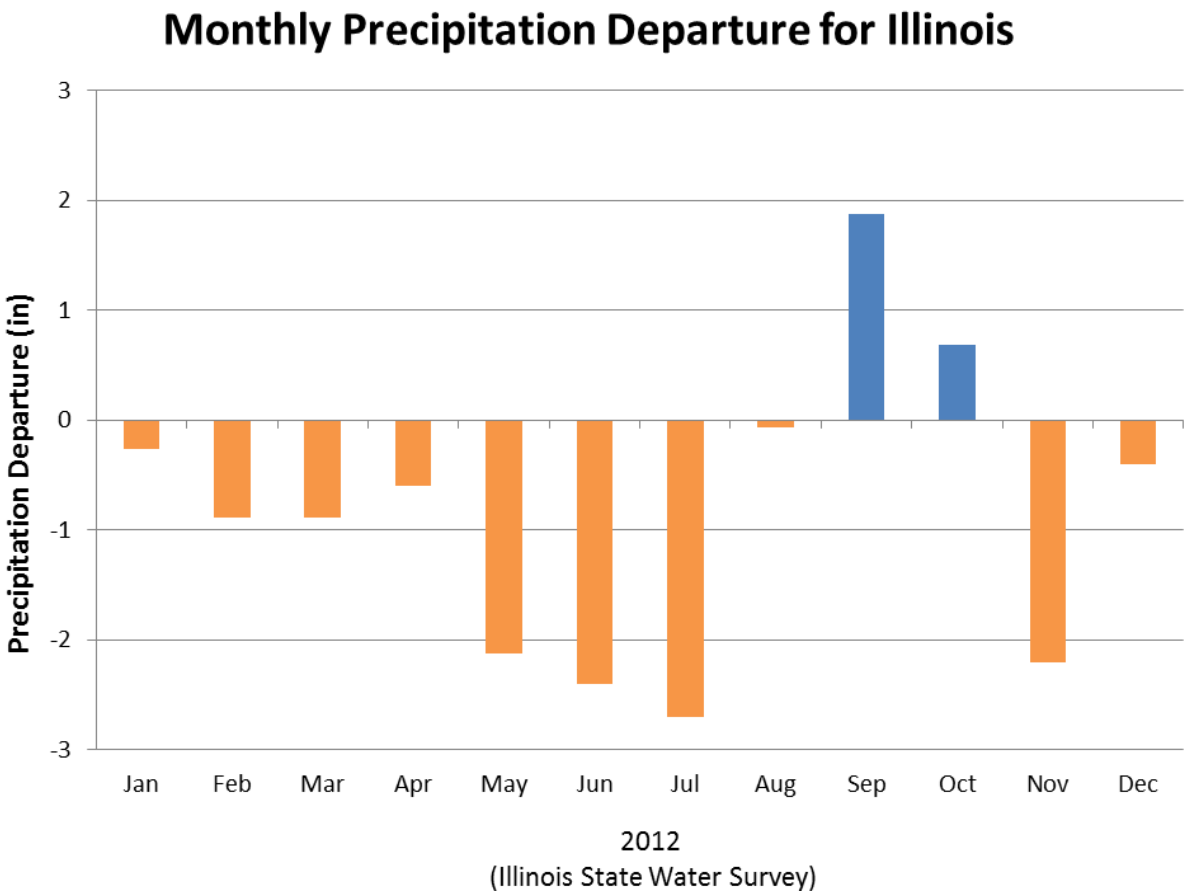


Figure 2. Statewide average precipitation for 2012 in Illinois. Orange bars indicate a deficit while blue bars indicate a surplus of precipitation for the month. (Courtesy of ISWS Drought Update)

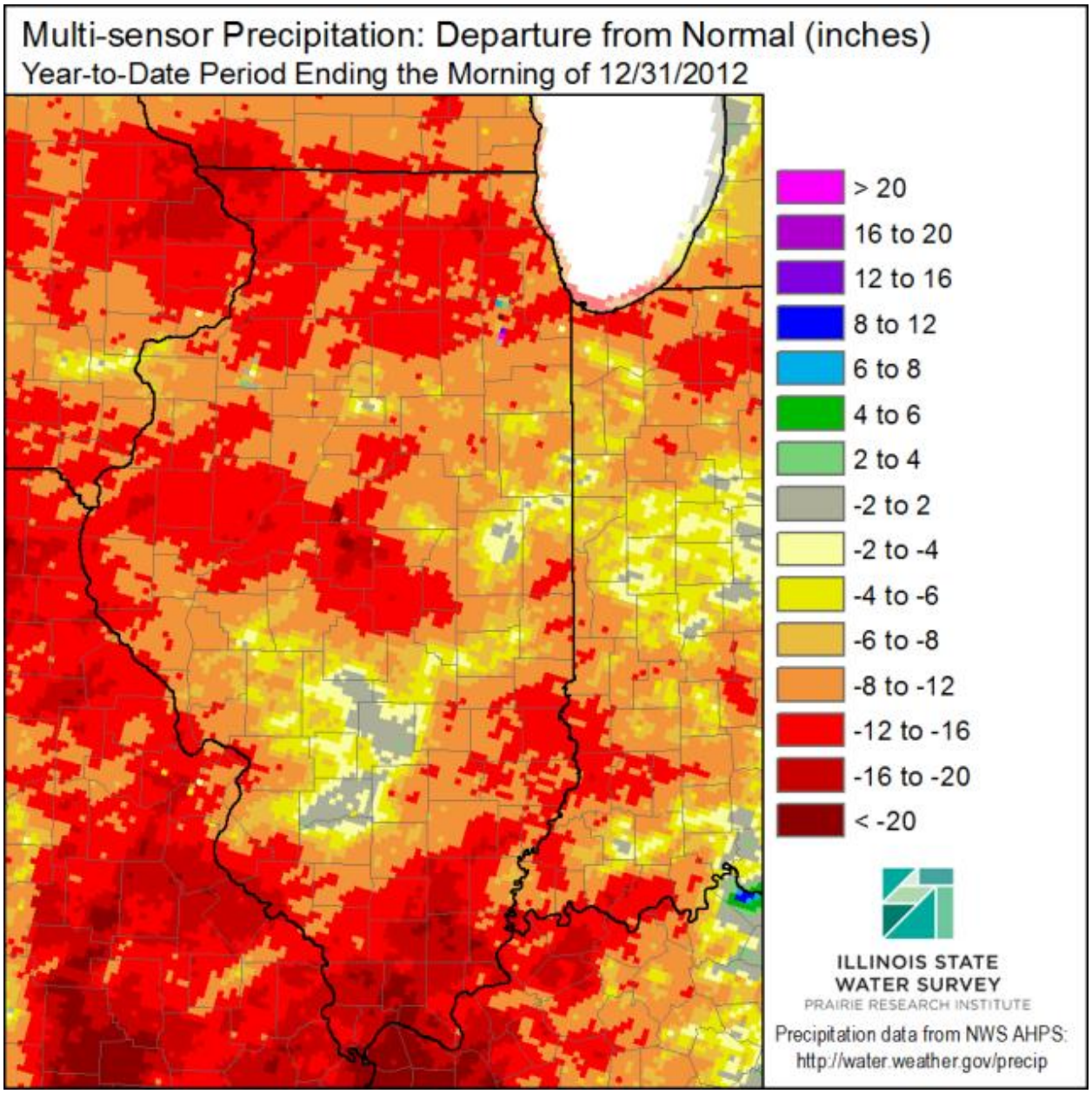


Figure 3. Precipitation Deficit for 2012

STREAMFLOW CONDITIONS

Streamflow was generally decreasing at most stations throughout the state in June, July and August. Of the 114 stations in Illinois with more than 30 years of continuous record, six stations set new record lows and 17 tied record lows For example, the long-term streamflow station on the Sangamon River at Monticello had the lowest 7-day flow (0 cfs for 16 days) in 105 years of record. Substantial precipitation in much of the state occurred starting in August, and continued through September, and early October, which resulted in a decrease in the drought severity.

SHALLOW GROUNDWATER WELLS

Using groundwater wells regularly measured by the Illinois State Water Survey and the U.S. Geological Survey some impacts of the 2012 Drought can be documented. The 2012 Drought resulted in most shallow groundwater wells showing steep declines of their levels beginning mid-winter to late spring and continuing into late summer. Beginning in August, some groundwater levels started to respond to precipitation events in east-central and southern Illinois, although not in all wells in those areas responded. Additional groundwater monitoring wells responded to the precipitation in September and October 2012, although these again were primarily in the east-central and southern Illinois. At least three wells had their deepest groundwater levels for those wells with 10 or more years of record (Champaign, Vermilion and Lee counties). Throughout the State of Illinois, very few wells have recovered to the groundwater levels measured in late December 2011.

CONFINED GROUNDWATER WELLS

There are not as many confined aquifer monitoring wells with continuous data sets throughout Illinois. These wells generally do not show direct responses to a drought, but may respond to increased pumping because of the drought. As of late December 2012, several of the wells did not recover to water levels measured at the end of 2011.

WATER QUALITY

The drought resulted in several water-quality issues throughout Illinois, including high water temperatures and low dissolved oxygen levels which stressed fish and other biota, sometimes resulting in fish kills. High water temperatures also impacted industrial and power plants with water intakes on rivers and lakes. Ongoing monitoring efforts by the Illinois Environmental Protection Agency (IEPA), the Illinois State Water Survey (ISWS), the U.S. Geological Survey (USGS), and other agencies were able to document water-quality impacts of the drought. As a result of the drought, real-time temperature monitoring was added at several power plants to USGS streamgages. In response to several reports of harmful algal blooms, a reconnaissance was conducted by the IEPA and the USGS during August through October 2012 to (1) confirm recent detections of high cyanotoxin concentrations, (2) assess the spatial extent, concentration, and characteristics of cyanobacterial blooms in Illinois, and (3) provide data to support state and local agencies in managing water resources to protect human, animal, and ecological health.

WINTER 2012 -2013

Winter 2013 brought the apparent end of the drought. The precipitation recorded in the winter 2013 was above normal for the entire state as shown in Figure 4. The National Weather Service predicted a slight chance of above normal precipitation for April and the 3 month period of April, May, and June. Topsoil throughout Illinois was rated as 81% adequate moisture by the USDA National Agricultural Statistics Service (USDA NASS) in the Illinois Weather and Crops Report of March 25, 2013. However, Northwest and West Illinois showed 3% and 10% prospectively very short topsoil moisture. Most streams in Illinois have returned to normal or above normal flows. There are a few streams in Central and Eastern Illinois which are still showed below normal stream flows. The water supply reservoirs have

recovered. A few reservoirs in Central Illinois have not made a complete recovery. The groundwater levels are recovering but have not returned to pre-drought levels. Some groundwater wells in Northwest Illinois have not shown signs of recovery. The U.S. Drought Monitor has removed Illinois from all categories of drought as of March 19, 2013. However, the very northern counties in Illinois remain abnormally dry.

The State Water Plan Task Force determined that the statewide Drought of 2012 appears to be over at the March 21, 2013 meeting. There may be small areas where dry conditions remain. Due to dry conditions in the plains states, some low water conditions along the Mississippi River were still possible.

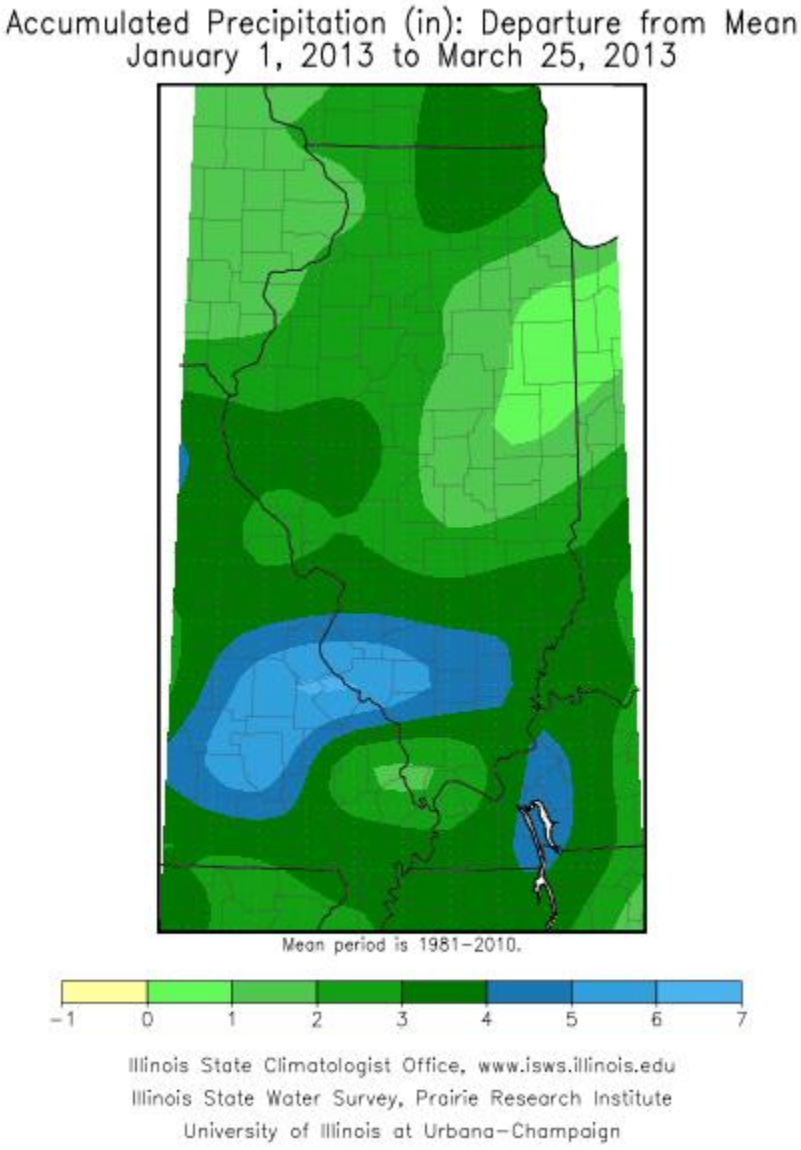


Figure 4. Precipitation Departure from Normal for Winter 2013.

AGRICULTURAL CONDITIONS

Soil moisture conditions in the spring of 2012 allowed farmers in most Illinois counties to get their crops planted with high expectations for a good yield. 12,800,000 acres of corn and 9,050,000 acres of soybeans were planted across Illinois at a time when crop prices were high. By June 1, crop conditions across Illinois were reported to be mostly good, but drier conditions were already becoming a distinct pattern.

By July, crops throughout Illinois were in various levels of stress due to a shortage of rainfall and many consecutive days of above normal temperatures. All regions of Illinois sustained major damages to crops; the most severe was in the southern third of the State. According to the USDA National Agricultural Statistics Service, statewide 2012 corn and soybean yields were 105 bushels per acre and 43 bushels per acre respectively, down when compared to the 2011 yields of 157 bushels per acre for corn and 47.5 bushels per acre for soybeans.

Livestock producers were also negatively impacted by the severe drought conditions. Pastures dried up quickly and producers resorted to feeding stored hay early. Hay growth was significantly curtailed, greatly reducing the hay crop. Some livestock producers experienced a shortage of well water. These factors led to some producers liquidating a portion of their entire livestock herd.

The pork industry also encountered higher feed prices due to the 2012 drought. In response, Governor Quinn directed that the next major State purchase of meat include a 30% increase in the purchase of pork and that it be procured from Illinois companies.

AGRICULTURAL ISSUES

1. Yields for corn, soybeans and hay were significantly reduced – These lower yields resulted in reduced commodity exports and increased feed prices for livestock producers.
2. Aflatoxin –The presence of higher than normal levels of aflatoxin in this year's corn crop prompted the Illinois Department of Agriculture to request a blending waiver agreement from the US Food and Drug Administration (FDA). This is the first time the Department has sought and received authority to oversee the blending of corn that contains aflatoxin. This has allowed the grain industry to supply livestock producers with a safe supply of corn to feed their livestock according to FDA aflatoxin guidelines. The blending waiver agreement expires June 1, 2013. An application was made to FDA to extend the blending waiver to September 1, 2013.
3. Some livestock producers experienced a shortage of well water. These producers were faced with hauling water on a regular basis throughout the summer and fall to sustain their herds. Some deepened existing wells or dug new wells.
4. Irrigation water usage - Agricultural irrigation increased in 2012 over previous years and that may foster the future expansion of irrigation systems in Illinois.
5. Movement of agricultural products via commercial navigation system – Movement of corn, soybeans, fertilizers, and other agricultural commodities is very dependent upon the inland waterway systems to successfully arrive at the designated destination. Middle Mississippi River (St. Louis to Cairo) river stages in December were dropping to levels of great concern to the agricultural and navigation industries.

6. The economic conditions of farmers going into 2013 are expected to be better for those who had purchased federal crop insurance for 2012 as compared to those without that coverage. Those who experienced major crop damage without the protection of crop insurance may be experiencing financial shortfalls or hardships.
7. Poor crop growth resulted in a limited uptake of nutrients (e.g., Nitrogen) in some areas during the 2012 drought. Agricultural producers will factor in the presence of the remaining nutrients into their plans for the 2013 crop season to prevent nutrient runoff into water bodies.

AGRICULTURAL RECOMMENDATIONS

1. Federal/State Coordination-Information Flow

Federal agencies with drought related responsibilities should employ better practices to achieve a more timely release of information (e.g., disaster designation status) to their state counterparts.

2. Rural Water Districts

Continued federal appropriations to USDA Rural Development are needed regarding the construction of rural water mains to provide a safe, reliable supply of water to rural residents.

3. Planning for Future Droughts

Municipalities should be more proactive with public water supply planning to be better positioned to respond to future severe drought events.

4. Water Law/Policy

The Drought of 2012 illustrates the need in Illinois for all water related laws and policies to be reexamined for possible improvement. Water ownership and water rights issues are coming to the forefront.

5. Aflatoxin

To prevent a lack of consistent testing/certification for aflatoxin levels in corn, a more unified testing and certification process is needed.

6. Nomenclature

Improvements in nomenclature are needed to help producers gain a clearer understanding of disaster assistance related programs. For example, "Early Release of CRP for Haying and Grazing" and "Emergency Release of CRP for Haying and Grazing" caused some confusion in the agricultural community with the 2012 drought.

7. US Farm Bill

Work needs to continue on the Farm Bill to ensure that disaster assistance programs are reauthorized and funded.

WATER SUPPLIES

Most public water supply systems in Illinois have adequate supplies to meet the demands of public usage. Studies have demonstrated that several systems are "at risk" of not being able to meet the water supply demands of their users for a minimum of 18 months. (Data for Assessing Drought Vulnerability of

Illinois Community Surface Water Systems, Hecht and Knapp, 2008) In mid-August – prior to the drought relief brought by the remnants of Hurricane Isaac – the water levels of most Illinois reservoirs were declining rapidly similar to that experienced by some of the worst historical droughts Drought conditions would have needed to continue unabated into 2013 before most of Illinois' water supply reservoirs would have had serious concerns about depleted water storage, which normally occur during the second year of an extended drought episode.

The "at risk" systems which experienced the worst water supply deficits include La Harpe, Decatur, and Vienna Correctional Center.

1. La Harpe: La Harpe supplies water to 1400 people. The water is diverted from Crooked Creek into a reservoir. A ground water supply augments the surface supply. The October 17, 2012 report showed the reservoir was 58" below normal pool on. La Harpe was utilizing 60% groundwater and 40% lake water.

2. Decatur: Drinking water for the City of Decatur, Illinois (Facility No. 1150150) is supplied by the Decatur community water supply (CWS). Lake Decatur and ten groundwater wells, serve as the source of this drinking water. Combined pumpage from the two surface water intakes (IEPA #45004 and #00122) and the wells exceeds 37.5 million gallons per day, providing water to approximately 34,000 service connections and an estimated population of 87,000 people. Connected facilities that purchase all their water from Decatur include the Village of Mt. Zion (1150350). Local industry in Decatur accounts for a large portion of the water usage.

3. Vienna/Shawnee Correctional Centers: Vienna/Shawnee Correction Center (VSCC) reservoir supplies water to 4000 people. VSCC experienced record low water levels in their reservoir. Snowfall in January 2013 started the recovery of their reservoir. By March 20, 2013 the reservoir was full.

PUBLIC WATER SUPPLY ISSUES

1. Decatur problems reoccur during each drought
2. Some communities have water supplies which are not adequate for 18 months

PUBLIC WATER SUPPLY RECOMMENDATIONS

1. Work with Department of Corrections to find source for reservoir augmentation at VSCC.
2. IEPA has requested Decatur to provide weekly status reports on their efforts to obtain additional sources of drinking water.
3. Additional state-wide water supply planning should be conducted to identify the supply and demand on surface and groundwater supplies.

INDUSTRIAL WATER USAGE

The coal industry depends on a constant water supply to suppress coal dust as coal is mined. These coal mine operations draw water from numerous sources, including local impoundments, rivers and streams, and federal reservoir allocations.

A coal mine in Washington County experienced shortages of available water in August and requested access to water from state park lakes. The mine was able to obtain water to sustain their operations through their own initiatives.

Power plants depend on water supplies to provide cooling water which is essential to the generation of electricity. Closed system plants are those that utilize cooling towers or maintain cooling ponds. Cooling pond plants maintain an adequate water supply to sustain operations for a limited time period. Cooling tower plants still need a small supply of make-up water. Open cycle plants require a continuous supply of cooling water from adjacent waterways, most of which is immediately returned to the water source. Low flow conditions during 2012 resulted in the need to limit make-up flow and/or to decrease power generation at many power generating facilities in order to stay in regulatory compliance and maintain safe unit operation.

Nuclear power plants such as Braidwood Station that withdraws water from the Kankakee River reached its low flow threshold specified in their DNR Public Water withdrawal permit and withdrawal of water was temporarily suspended. The Kendall 1200-MW combined cycle combustion gas turbine station draws water from the Illinois River and its withdrawal of that water was severely restricted when the Illinois and Kankakee river flows reached low flow limits set by permit. Three open-cycle fossil fueled plants on the Chicago Sanitary and Ship Canal/Lower Des Plaines River and one on the Mississippi River were required to reduce power production during critical demand periods in response to extremely low river flow conditions, which were further exacerbated by frequent level manipulations by upstream entities.

Low river flows coupled with prolonged periods of above average air and water temperatures also challenged power plants to meet their National Pollutant Discharge Elimination System permits (NPDES) discharge temperature limits. Short-term site-specific thermal variances were granted by the Illinois Environmental Protection Agency, based on the showing of sufficient need by individual entities.

INDUSTRIAL WATER USAGE ISSUES

1. Public Water stream regulation of water withdrawals
2. Nuclear power plant dependence on limited water supply
3. Fossil-fueled powered power plants dependence on limited water supplies
4. Coal mining industry dependent on limited water supplies

INDUSTRIAL WATER USE RECOMMENDATIONS

1. Work with industries to identify adequate water supplies required to sustain existing and projected production levels
2. Work with industries to develop recommended water use restrictions when water supplies are inadequate to sustain existing production
3. Develop a mechanism to obtain expedient, long-term emergency regulatory relief for IEPA and IDNR restrictions upon demonstration of no adverse impacts.

PRIVATE WATER USAGE

Many agricultural producers were large water users in 2012. Water was used for crop irrigation and for livestock production. Sources of water included surface water streams and groundwater wells.

Irrigation usage on the Vermilion River upstream of Streator depleted the stream flow at Streator such that no water was reported over the Streator dam. Streator draws water from the Vermilion River above the dam for replenishment of their water supply lake. With no water in the stream, alternate water sources were sought. Irrigation utilizing groundwater reduced the groundwater availability for private users. Several counties received complaints about the irrigations wells depleting private wells.

Numerous private wells in shallow aquifers ran dry. Supplemental water sources were utilized. Supplemental water demand significantly increased demand on municipal systems. Some municipalities eliminated bulk water sales as their supplies dwindled.

PRIVATE WATER USAGE ISSUES

1. Competition for groundwater supplies
2. Inadequate supplemental sources

PRIVATE WATER USE RECOMMENDATIONS

1. Illinois should conduct a state-wide assessment of all water uses, including private water uses, and assess the supply and demand and the challenges of meeting that demand

NATURAL RESOURCE IMPACTS

As flows in the rivers and streams of Illinois decreased during the drought, water temperatures rose and dissolved oxygen levels fell. These river and stream conditions contributed to a significant number of fish kills which occurred state-wide. Additionally, several mussel beds dried up, leaving the mussels exposed to high temperatures and predators.

The hazards of wildfire existed in natural areas as dry weather persisted. These natural areas are used frequently by campers and hikers. In many areas of southern Illinois, the dry conditions led to burn bans which were implemented by most counties.

NATURAL RESOURCE ISSUES:

1. Fish kills. Mussel loss
2. Low DO, high water temperatures
3. Request from industry for water from State Parks

NATURAL RESOURCE RECOMMENDATIONS:

1. Monitor the variety and abundance of fish, mussels, and other aquatic life in the rivers and lakes that have experienced drought impacts.
2. Develop resource management plans to address the impacts of drought.

NAVIGATION CONDITIONS

National drought conditions grew progressively worse across states along the Mississippi River and Missouri River. With reduced natural runoff from the Missouri River Basin, and with flows dropping along the Mississippi River, the Mississippi River from St. Louis, Missouri to Cairo, Illinois began to show

signs of navigational stress. Scheduled reductions in Missouri River reservoir releases occurred on December 1 in accordance with the Missouri River Basin Master Manual. On December 1, 2012 the Corps reduced reservoir releases from 37,000 cfs to 12,000 cfs. Mississippi River stages were predicted to fall to -5.5 feet at the St. Louis gage by December 15 which would significantly limit navigation near Grand Tower and Thebes. A request was made to the Assistant Secretary of the Army to "take all reasonable measures to sustain navigation" on the Middle Mississippi River. The lowest stage at the Mississippi River St. Louis gage was -4.52 feet on January 2, 2013.

Utilization of barges to move commodities is very efficient. To replace one barge, the commodities would fill 16 jumbo hopper rail cars or 70 trucks. It would strain the transportation system to move these commodities utilizing a different mode. During the low stages on the Mississippi River, barges are not being loaded to full capacity (11' -12' draft). When loading the barges, operators must be cognizant of future river levels as the travel time for a barge down the river takes days.

Navigation was threatened in the 180 miles stretch of the Mississippi River from St. Louis to Cairo. In order to maintain navigation on the Mississippi River, the Corps of Engineers begin dredging and rock removal near Thebes in December 2012. The Corps of Engineers began releasing water from Carlisle Lake on December 15, 2012 to supplement flows on the Mississippi River. The Corps does not have authority to release water from the Missouri River reservoirs for navigation on the Mississippi River.

NAVIGATION ISSUES

1. Navigation on the Mississippi River is dependent on flows from states in the Upper Mississippi River and the Missouri River. When drought affects the Midwest and western states, navigation can be threatened.
2. Many Illinois exports and imports are dependent upon navigation. Ensuring a reliable navigation system during drought is not always possible.

NAVIGATION RECOMMENDATIONS

1. Meet with navigation industry to develop plan of action for drought conditions.
2. Meet with all transportation industries to develop plan of action for drought conditions.

ECONOMICS OF THE DROUGHT

Numerous economic consequences of the Drought of 2012 have been reported. These consequences include: reduced crop production, reduced livestock operations, coal industry reduction in mining, power industry reduction in power generation, water use restrictions in communities which reduced commercial business opportunities, dependence on federal and state loan programs to ensure economic vitality of Illinois businesses, and lost opportunities. The Department of Commerce and Economic Opportunity is working to obtain data to document these economic consequences. This work is on-going.

The National Drought Mitigation Center reported ethanol production fell in 2012. Numerous ethanol plants closed throughout the summer and fall. EPA refused to waive the mandated ethanol production.

Corn was imported into Illinois from North Dakota for both ethanol production and livestock feed. Ethanol producers lost $0.36 per gallon in 2012 after making $0.24 per gallon in 2011.

ECONOMIC IMPACTS

1. Financial loss in agricultural community
2. Government program costs
3. Transportation of products
4. Reduction in Illinois exports

ECONOMIC RECOMMENDATIONS

1. Development of a comprehensive plan, by appropriate governmental agencies, to assist those famers whose acreage is currently uninsured to acquire crop insurance before the next major drought event occurs.

2. It may be of value for appropriate governmental agencies to assess the current situation related to the overall efficiency of all major intermodal operations located in close proximity to the Mississippi River. This evaluation would be conducted with an eye on the likelihood of future drought events and the need to mobilize alternative methods of transportation as quickly, efficiently, and cost-effectively as possible.

3. Improve awareness of programs designed to assist with drought recovery.

TECHNICAL ISSUES

Regulation of water usage based at low flow conditions has met with opposition from power companies as it impacts their ability to generate electricity. Some biologists believe that the $Q_{7,10}$ flow rate provides a good indicator of when instream aquatic resources will be at stress levels, and acknowledge that there may be other important metrics to consider, including temperature and dissolved oxygen. A more robust metric of reduced withdrawal and for no withdrawals may be possible to develop.

Temperature restrictions on water releases to Illinois rivers and streams are managed by the IEPA. When water temperatures in the rivers and streams rise due to high air temperatures, meeting the temperature restriction becomes challenging for compliance. IEPA has a process for issuing provisional variances, based on adequate showing of need by individual entities.

TECHNICAL ISSUES

1. Use of $Q_{7,10}$ flow for initial regulation of water withdrawals
2. Variances during low flow conditions

TECHNICAL RECOMMENDATIONS

1. Convene meeting between regulators and industry to review opportunities for revising low flow water use restriction and available thermal relief mechanisms.

POLICY ISSUES

The availability of water for multiple uses during periods of low flows and limited water supply has few administrative remedies. When riparian owners utilize available water, other users may find themselves with insufficient water supply to operate. Comprehensive studies and management standards for water supply, both surface water and groundwater, are needed to help with future consequences of drought.

POLICY ISSUES

1. Limited management authority for governmental units to respond to drought
    a. No regulation of limited groundwater resources
    b. No regulation of riparian water usage
    c. Few identified alternative water supplies for municipalities
2. Uncertainty about government programs available to assist

POLICY RECOMMENDATIONS

1. Develop statewide water use management strategy for drought periods
2. Review $Q_{7,10}$ flow rates and associated parameters for low flow regulated usage
3. Develop statewide water supply planning regions and perform a statewide water supply and demand assessment
4. Review existing governmental authorities to respond to drought emergencies and develop new authorities where needed

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ILLINOIS STATE WATER SURVEY
PRAIRIE RESEARCH INSTITUTE

Response to the 2012 Drought

Through much of its history, the **Illinois State Water Survey (ISWS)**, a Division of the Prairie Research Institute at the University of Illinois, has been involved in climate and water supply issues that are central to the analysis and understanding of drought and its impacts. Throughout the progression of the 2012 drought, ISWS scientists, including the State Climatologist, were monitoring the climatic and hydrologic conditions of the State. An initial report on dry conditions was issued by the ISWS in April 2012, and a drought advisory was declared in May 2012. The ISWS presentation to the State Water Plan Task Force on June 19 was a key influence in that group's recommendation to activate the Drought Response Task Force. Over the course of the drought the ISWS has continued to provide periodic assessments of the climatic and hydrologic conditions during the drought, the most recent of which is attached.

Like the drought itself, many of its impacts are slow in developing. To anticipate the extent of impacts and identify their potential threats, it is often necessary to understand similar impacts of past droughts, which is where the ISWS's experience is most valuable. For example, it is not sufficient by itself to know that a water supply lake is 2 feet below normal; but instead is important to understand if such below-normal behavior has led to problems in similar drought episodes. As part of its standard activities, the WARM (Water and Atmospheric Monitoring) program at the ISWS has collected and maintained long-term records on water supply lake levels, groundwater levels, and soil moisture that are essential to understanding the implications of ongoing drought conditions and providing a prognosis or perspective on the current drought's progression.

As the primary agency in Illinois for research and information on surface water, groundwater, and the atmosphere, the ISWS has continued to collect data, analyze information, and provide advice to State, Federal and regional agencies and also to private citizens during the drought period. Much of the special data collection efforts during this drought were centered on Decatur's water supply situation; with data being collected and analyzed by ISWS scientists to identify: 1) stream channel losses in the Sangamon River upstream of Lake Decatur, 2) effects of Decatur's well field on regional water levels in the Mahomet Aquifer, and 3) interactions between groundwater and the Sangamon River, with an ultimate purpose of quantifying how much of the water pumped from the aquifer actually reaches Lake Decatur and supplements the City's supply.

Water budget models of water supply lakes, developed previously as part of the ISWS programmatic studies, have also been used to compare the impacts of the current drought with that of previous historical droughts. These comparisons and projections based on historical drought sequences have been used to identify community systems that potentially would be vulnerable to water supply shortages if drought conditions were to continue.

Finally, following past drought episodes the ISWS has produced comprehensive reports documenting those droughts and associated impacts, as it will for the current drought once its recovery is nearly

complete. These drought reports are essential for maintaining the ISWS's ability to study and understand Illinois drought characteristics so that we can address future drought episodes. The ISWS also maintains a drought web site on current drought information, drought planning and preparation, and an archive on previous Illinois droughts. Go to: http://www.isws.illinois.edu/hilites/drought/

Additional activities of the ISWS and the State Climatologist during the drought include:

Analyze data on current water availability at water supply systems throughout Illinois and work with IEPA to identify which of these systems are most likely to experience water supply concerns at various stages throughout the drought.

Prepare/update hydrologic models of selected community water supply systems that are able to quantify the relationship between observed water levels, water use and its conservation, and the ongoing hydrologic and climatic forces. Use these models to: 1) prepare prognoses of expected water availability and vulnerability if drought conditions are to persist, and 2) simulate conditions with the water supply if the climatic and hydrologic sequences from past extreme droughts were assumed to recur today, thus juxtaposing the historical droughts with the existing community water supply systems.

Prepare written reports and briefings for the Illinois Drought Response Task Force (DRTF). These are posted on the Water Survey web site. Prepare informational materials for the public, agencies, and media that describe the vulnerability of water supply systems to drought with specific regard to the ongoing water supply conditions, common misconceptions concerning drought, and comparisons to some of the State's worst hydrologic droughts of the past.

Help with providing documentation for disaster declarations. This ranges from providing statewide precipitation numbers for the Governor's drought press release to helping farmers with monthly rainfall amounts and the normal monthly values for their area.

Regularly talk to the media and give presentations to groups interested in drought. The State Climatologist typically deals with media requests on a daily basis. Presentations have been made to many groups and meeting, including farm and agriculture groups, the Mahomet Aquifer Consortium and other regional water supply planning groups, the American Water Works Association, Illinois Environmental Protection Agency, and other related agencies and associations.

Participate in regional and national meetings and webinars as either a panelist or presenter.

Provide feedback to the authors of the US Drought Monitor.

ILLINOIS STATE WATER SURVEY
PRAIRIE RESEARCH INSTITUTE

DROUGHT UPDATE

www.isws.illinois.edu/hilites/drought

January 25, 2013

Summary

Precipitation since the December 17, 2012, Drought Update has been slightly below average in parts of central and northern Illinois and above average in southern Illinois. Soil moisture, streamflows, and lake levels, especially in southern Illinois, have shown continued improvement since December. However, more precipitation is needed for improvement in the deeper soil levels, some lake levels, and shallow groundwater, particularly in western and northern Illinois where there has been less recovery in the precipitation deficit. As there has been with most historical drought episodes, there has been considerable regional and local variability in precipitation amounts and thus in both the drought's impact and its current state of recovery. For example, the La Harpe Reservoir in western Illinois, is one of those pockets where water supply concerns have not yet been allayed. Even with what could be considered, by most standards, a full recovery in hydrologic conditions later this spring, there could still be lingering water supply impacts in the summer 2013 in those areas using or influenced by shallow groundwater.

Precipitation and Temperature

The statewide precipitation was 3.1 inches, 116 percent of the long-term average for the period from December 17, 2012, to January 24, 2013. Precipitation totals ranged from 2 to 3 inches in northern Illinois to 2 to 5 in central Illinois to 3 to 7 inches in southern Illinois (Figure 1). In general, amounts were close to average in northern Illinois, slightly below average across central Illinois, and 1 to 2 inches above average in southern Illinois (Figure 2).

Figure 3 shows the 2012 statewide monthly precipitation departure from the 1981-2010 average. Generally dry conditions prevailed from January to April with slowly growing deficits by the end of April. However, the core months of the 2012 drought were May, June, and July, when deficits grew substantially. August was close to normal while September and October were above normal due to rains from the remains of Hurricane Isaac over Labor Day weekend and other weather systems. Dry conditions prevailed in November, with slightly drier than average precipitation for December.

The statewide average precipitation for the year 2012 was 30.4 inches, 9.6 inches below the 1981-2010 average. Figure 4 shows the distribution of precipitation deficits across the state for 2012. The amounts

are estimated from radar data, and calibrated with available rain gauge data. The result is a higher resolution precipitation product. Portions of southern, western, and northern Illinois were still 12 to 16 inches below average. Meanwhile, areas east of St. Louis and north of Champaign are at or near normal precipitation, erasing the significant deficits accumulated earlier in the year. Precipitation in January 2013 has helped ease the deficits in the southern third of the state.

According to the U.S. Drought Monitor for January 22, 2013, Illinois still has 30 percent of the state rated abnormally dry and another 36 percent in either moderate (D1) to severe drought (D2) – the two lowest categories of drought.

One area of interest this winter has been the widely noted lack of snow across the northern two-thirds of the state. While southern Illinois experienced a significant winter storm right after Christmas, the rest of the state has seen little snow. In fact, snowfall in the northern two-thirds of the state ranged from 1 to 12 inches as of January 25, 2013, and is 10 to 50 percent of average for the winter. For example, as of January 25, Chicago had reported only 2.8 inches of snow for the snowfall season. While the lack of snow and lack of snow cover are important issues, the immediate impact on the drought are not evident because of a few rain events since December 17 have helped to make up the difference in terms of actual water content.

Soil Moisture

The ISWS maintains a soil moisture network of 19 sites in Illinois. However, the network is not operated in winter months because of the potential for frozen soils to cause erroneous readings.

Agricultural Conditions

As of December 31, 2012, the USDA reported that the statewide topsoil moisture was rated at 2 percent “very short” and 28 percent “short”. Subsoil moisture was rated as 20 percent “very short” and 47 percent “short”. In areas without frozen soils, it is likely improvements in soil moisture have occurred since the December 31 report, especially in southern Illinois. More details can be found in the Illinois Weather and Crops report published by the USDA.

Water Supply Reservoirs

At this stage in the recovery from the 2012 drought, there is only one community water supply system that we consider to still be threatened with potential storages, that being the La Harpe system in Hancock County. The recovery at a number of other reservoirs is still being watched.

Late winter and spring are seasons when reservoir levels have always rebounded when they are low, even during the worst droughts and driest such seasons on record. Drought recovery is typically not considered complete for reservoirs until they have returned to full pool; however, given current conditions and seasonal tendencies, the ISWS considers that low reservoirs in the State are likely to nearly if not fully replenish in the next 3-4 months prior to the onset of summer when reservoir levels may once again be drawn down. Because of this expected recovery, we no longer consider current low reservoirs levels, where they exist, to pose a threat to water supply. La Harpe Reservoir is the primary exception, to a great extent because that portion of western Illinois is one of the regions of the State that have seen the least precipitation and overall recovery over the past few months.

Figures 5-7 show the traces in water levels at three water supply lakes that have been of some concern over the course of the drought. Many reservoirs have already completely refilled and, for them, the drought is effectively over. Over the past month the Lake Decatur reservoir has essentially been replenished and has periodically been releasing water to lower the lake level closer to its normal winter pool level (see Figure 5). Because of expected water excesses in winter/spring, the ISWS considered the Decatur system to effectively be recovered by November; however, we also acknowledge that the groundwater resource that Decatur uses for supplemental supply may likely not fully recover this spring and thus could enter next summer in a partially-depleted condition.

The water level for the Vienna/Correctional Center reservoir in Johnson County has rebounded substantially during January (Figure 6). Although the lake is still well below its full pool level (at 380 feet), we expect that there will be considerable additional recovery over the next few months that will mostly replenish the lake. This expectation is based on the fact that this part of Southern Illinois receives considerably more rainfall during the winter and early spring that the remainder of Illinois, even during the driest years. We also note that the January 2013 lake level is considerably higher than the expected January level during a severe drought similar to that of the 1953-54 drought (Figure 6).

Lake Springfield is still over 3 feet below normal, but has been trending upward over the past month (Figure 7). Figure 7 also shows that we would, in contrast, expect continued reduction in the lake level during a more severe drought period. With the lake trending up at this time of the year, we project continued recovery over the next few months and a high likelihood that the lake will refill later by this spring. There are a handful of other water supply reservoirs in the Springfield region, most in Macoupin County, that are experiencing similar conditions, and we expect that most or all of these reservoirs will replenish by the spring.

Shallow Groundwater Supplies

Groundwater levels are still declining in northern Illinois, but have experienced moderate improvement in much of central and southern Illinois. As stated in previous updates, shallow groundwater is usually the last hydrologic component to see recovery following drought conditions. Even if soil moisture, reservoirs, and stream levels fully recover in upcoming months, and the drought is declared to be no more, there may still be lingering effects from groundwater levels that have not fully returned to pre-drought levels. This may not be much of a concern unless 2013 is also a dry year; in which case the number of wells having problems could be greater than in 2012. Lingering problems with low groundwater levels could also affect streams and a handful of surface water supplies. Many streams in northwestern Illinois and other locations scattered throughout the State receive a good share of their flow from groundwater. A study of historical flow records indicates that many such streams experience their lowest flows during the year following a drought – when groundwater levels also often reach their minimum. Although drought conditions are recovering in Illinois and there has been moderate improvement in groundwater levels in central and southern Illinois. But the extent of the overall recovery is weakest in western and northern Illinois, in which regions groundwater levels are still declining. At this point, we believe that the potential exists for limited groundwater recharge this spring for these portions of the State and thus even greater problems in 2013 for some water supplies that depend on shallow groundwater.

Streamflow levels

Over the past month, the regions of Illinois that are still experiencing below-normal streamflow levels for this time of year are dwindling in size (Figure 8). Specifically, streamflow levels are not as consistently low as would be expected during a persisting severe drought, another sign of the gradual hydrological recovery from the drought which bolsters the expectation of full recovery in surface water levels by the end of the spring. But as noted in the paragraphs above and in previous updates, for certain regions, such as western and northern Illinois, the degree of drought recovery has been less and there is a concern that baseflow levels in streams may decline to even lower levels in 2013 if: 1) the upcoming spring and summer are also dry and 2) the corresponding recharge of shallow groundwater is limited.

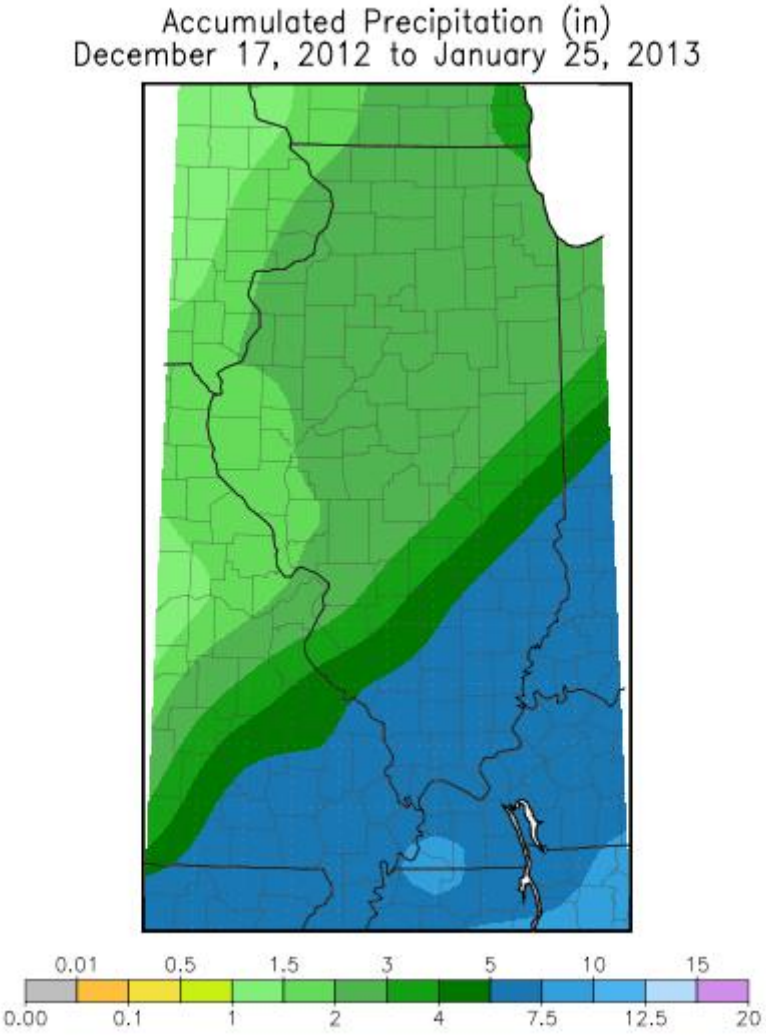


Figure 1. Shown are the accumulated precipitation amounts from December 17, 2012, to January 25, 2013. Map prepared by the ISWS using data from the Midwestern Regional Climate Center.

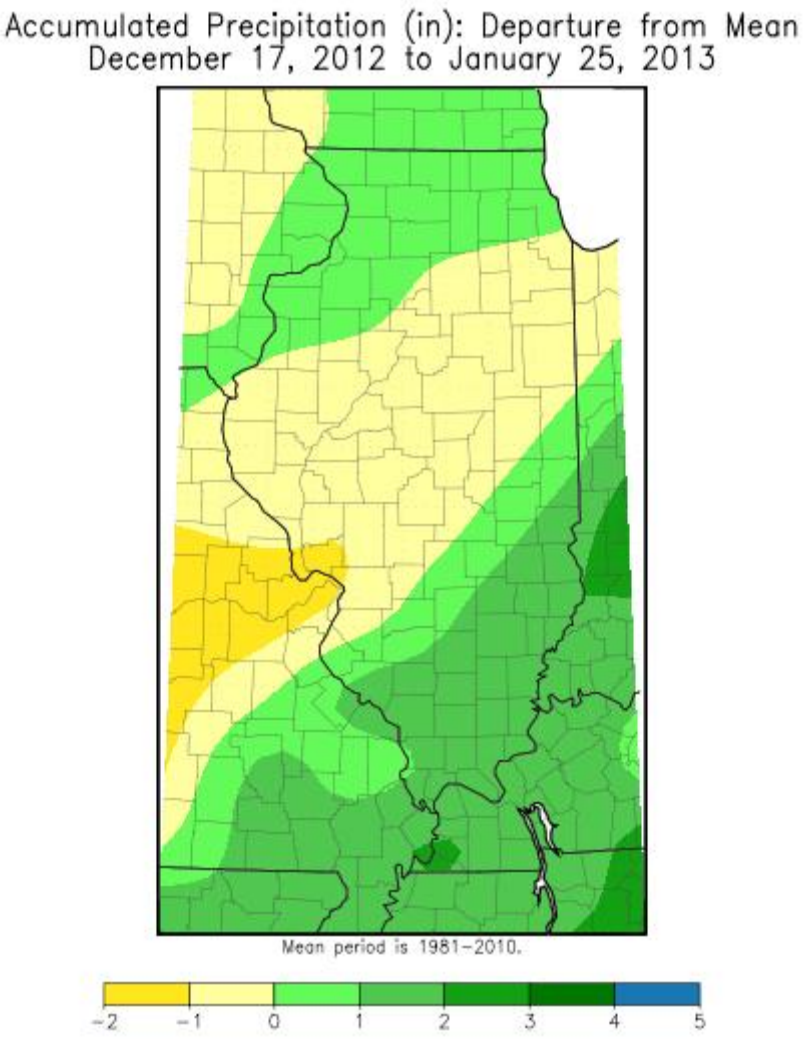


Figure 2. Shown are the accumulated precipitation departures from average from December 17, 2012, to January 25, 2013. Map prepared by the ISWS using data from the Midwestern Regional Climate Center.

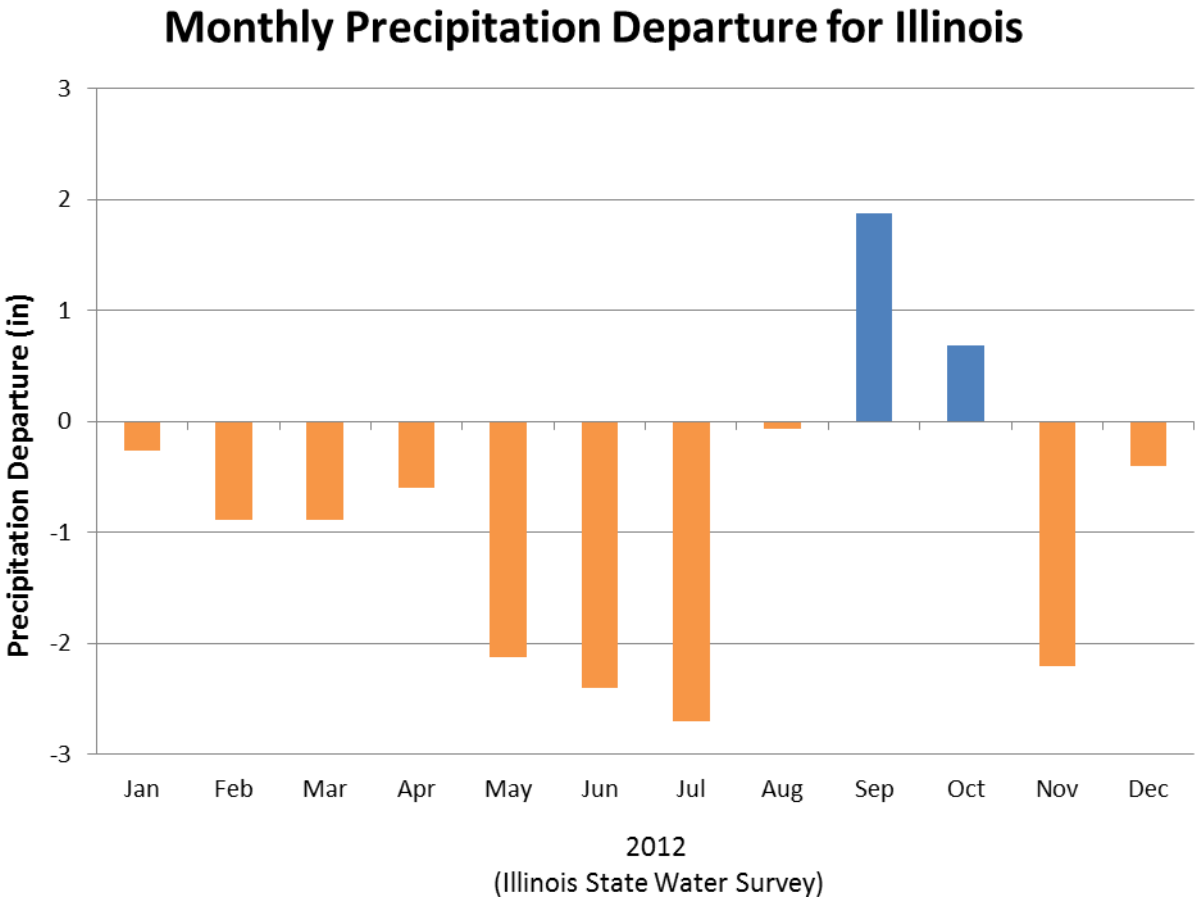


Figure 3. Statewide average precipitation departures from average for 2012 in Illinois. Orange bars indicate a deficit while blue bars indicate a surplus of precipitation for the month.

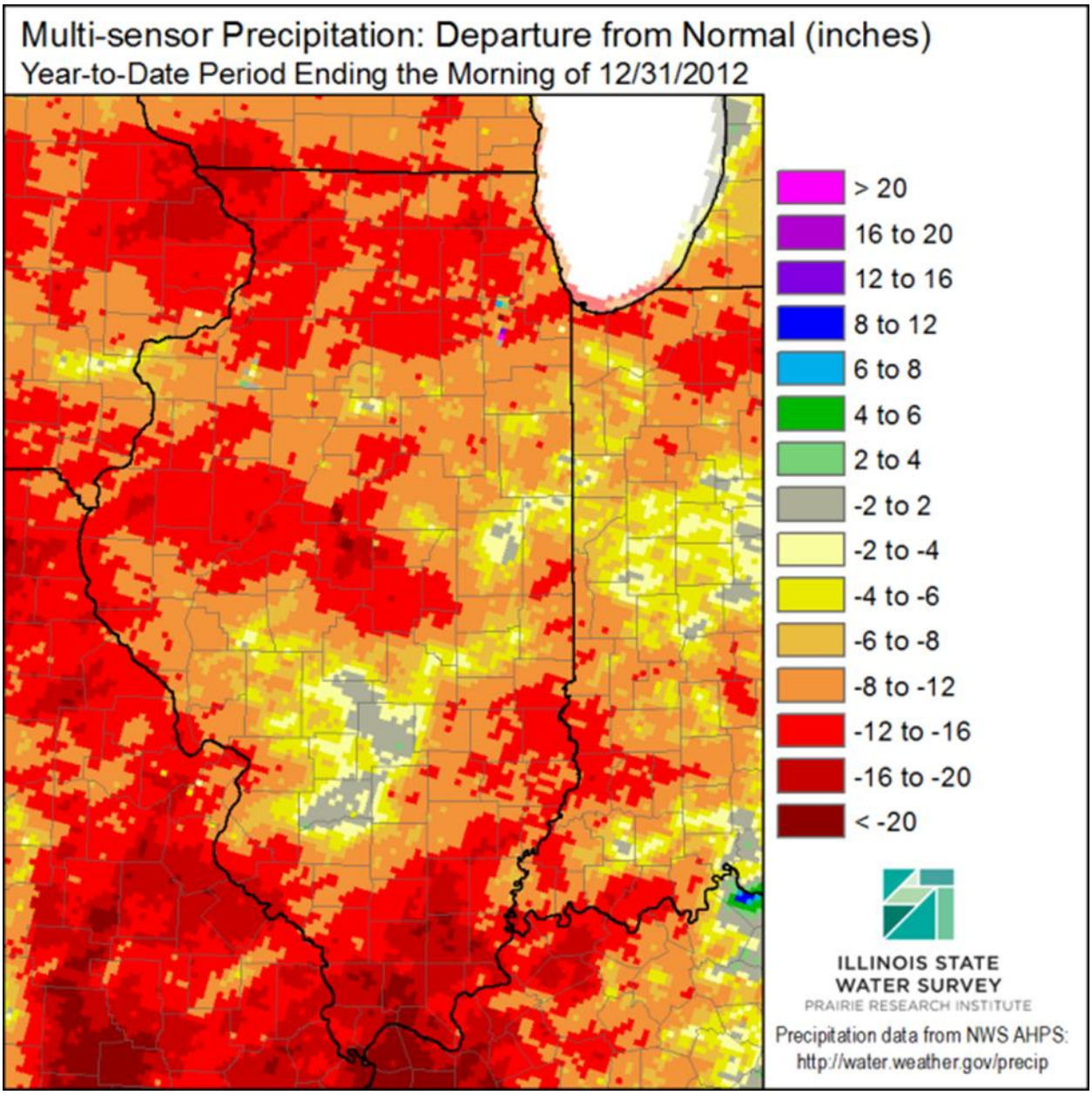


Figure 4. Shown are the January 1 to December 31, 2012, rainfall departures from normal, based on the radar/raingauge data from the Advanced Hydrologic Prediction Service (AHPS) of the NWS and prepared by the ISWS.

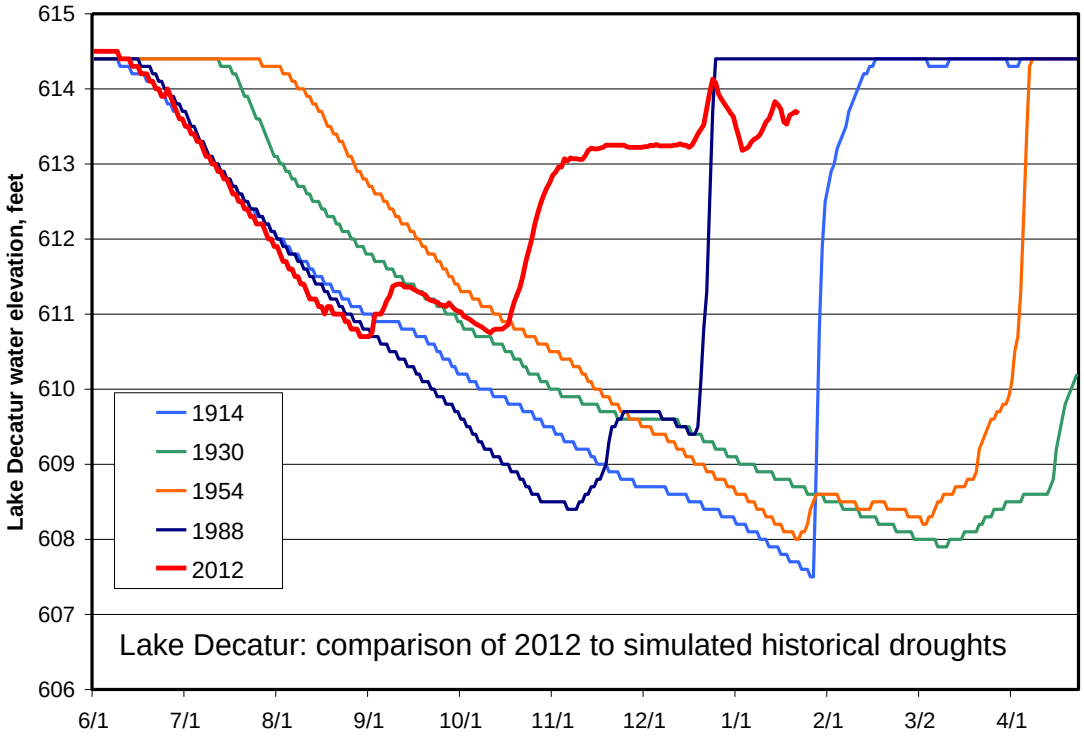


Figure 5. Water level in Lake Decatur in 2012 compared to simulated levels illustrating how Decatur's current water system would react if faced with conditions similar to major historical droughts.

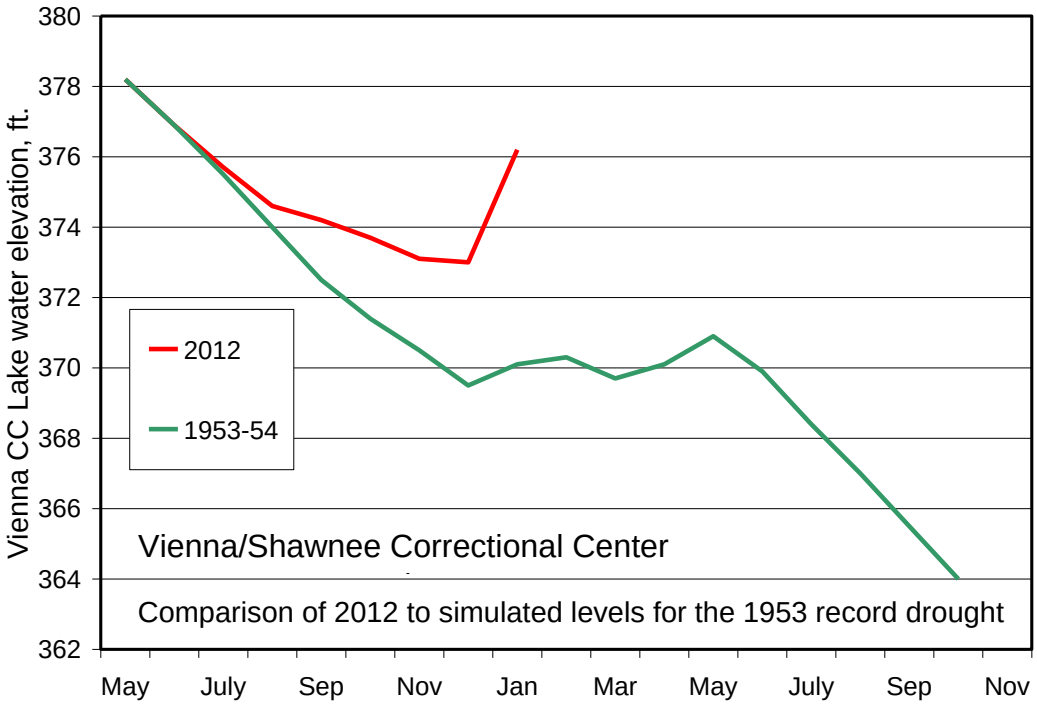


Figure 6. Water level in the Vienna Correctional Center Lake in 2012 compared to conditions during a drought similar to the 1953-54 drought of record.

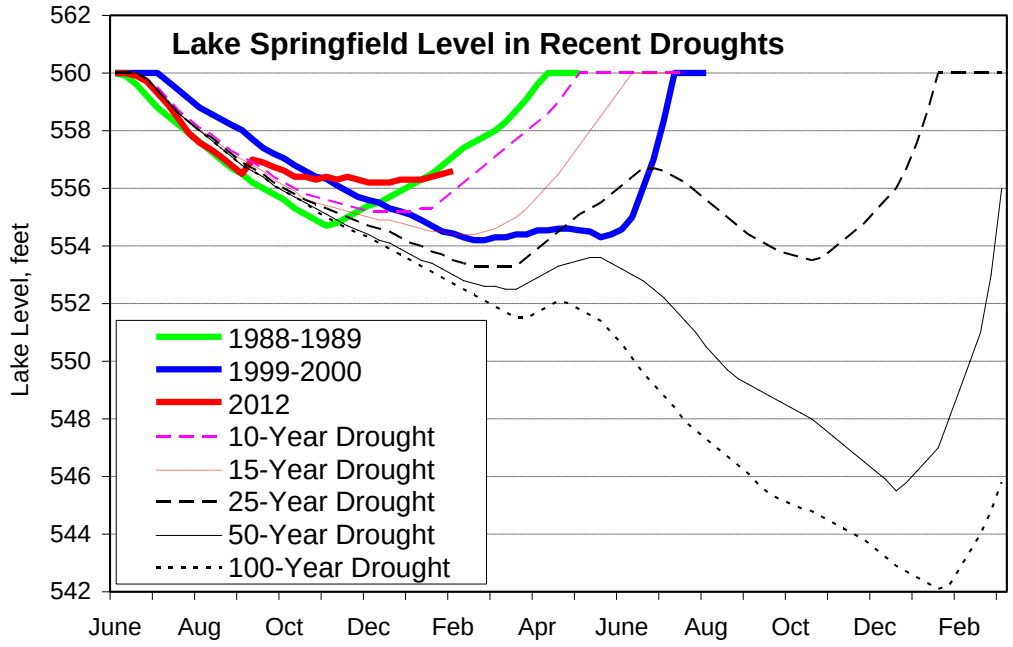


Figure 7. Water level in Lake Springfield in 2012 compared to: a) that from recent drought episodes, and b) levels expected with major droughts of varying severity or frequency.

Water Table Observation Well Network:

Shallow groundwater well monitoring is conducted at 16 locations in Illinois sited in rural areas to measure water-table conditions under natural conditions remote from pumping stations (Figure 1). Wells are installed with on-site recording devices and downloaded during monthly site visits. These data enable ISWS staff to assess short- and long-term trends in water-table levels to enhance the understanding of the impacts and extent of phenomena such as droughts and floods in Illinois. In particular, these data become important to monitor the lingering effects of periods of deficit precipitation on the shallow groundwater resources of the state.

At the start of 2012, shallow groundwater levels were generally above normal, but starting in February, levels began dropping and were below normal in every month from February to December 2012, with the greatest deviation from normal in December (Figure 2). Hydrographs from three of the monitoring wells are shown in Figure 3.

Current Shallow Groundwater Conditions (December 2012)

Statewide, shallow groundwater levels were below normal with an average departure of -3.0 feet, ranging from 7.1 feet below to 0.9 feet above normal levels (Table 1). One well, Coffman (Pike Co.), reported its lowest reading on record for the month, and another (Snicarte in Mason Co.) continued to report a water level below the bottom of the well. For the first time in nine months, the SE College well (Saline Co.) reported a water level above a record low.

Shallow Groundwater Conditions in July 2012

During July 2012, shallow groundwater levels were below normal throughout the state with an average departure of -2.3 feet, ranging from 5.7 feet to 0.8 feet below normal levels (Table 1). Levels were approximately 4.1 feet below July levels of 2011. Five wells, Fermi Lab (DuPage Co.), Coffman (Pike Co.), Janesville (Coles Co.), SE College (Saline Co.), and Bondville (Champaign Co.), had their lowest reading on record for July. The water level within Snicarte (Mason Co.) was below the bottom of the well. July 2012 was the fourth straight month for record low levels from the Fermi Lab and SE College wells.

Trends from July to December 2012

There was above average precipitation in September and October 2012, especially in the southern third of the state. As a result, shallow groundwater levels generally rose to above average levels. However, water levels in the northern two-thirds of the State continued to decline (Table 1).

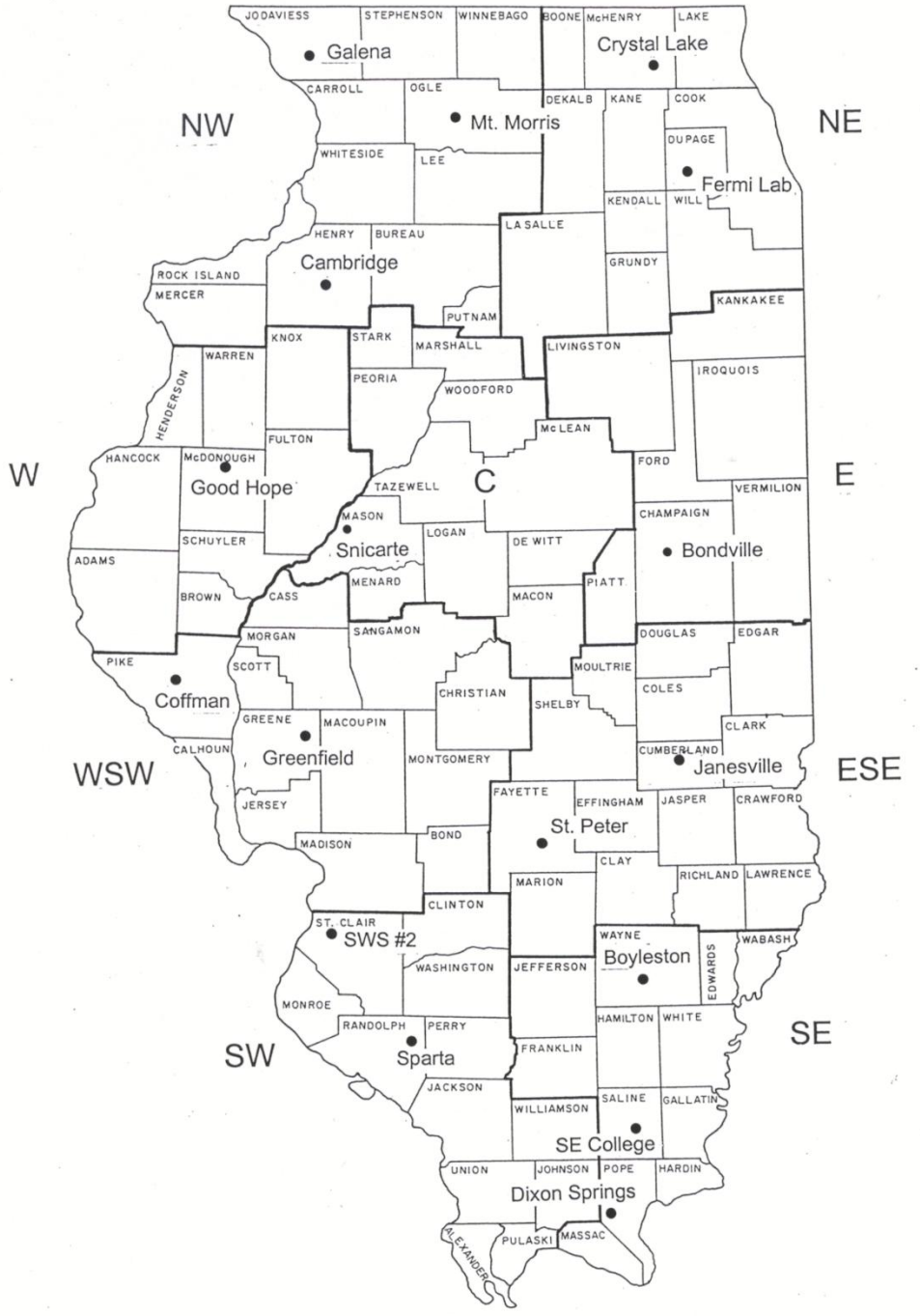


Figure 1. Location of shallow groundwater monitoring wells in Illinois.

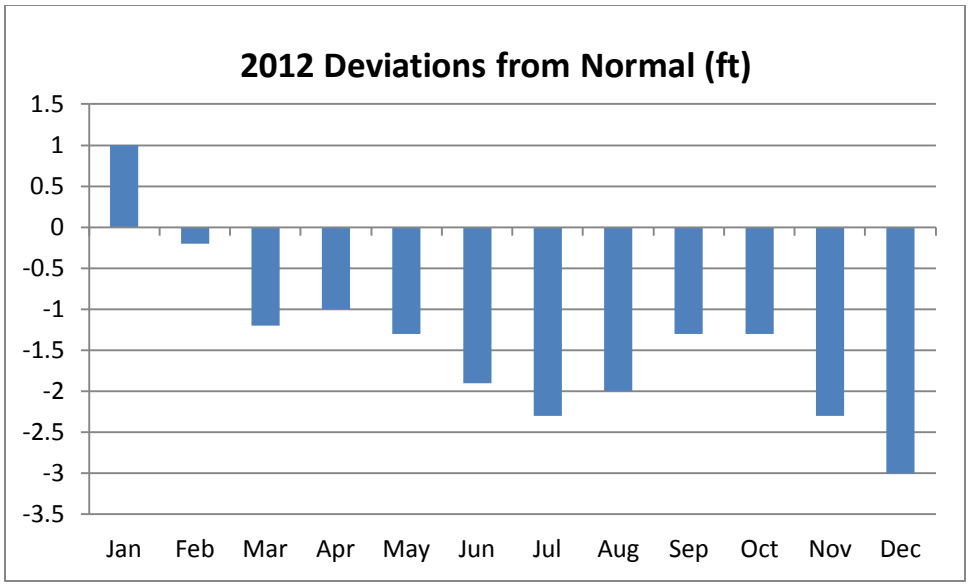


Figure 2. Monthly deviations from normal for shallow groundwater levels in Illinois in 2012.

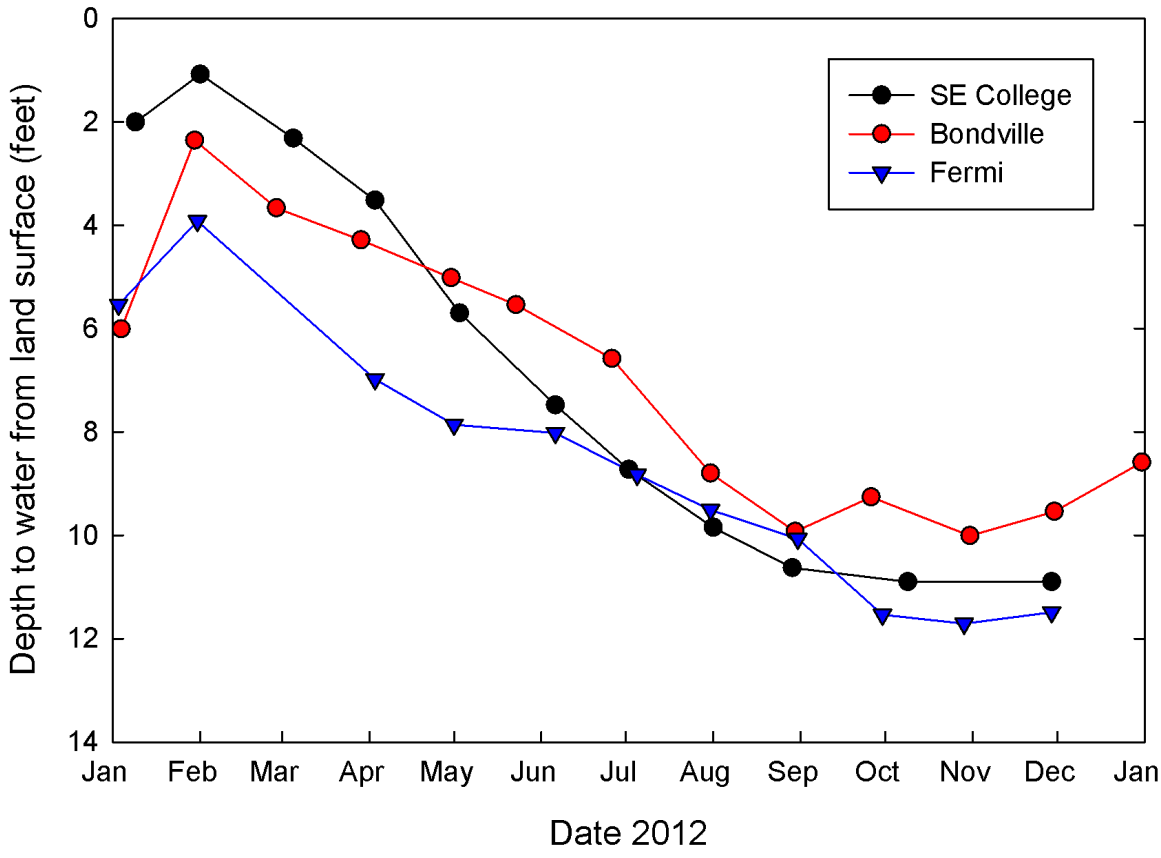


Figure 3. Hydrograph showing water level depths in several monitoring wells in 2012.

Table 1. Groundwater levels measured in July and December 2012, and deviations from 15-year average for those months. NA = not available.

	Jul-12		Dec-12		Deviation from normal
Well name	*Depth to water (feet)*	*15-year avg. Level (feet)*	*Depth to water (feet)*	*15-year avg. Level (feet)*	*July - Dec*
Galena	21.31	-1.81	22.05	-0.96	-0.74
Mt. Morris	18.89	-1.78	25.50	-4.64	-6.61
Crystal Lake	5.80	-1.18	7.2	-1.81	-1.40
Cambridge	NA	NA	NA	NA	NA
Fermi Lab	9.20*	-1.52	10.80	-3.62	-1.60
Good Hope	9.65	-3.91	13.35	-5.9	-3.70
Snicarte	NA**	NA	NA**	NA	NA
Coffman	18.12*	-6.28	19.42*	-6.88	-1.3
Greenfield	15.32	-2.94	18.48	-5.59	-3.16
Janesville	8.29*	-2.29	4.92	-0.20	3.37
St. Peter	5.49	-1.99	1.36	0.60	4.13
SWS #2	15.53	-1.96	15.30	-1.68	0.23
Boyleston	6.13	-1.41	8.14	-4.61	-2.01
Sparta	9.25	-2.68	8.66	-1.35	0.59
SE College	9.85*	-2.92	9.65	-5.51	0.20
Bondville	10.27*	-4.96	7.12	-2.60	3.15
AVERAGE					-0.63

* Lowest reading reported in this month for the period of record

** Water level fell below the bottom of the well

U. S. GEOLOGICAL SURVEY

Drought Summary of USGS Activities in 2012 to Support the State of Illinois Governor's Drought Response Task Force

Introduction

The U.S. Geological Survey (USGS) collects streamflow, groundwater level, and water-quality data for the State of Illinois and the Nation. Much of these data are collected every 15 minutes (real-time) as a part of the national network, so that water-resource managers can make decisions in a timely and reliable manner. Much of the USGS real-time data are commonly collected every 15 minutes, and transmitted hourly. The length of time in the transmission and data routing results in data being available on the Web generally within 30 to 90 minutes. Data are quality checked daily. USGS real-time data includes streamflow, precipitation and groundwater levels. Coupled with modeling and other water-resource investigations, the USGS provides data to the State during droughts and other hydrologic events. This summary focuses on the data collected in 2012, primarily the spring, through October 2012. This is also the time period when the normal hydrologic cycle has the highest streamflows and groundwater levels, to the lowest.

Streamflow

Current (real-time) and historical streamflow data are available on the USGS web site for over 230 USGS streamgages in Illinois (figure 1) (http://waterwatch.usgs.gov). Generally, the daily, monthly, and annual discharge statistics are provided. Streamflow was generally decreasing at most stations throughout the State in June, July and August. Of the 114 stations in Illinois with more than 30 years of continuous record, six stations set new record lows and 17 tied record lows (table 1). For example, the long-term streamflow station on the Sangamon River at Monticello had the lowest 7-day flow (0 cfs for 16 days) in 105 years of record.

Substantial precipitation in much of the State occurred starting in August, and continued through September, and early October, which resulted in a decrease in the drought severity. Illinois had zones of below normal streamflow based on the 7-Day average streamflow when compared to the historical streamflow. Streamflow conditions at three index streamgages representing the geographic distribution of climate areas in the State (figure 2) are compared to the previous drought of 1987-88, as well as the normal streamflow over a 30-year period. In general, the streamflow at these three sites, and many of the other streamflow sites which have a 30-year period of record or greater, have returned to normal or near normal for this time of year.

Low streamflows may adversely affect the biological integrity of the stream, water supply, and/or wastewater discharge operations. To supplement USGS real-time streamflow data currently collected at over 230 locations across the State, many of them at streamgages where low flows were confirmed or at the request of the cooperator. The USGS also collected discrete streamflow information by 15 streamflow measurements at 7 different sites as requested, and are highlighted in table 2 in yellow. All of this additional information was at locations with high areas of concern for water-resource managers and sites for which historic streamflow information is available for comparison. The USGS collected over 200 low-flow measurements in the midst of the drought that are listed in table 2. These measurements were regularly updated and made available through the USGS website.

Groundwater Levels

The USGS, in cooperation with the Illinois State Water Survey and the Illinois State Geological Survey of the Prairie Research Institute of the University of Illinois, monitors real-time groundwater levels in clustered, deep, and shallow wells in Champaign, Lee, Madison, and Tazewell Counties. Levels were also monitored in a single well in Vermilion County, in 4 deep bedrock wells and 1 shallow well in Lake County, and at 27 sites (44 wells) in, and in cooperation with, McHenry County (figure 3). In early September, an additional real-time well was added in Kane County. All real-time sites and other groundwater levels can be accessed through the web at http://groundwaterwatch.usgs.gov/. At sites where ten or more years of groundwater data are available, various groundwater-level statistics are automatically calculated to allow at-a-glance information about long-term water-level trends, as illustrated in the figures next to selected hydrographs in figure 5.

Periodic to continuous groundwater levels (some of which are transmitted in real time) are monitored routinely in a network of observation wells. The network includes approximately 30 water-table wells that can provide useful information on the impact of present and future drought conditions on shallow groundwater levels, discharge to streams, and future recharge to deep aquifers. Manual measurements of groundwater levels were made by the USGS at an increased frequency in some parts of Illinois. Since June, the USGS has more frequently collected groundwater levels from a subset of wells in the central portion of the Mahomet Aquifer because of substantial declines (figure 3). A datalogger was installed on August 24 in one Mahomet Aquifer well about 2 miles north of the Decatur well field recording groundwater levels every 15 minutes (figure 4). Supplemental groundwater levels were collected in an intensive synoptic assessment from about 120 wells in the Lockport/Romeoville area in July and about 14 wells in northern Illinois in early October.

Substantial precipitation in August, September, and October has resulted in the rise of groundwater levels in many of the shallow monitoring wells in Illinois. The degree of response varies across the State as shown in a series of hydrographs in figure 5 which illustrates the groundwater level response in real-timed wells running roughly north to south when considering the data for the period beginning before the drought, April 15, 2012, to November 1 2012. For the well in Vermilion County, where the USGS has approximately 20 years of record, the historical analysis indicates that the groundwater level is recovering to near the 10-24 percentiles of historical water levels. The other well with sufficient historical record in Lee County still shows a significant deficit in the groundwater levels. The other wells do not have sufficient historical records for these analyses.

In the confined aquifers monitored in real time, the response is more varied. These confined wells would not likely show direct response to drought, other than through increased withdrawals due to increased water demand. In all of the wells presented, the increased demand resulted in drawdowns that have generally started to recover, but have not reached pre-pumping levels. The exception is the Cambrian-Ordovician confined well in Lake County, which continues to show a modest response to withdrawals. This is likely due to the proximity from major pumping centers further west, since the area around that well generally uses Lake Michigan water for supply.

Water Quality

The USGS currently operates continuous multi-parameter water-quality instruments at the Illinois River at Florence, IL, and Kickapoo Creek near Bloomington, IL. These instruments measure and record temperature, dissolved oxygen, pH, and specific conductance. The USGS operated 7 real-time continuous nitrate sensors throughout the State (figure 6), almost all in cooperation with the Illinois Environmental Protection Agency (IEPA). Data from the six continuous nitrate sensors in operation over

the summer documented low nitrate concentrations from June through mid-October 2012, with temporary increases in concentration in response to precipitation events in early September. Real-time water temperature readings may be of particular interest during drought conditions. The USGS currently collects water temperature at 18 surface-water sites (figure 6) and 5 groundwater wells. All of the real-time water-quality data are available through the web at http://waterwatch.usgs.gov/wqwatch/.

Hot and dry climatic conditions can promote excessive aquatic plant growth resulting in levels of blue-green algae (or cyanobacteria) that can adversely affect the health of water users and recreationalists. These algal blooms can contain toxins and may foul the taste and odor of raw and finished drinking water. The IEPA and the USGS sampled 13 lake and stream sites throughout Illinois (figure 7) for the presence blue-green algae and related toxins in response to the drought. Based on the analyses completed thus far, three of the sites contained levels of the microcystin toxin considered to be high or very high risk to humans (above the 20 ug/L World Health Organization criteria), with the highest result at 4,800 ug/L. The lake samples at West Lake (1700 ug/L) and Camp Walter Scott (1500 ug/L) also had significant concentrations of Microcystin. Additional analyses of these samples are still ongoing for additional toxins. Real-time monitoring of in-situ blue-green algae can provide early warning signs of impending problematic conditions and monitoring of existing growth conditions. The IEPA is following up on future activities with other State agencies.

Precipitation

The USGS provided a Web-based tool displaying provisional precipitation data that are collected throughout Illinois, as well as individual data for each USGS rain gage. These data used in the Web-based tool are transmitted to the USGS from Federal, State, and local agencies at about 130 sites, and are posted as color-coded amounts for selected time periods on a Google Map platform (*http://il.water.usgs.gov/gmaps/precip*). There is an option to display NEXRAD imagery from the National Weather Service for comparison with raingage totals. The data can be sorted by precipitation totals, enabling water-resource managers to pinpoint areas that have received short-term rainfall relief from the drought. The USGS, in cooperation with State and local cooperators, also operates, maintains, and publishes precipitation data from a network of 56 real-time precipitation gages. Approximately 15 of those gages are part of the public accessible, real-time network in DuPage County, run in conjunction with the County.

National Resources Available

The USGS collects national data sets for streamflow, groundwater, precipitation, and water quality, which provide Illinois with comparable data outside the State boundary. This allows users a regional comparison of data. Streamflow data collected by the USGS on a national scale is maintained in the WaterWatch and viewer. The WaterWatch viewer (*http://waterwatch.usgs.gov/*) shows the below normal 7-Day average streamflow when compared to historical streamflow for the day of the year. Comparisons to surrounding States can help Illinois evaluate the extent of drought conditions. Also, among the USGS-maintained national databases is the Drought Monitoring Viewer (*http://vegdri.cr.usgs.gov/viewer/viewer.htm*). This satellite-derived imagery captures on-the-ground information weekly about the relation between climate variables and vegetation health. The interactive nature of the system allows the users to locate and further investigate an area of interest.

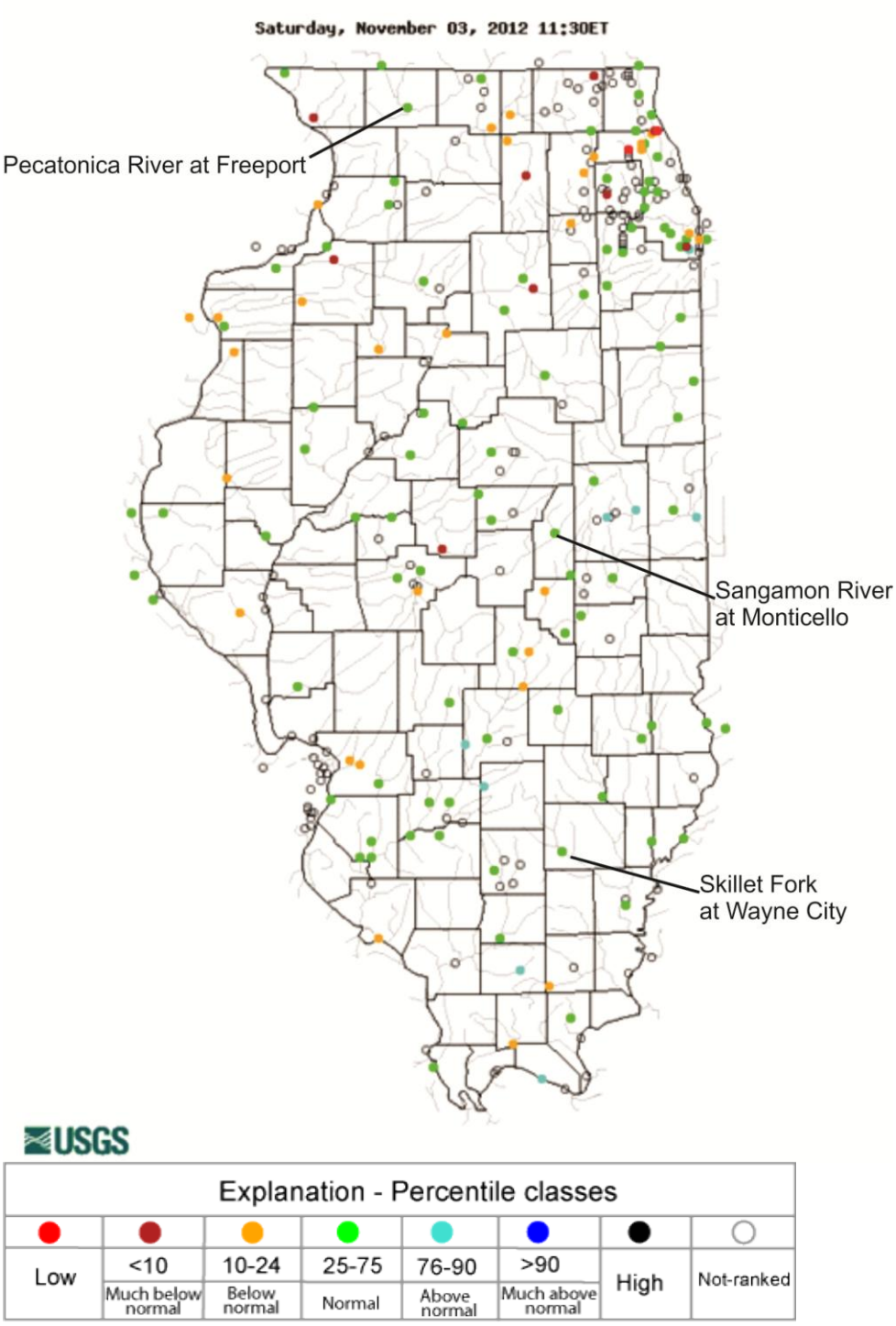


Figure 1. Map of real-time streamflow data with all current streamgages shown and only those with sufficient historical record provided with color-coding for the percentile of flow for November 3, 2012 with the locations of the streamgages where hydrographs are presented and discussed in figure 2.

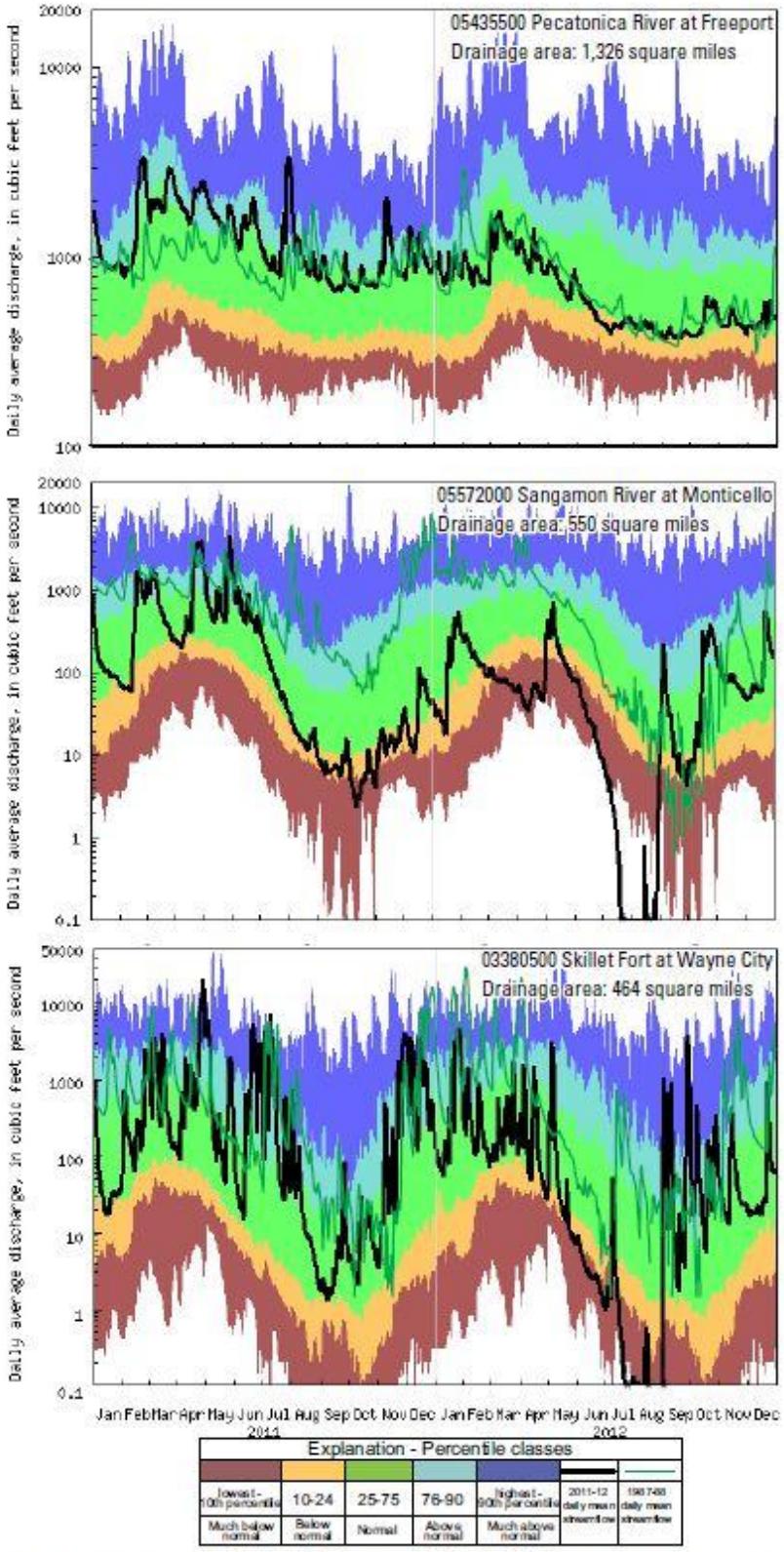


Figure 2. Duration hydrographs of daily average streamflow for 3 index stations in Illinois shown in Figure 1. Asterisk(*) indicates flow less than 0.1 cubic feet per second (cfs). Substantial precipitation in August, September, and early October 2012 resulted in increases in streamflow in Monticello and Wayne City that are above normal for October. Streamflow at Freeport remained normal to above normal for most of 2012.

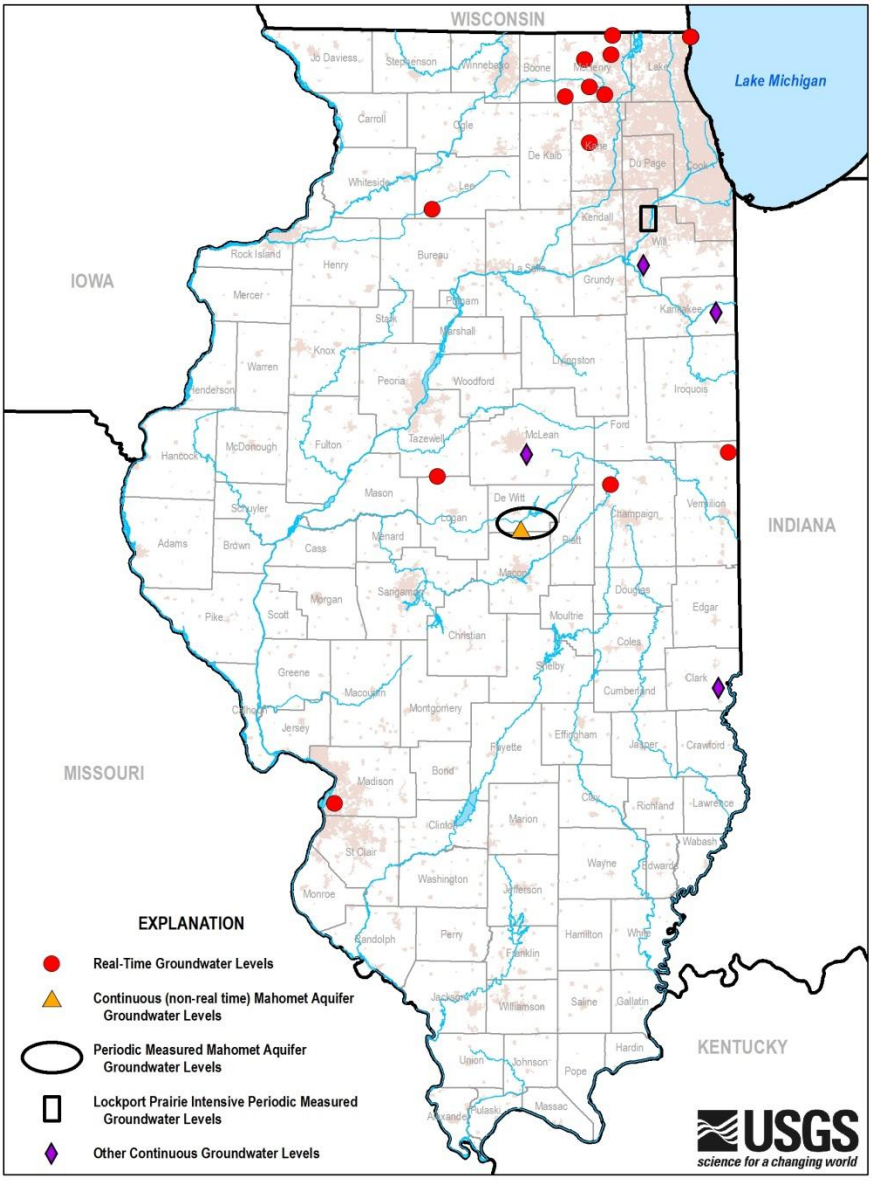


Figure 3. Real-time, continuous and periodic well locations in Illinois discussed in summary and many of the hydrographs presented in figures 4 and 5.

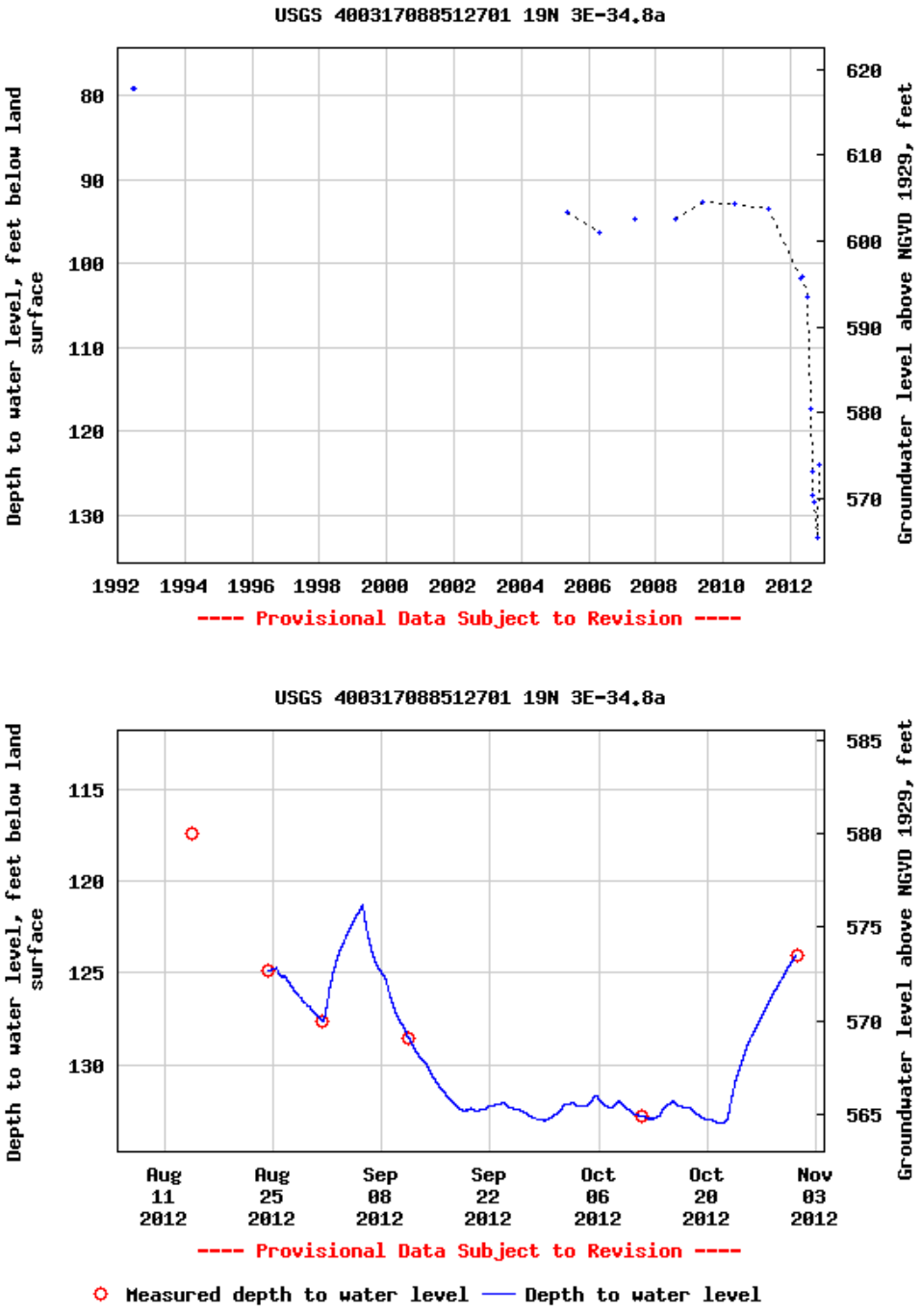
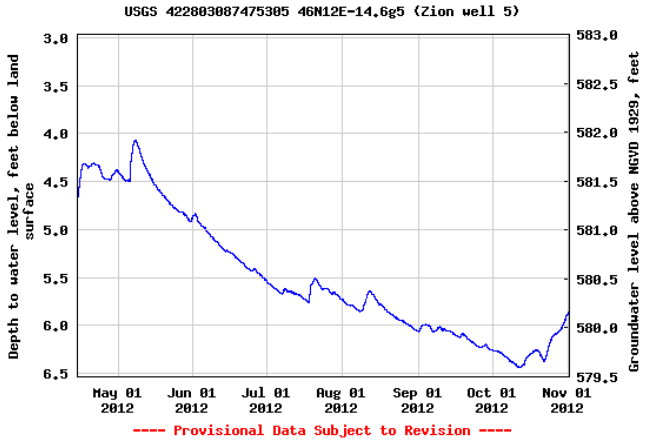


Figure 4. Two hydrographs for one of the wells the USGS has monitored groundwater levels since 2005. The upper hydrograph provides the historical groundwater measurements since 1992. The decline of groundwater levels in 2012 is shown. The lower hydrograph provides the continuous groundwater levels from a datalogger installed in the well on August 24 just before the City of Decatur began pumping from their supplementary well field, to the current recovery upon cessation of pumping near the end of October.

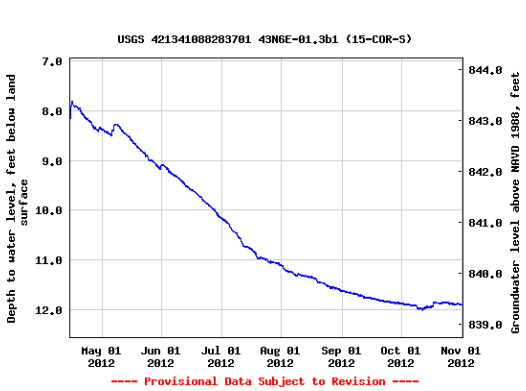
Figure 5 (next 5 pages). Hydrographs from selected real-timed groundwater wells in both confined and unconfined aquifers. For 5 wells where 10 or more years of data are available, detailed hydrographs with statistical presentation of data are presented.

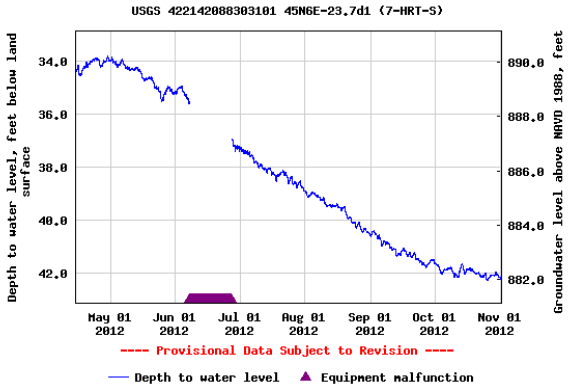
Unconfined Aquifers

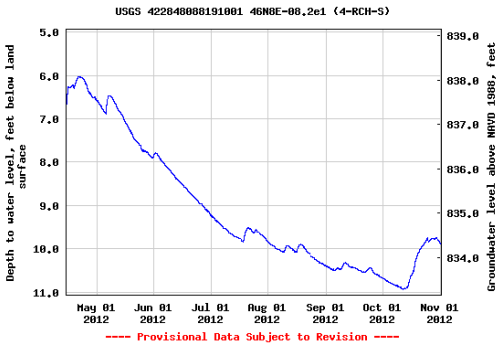
Lake County

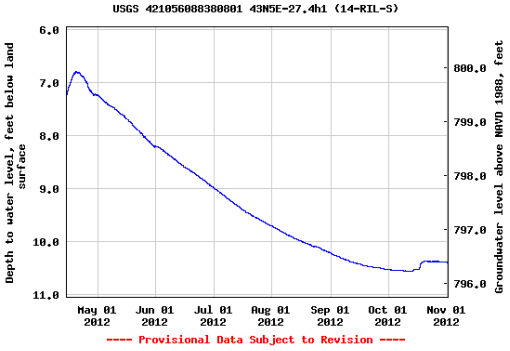


McHenry County

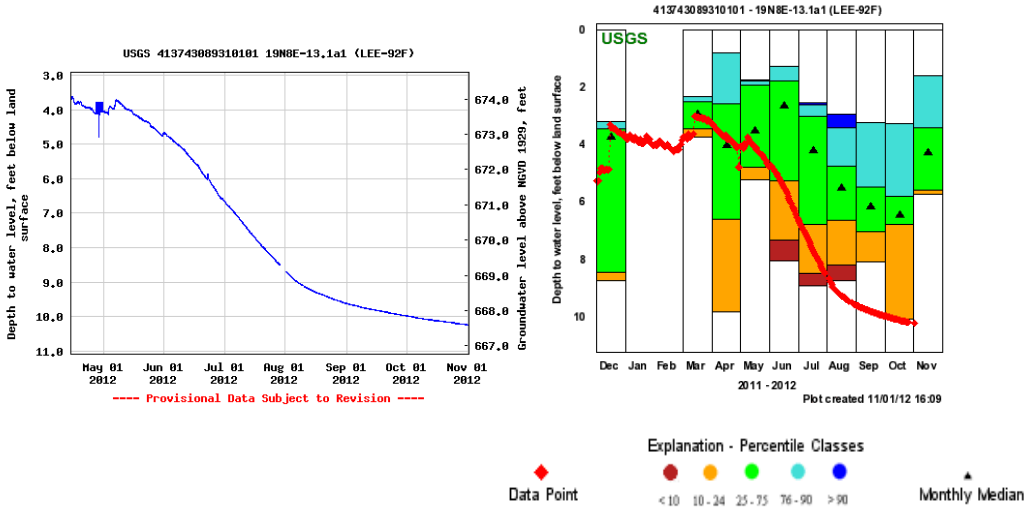




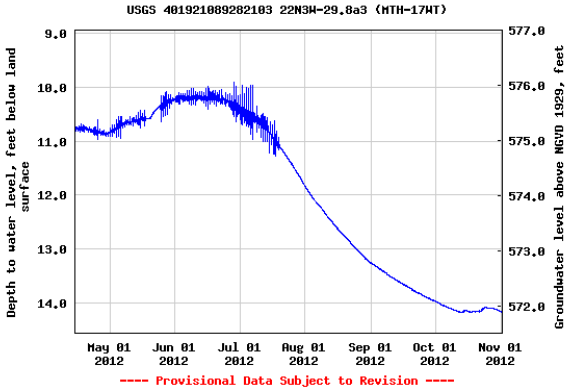




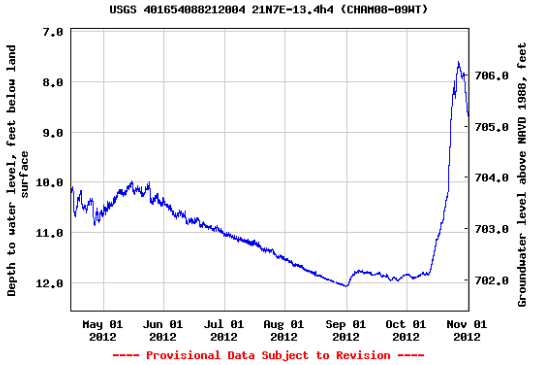
Lee County



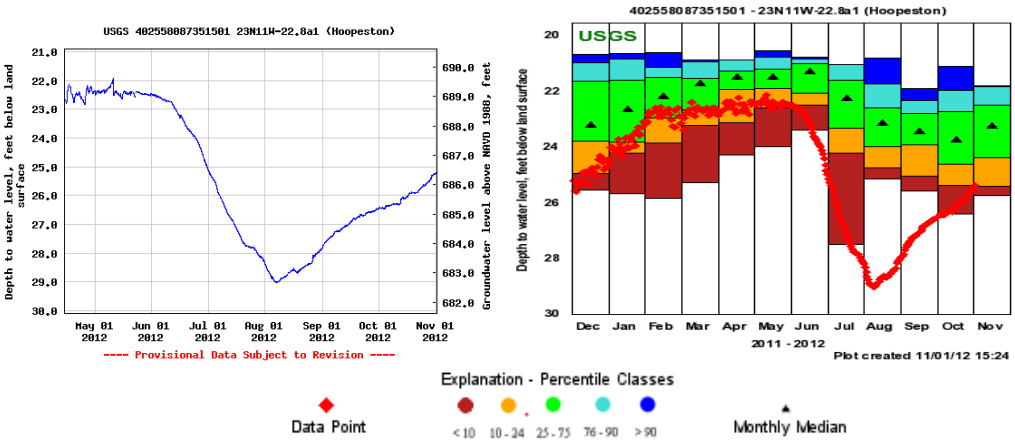
Tazewell County



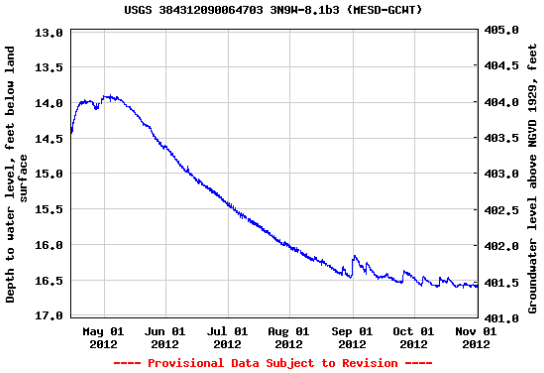
Champaign County



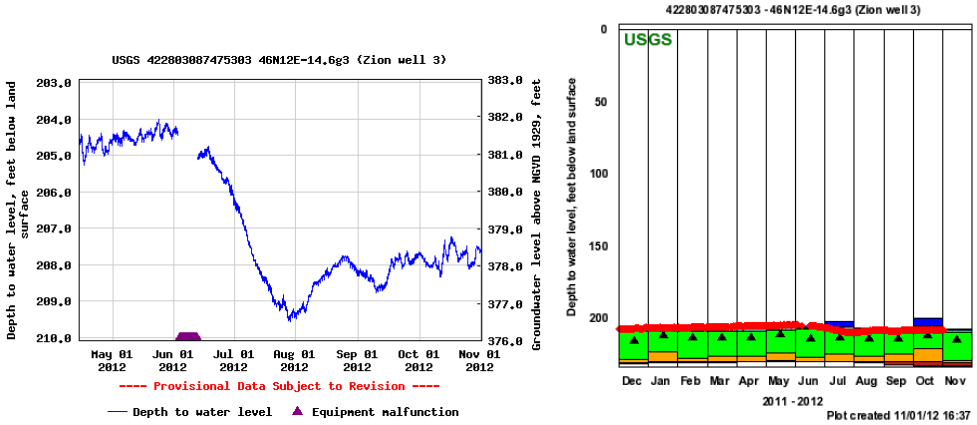
Vermilion County

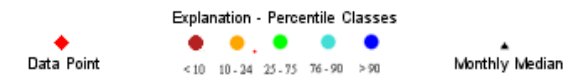


Madison County

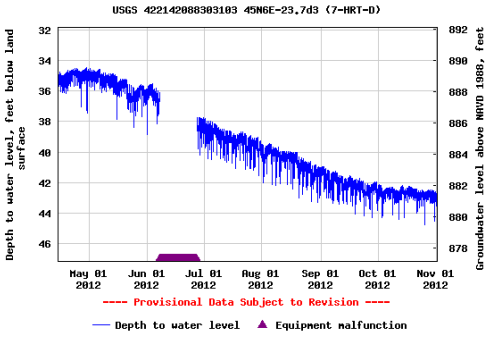


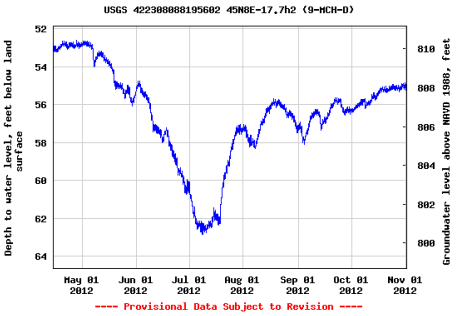
Confined Aquifers
Cambrian-Ordovician Bedrock Aquifers
Lake County



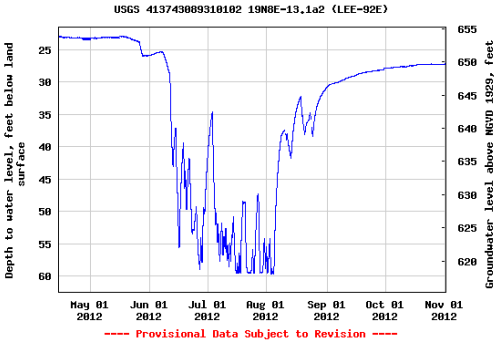


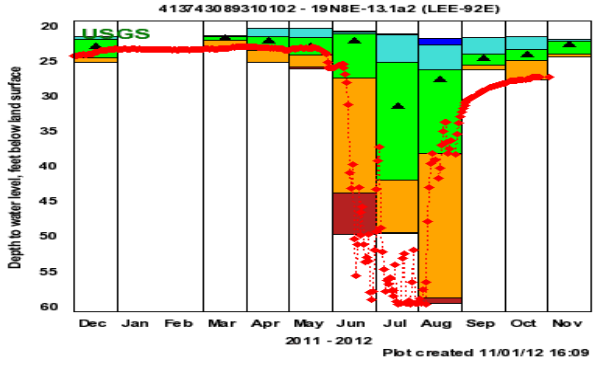
Confined Deep Sand and Gravel Aquifers
McHenry County

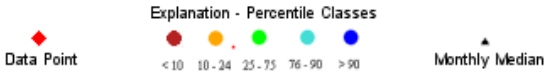




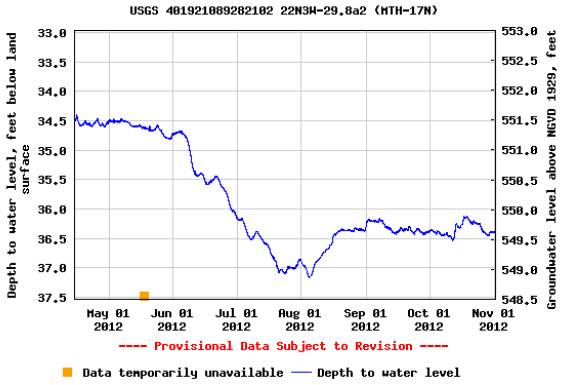
Confined Glacial Aquifer
Lee County

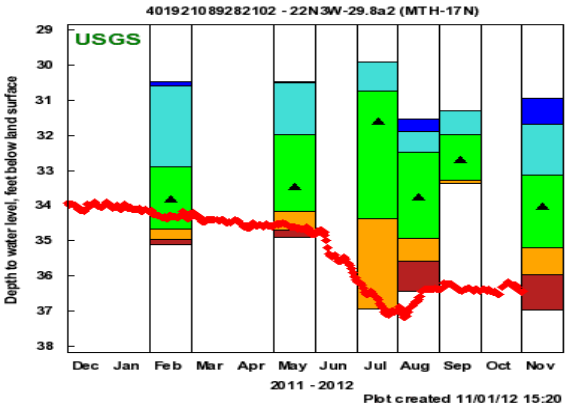


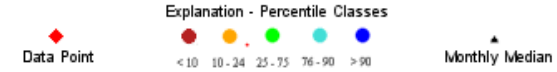




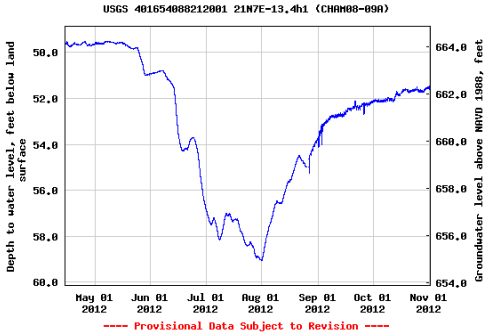
Confined Mahomet Glacial Aquifer
Tazewell County







Champaign County



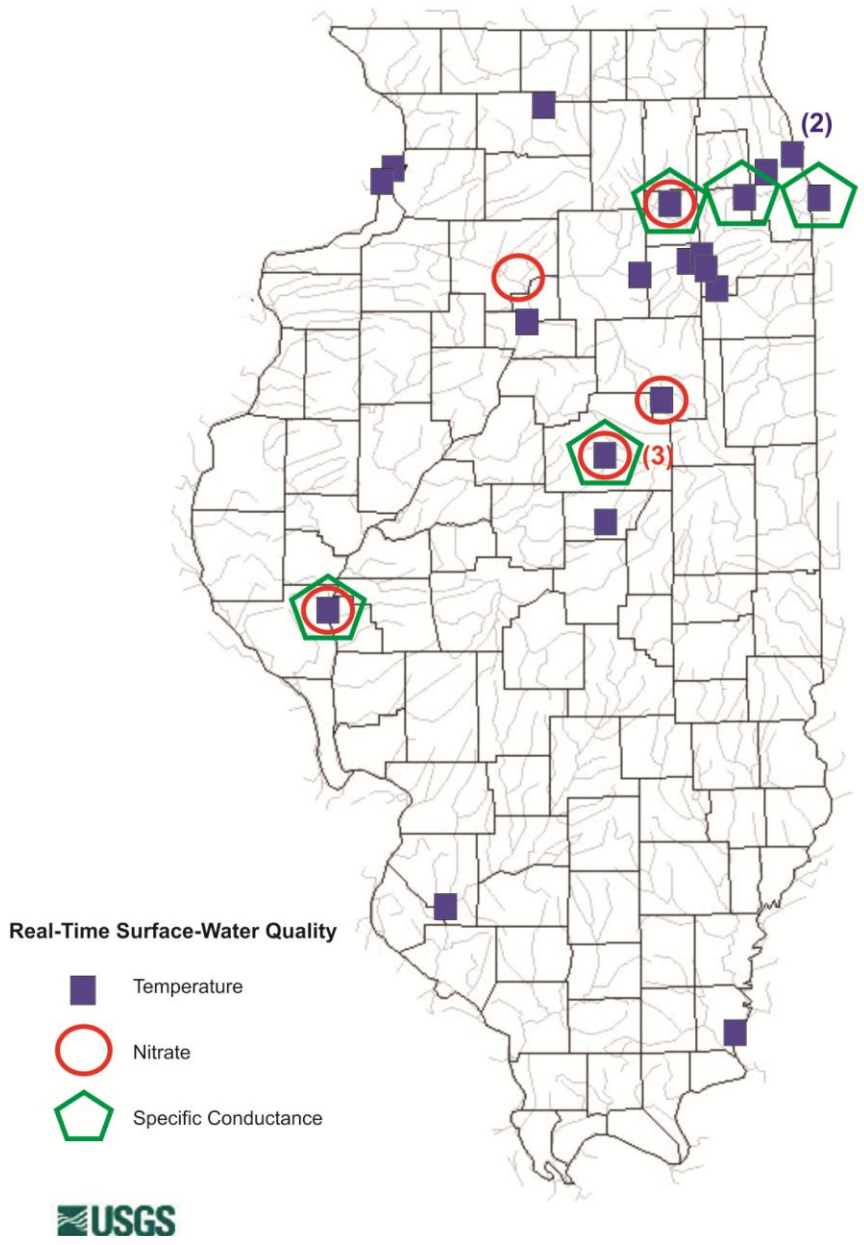


Figure 6. Real-time continuous temperature, nitrate and specific conductance sensors operated by the USGS in streams and rivers in Illinois.

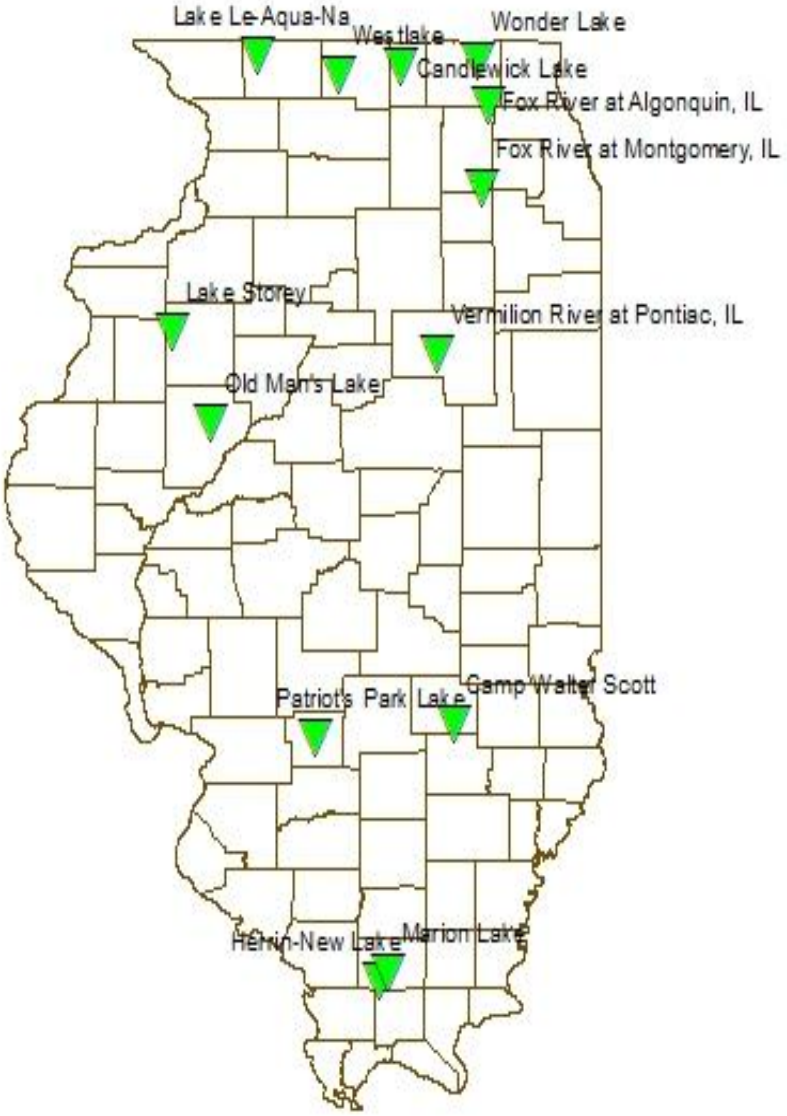


Figure 7. Lakes and rivers sampled by the IEPA and the USGS for blue-green algal toxins in late August and early September 2012.

Table 1. Summary of recent 7-Day average streamflow conditions [2012-05-18 to 2012-10-31}

["--", no data; ">", greater than all historical minimum values]

USGS station number	USGS station name	Drain. area [mi^2]	2012-05-18 to 2012-10-31				Historical annual minimum 7-day flows		
			No. of days with zero flows	Lowest 7-day average flow			No. of years	Min. (year) [ft^3/s]	No. of years with zero flows
				Date	Stream flow [ft3/s]	Rank			
5572000	SANGAMON RIVER AT MONTICELLO, IL	550	16	7/31/2012	0	1	105	0.07 -1988	0
5543500	ILLINOIS RIVER AT MARSEILLES, IL	8259	0	10/12/2012	1500	1	93	1670 -2006	0
5579500	LAKE FORK NEAR CORNLAND, IL	214	0	10/12/2012	0.7	1	65	0.96 -1988	0
5591200	KASKASKIA RIVER AT COOKS MILLS, IL	473	0	7/17/2012	1.66	1	43	2.66 -1988	0
3336900	SALT FORK NEAR ST. JOSEPH, IL	134	0	8/13/2012	2.74	1	42	3 -1977	0
3336645	MIDDLE FORK VERMILION RIVER ABOVE OAKWOOD, IL	432	0	8/4/2012	1.61	1	34	5.13 -1981	0
3338780	NORTH FORK VERMILION RIVER NEAR BISMARCK, IL	262	0	7/31/2012	2.67	1	24	2.69 -1991	0
5590950	KASKASKIA RIVER AT CHESTERVILLE, IL	358	0	7/14/2012	5.49	1	18	5.97 -1999	0
5551675	BLACKBERRY CREEK NEAR MONTGOMERY, IL	55	0	8/11/2012	0.21	1	14	0.35 -2005	0
5551000	FOX RIVER AT SOUTH ELGIN, IL	1556	0	7/13/2012	214	1	13	234 -1991	0
5548105	NIPPERSINK CREEK ABOVE WONDER LAKE, IL	84.5	0	9/22/2012	5.17	1	9	7.01 -1994	0
5541710	AUX SABLE CREEK NEAR MORRIS, IL	172	0	10/1/2012	1.03	1	6	4.47 -2008	0
5579630	KICKAPOO CREEK NEAR BLOOMINGTON, IL	14.8	4	8/12/2012	0	1	6	0.01 -2008	0
5527910	NORTH MILL CREEK NEAR MILBURN, IL	28.4	0	8/8/2012	0.8	1	4	0.93 -2008	0
5536162	PLUM CREEK NEAR CRETE, IL	18.7	0	7/14/2012	0.45	1	4	0.69 -2010	0

Table 2. Summary table of extra drought measurements completed in 2012 by the USGS, with measurements that are highlighted in yellow made at a location where a USGS streamgage did not exist.

Station	Station Number	Date	Time (CST)	Gage Height (ft)	Discharge (cfs)
Apple R at Hanover, IL	05419000	08/02/12	1200	2.02	31.6
Aux Sable Cr nr Morris, IL	05541710	08/14/12	1000	3.88	4.53
Aux Sable Cr nr Morris, IL	05541710	08/08/12	1045	3.86	4.10
Aux Sable Cr nr Morris, IL	05541710	07/19/12	1530	3.27	2.06
Aux Sable Cr nr Morris, IL	05541710	07/12/12	1510	2.75	2.82
Aux Sable Cr nr Morris, IL	05541710	07/03/12	1145	2.79	7.36
Bay Cr nr Pittsfield, IL	05512500	07/17/12		1.39	0.22
Bear Cr nr Marcelline, IL	05495500	07/17/12		2.32	5.47
Big Bureau Cr at Princeton, IL	05565000	08/07/12	0935	1.96	1.46
Big Muddy R at Plumfield, IL	05597000	08/03/12	1200	6.34	41.6
Big Muddy R at Rte 127 at Murphysboro, IL	05599490	07/11/12		3.47	170
Big Muddy tributary below Rend Lake	xxxxxxxx	08/03/12			38.0
Blackberry Cr at Yorkville, IL	05551700	07/10/12	1205	2.75	4.50
Blackberry Cr nr Montgomery, IL	05551675	07/10/12	1350	3.27	3.93
Bonpas Creek at Browns, IL	03378000	07/05/12		0.51	0
Butterfield Cr at Flossmoor, IL	05536255	07/12/12	1230	3.92	0.86
Cache R at Forman, IL	03612000	07/13/12		8.70	1.26
Cahokia Cr at Edwardsville, IL	05587900	08/07/12	1525	3.04	0.430
Casey Fork nr Mt Vernon, IL	05595820	07/05/12		1.87	2.22
Crab Orchard Creek near Marion	05597500	08/02/12	0830	1.13	0.12
Deer Cr nr Chicago Heights, IL	05536235	07/11/12	1245	3.74	2.85
Des Plaines R at Gurnee, IL	05528000	08/08/12	1400	1.48	35.9
Des Plaines R at Riverside, IL	05532500	07/09/12		1.53	128
Des Plaines R nr Lemont, IL	05533600	07/18/12		5.09	214
Des Plaines R nr Russell	05527800	08/03/12		1.76	0
DuPage R at Shorewood, IL	05540500	07/06/12		2.14	110
DuPage R nr Plainfield, IL	05540290	08/13/12	1200	7.72	127
E Br DuPage R at Bolingbrook, IL	05540250	08/13/12	1815	14.81	43.7
EB DuPage R nr Downers Grove, IL	05540160	07/11/12	0625	10.33	14.5
Edwards R nr New Boston, IL	05466500	08/08/12	1140	11.70	45.3
Edwards R nr New Boston, IL	05466500	07/19/12	1115	12.10	45.3
Edwards R nr Orion, IL	05466000	07/19/12	1330	0.89	10.3
EF Kaskaskia R nr Sandoval, IL	05592900	07/05/12		2.31	0
EF Shoal CR nr Coffeen, IL	05593900	07/10/12		2.24	0
Elkhorn Cr. nr Penrose, IL	05440000	08/08/12	1110	2.86	46.7
Embarras R nr Camargo, Il	03343400	07/18/12	0900	1.50	0.93
Ferson Cr nr St Charles, IL	05551200	08/30/12		1.14	1.11

Ferson Cr nr St Charles, IL	05551200	07/03/12	0758	1.33	5.36
Flag Cr nr Willow Springs, IL	05533000	07/17/12		2.96	11.9
Flint Cr nr Fox River Grove, IL	05549850	06/28/12	1245		1.37
Flint Cr nr Fox River Grove, IL	05549850	06/27/12	1130		1.08
Flint Cr nr Fox River Grove, IL	05549850	06/26/12	1315		0.83
Fox R at Algonquin (DS tailwater)	05550001	07/12/12	0801	4.20	158
Fox R at Algonquin (DS tailwater)	05550001	07/06/12	0741	4.27	172
Fox R at Burtons Bridge, IL	05549600	06/28/12	1045		114
Fox R at Burtons Bridge, IL	05549600	06/27/12	1515		108
Fox R at Burtons Bridge, IL	05549600	06/26/12	1115		129
Fox R at Dayton, IL	05552500	07/13/12	0830	4.74	318
Fox R at Montgomery, IL	05551540	08/30/12	1255	10.84	233
Fox R at Montgomery, IL	05551540	07/10/12	1545	10.78	191
Fox R at Sheridan, IL	05552000	06/28/12	0945		349
Fox R at Sheridan, IL	05552000	06/27/12	1215		447
Fox R at Sheridan, IL	05552000	06/26/12	1600		406
Fox R at South Elgin, IL	05551000	07/12/12	1402	11.92	198
Fox R at Yorkville, IL	05551580	07/10/12	0920	12.24	194
Franklinville Cr at Franklinville, IL	05438030	09/04/12		6.24	0.148
Franklinville Cr at Franklinville, IL	05438030	07/09/12	0841	6.31	0.53
Green R at Geneseo, IL	05547500	08/03/12	1030	2.20	58.4
Green R at Geneseo, IL	05447500	07/26/12	1200	2.30	64.1
Hastings Cr nr Lindenhuirst	05527905	08/01/12	1200	11.25	1.61
Henderson Cr nr Oquawka, IL	05469000	07/18/12	1300	12.41	38.1
Hickory Cr at Joliet, IL	05539000	07/18/12		10.70	10.4
Hickory Cr nr Brownstown, IL	05592575	07/10/12		4.08	0
Hurricane Cr nr Mulberry Grove, IL	05592800	07/12/12		3.12	2.21
Indian Cr at Wanda, IL	05588000	08/07/12	1341	0.54	0
Indian Cr nr Fairbury, IL	05554300	08/08/12	0752	7.58	0
Indian Cr nr Fairbury, IL	05554300	07/10/12	1121	8.04	0.73
Iroquois R at Iroquois, IL	05525000	07/13/12	1045	3.83	32.6
Kankakee R at Momence, IL	05520500	07/17/12	1030	0.97	445
Kankakee R at Wilmington, IL	05527500	07/20/12	1200	0.65	523
Kaskaskia R at Cooks Mills, IL	05591200	07/18/12	0900	1.30	5.34
Kaskaskia R Inflow at Ficklin, IL	394803088215001	07/18/12	1500	7.29	0.38
Kaskaskia R at Carlyle, IL	05593000	07/18/12		6.06	159
Kaskaskia R at Chesterville, IL	05590950	07/18/12	1100	29.61	6.41
Kaskaskia R at New Athens, IL	05595000	07/10/12		68.71	151
Kaskaskia R at Vandalia, IL	05592500	07/10/12		2.23	49.4
Kaskaskia R below Ficklin, IL	05590520	07/18/12	1430	2.22	34.6
Kaskaskia R below Ficklin, IL	05590520	07/02/12	1000	1.88	9.93
Kaskaskia R nr Cowden, IL	05592100	08/06/12	1100	1.60	27.5
Kaskaskia R nr Cowden, IL	05592100	07/11/12		1.56	22.6

Kaskaskia R nr Venedy Station, IL	05594100	07/12/12		1.68	209
Kaskaskia River at Ficklin, IL	05590520	07/02/12		1.88	9.93
Kaskaskia River at Ficklin, IL (flume)	05590520	07/02/12		7.25	0.40
Kickapoo Cr at 1320 Rd nr Charleston, IL	03343820	07/18/12	0635	3.66	1.48
Kickapoo Cr at 2100E nr Bloomington, IL	05579610	07/16/12	1305	7.74	0.25
Kickapoo Cr nr Bloomington, IL	05579630	07/16/12	1402	1.95	0.24
Kickapoo Cr nr Waynesville, IL	05578000	08/01/12	1400	1.98	3.47
Kickapoo Cr nr Waynesville, IL	05578000	07/16/12	1040	2.26	11.4
Kickapoo Cr Trib nr Bloomington, IL	05579620	07/16/12	1315	12.52	0.15
Kishwaukee R at Belvidere	05438500	08/03/12	1110	0.79	63.3
Kishwaukee R at Marengo, IL	05438170	09/04/12		6.74	15.5
Kishwaukee R at Marengo, IL	05438170	07/09/12	0719	6.94	25.6
Kishwaukee R near Perryville	05440000	08/03/12	0920	5.24	135
Kress Cr at West Chicago, IL	05540060	07/11/12	1017	3.66	0.61
L Calumet R at South Holland, IL	05536290	07/11/12	1115	5.01	32.1
L Crooked Cr nr New Minden, IL	05593575	08/07/12	0659	4.51	0
L Rock Cr at Millhurst Rd nr Plano, IL	05551930	06/28/12	0730		10.6
L Rock Cr at Millhurst Rd nr Plano, IL	05551930	06/27/12	1045		9.80
L Rock Cr at Millhurst Rd nr Plano, IL	05551930	06/26/12	1330		9.31
L Wabash R below Clay City, IL	03379500	07/05/12		3.48	9.59
L Wabash R nr Effingham, IL	03378635	07/26/12	0830	10.18	.044
L Wabash R nr Effingham, IL	03378635	07/11/12		10.36	0.23
Lake Fork at Atwood, IL	05590800	08/08/12	0830	0.96	0
Lake Fork nr Cornland, IL	05579500	07/19/12	1330	3.19	4.36
Lamoine R at Colmar, IL	05584500	07/17/12		2.74	7.11
LaMoine R at Ripley, IL	05585000	07/16/12		4.14	18.0
Lansing Ditch nr Lansing, IL	05536265	07/11/12	0930	3.69	0.04
Lansing Ditch nr Lansing, IL	05536265	07/02/12	1505	4.10	2.40
Long Run nr Lemont, IL	05537500	07/17/12		0.50	0.54
Lusk Creek nr Eddyville, Il	03384450	08/02/12	1400	2.09	0
Mackinaw R nr Congerville, IL	05567500	08/30/12	1000	0.59	13.5
Mackinaw R nr Congerville, IL	05567500	07/16/12	0800	0.54	8.76
Mackinaw R nr Green Valley, IL	05568000	07/16/12	0950	12.77	44.9
Macoupin Cr nr Kane, IL	05587000	07/18/12		4.04	9.18
Mazon R at Coal City, IL	05542000	08/08/12	0945	0.64	0.142
Mazon R at Coal City, IL	05542000	07/17/12		0.78	0.48
McDonald Cr nr Mt. Prospect, IL	05529500	07/13/12	1330	0.64	.10
MF Vermilion River above Oakwood, IL	03336645	07/31/12	1407	0.39	1.96
Midlothian Cr at Oak Forest, IL	05536340	07/12/12	0945	1.27	0.27
Mill Cr at Batavia, IL	05551330	08/30/12		1.92	0.807
Mill Cr at Batavia, IL	05551330	07/03/12	1017	2.03	2.67
Mill Cr at Milan, IL	05448000	08/07/12	1130	1.15	1.26
Mill Cr at Milan, IL	05448000	07/19/12		1.51	7.56

Mill Cr at Old Mill Creek, IL	05527950	08/03/12	1200	5.68	1.10
Mill Cr at Old Mill Creek, IL	05527950	08/03/12	1230	5.68	1.23
N F Embarras R nr Oblong, IL	03346000	07/13/12		1.80	0.55
N F Vermilion River near Bismarck	03338780	07/31/12	1557	4.36	3.08
Nippersink Cr above Wonder Lake, IL	05548105	09/04/12		4.68	6.70
Nippersink Cr above Wonder Lake, IL	05548105	07/09/12	1050	4.77	11.0
Nippersink Cr nr Greenwood, IL	05548030	09/04/12		6.85	0
Nippersink Cr nr Greenwood, IL	05548030	08/08/12	0935	7.47	0
Nippersink Cr nr Greenwood, IL	05548030	07/09/12	1559	7.65	0.09
Nippersink Cr nr Spring Grove, IL	05548280	07/09/12	1355	3.38	23.4
North Mill Cr nr Hickory Corners, IL	05527900	07/31/12	1200	6.01	0.06
North Mill Cr nr Hickory Corners, IL	05527900	07/31/12	1230	6.01	0.06
North Mill Cr nr Milburn, IL	05527910	08/03/12		16.68	1.13
North Mill Cr nr Milburn, IL	05527910	08/01/12		16.68	1.13
North Mill Cr nr Milburn, IL	05527910	07/10/12		16.61	0.20
Pecatonica R at Freeport, IL	05435500	07/31/12	1200	2.96	451
Pecatonica R at Shirland, IL	05437050	07/31/12	1200	3.25	775
Plum Cr nr Crete, IL	05536162	07/12/12	0807	6.86	0.57
Pope Cr. nr Keithsburg, IL	05467000	07/19/12	0900	19.35	17.1
Poplar Cr at Elgin, IL	05550500	07/12/12	1214	0.92	0.52
Rayse Creek nr Waltonville, IL	05595730	08/02/12	1200	-0.14	0
Rayse Creek nr Waltonville, IL	05595730	06/27/12	1315	0.31	0
Richland Creek nr Hecker, IL	05595200	07/05/12		25.48	11.2
Rock R at Byron, IL	05440700	08/06/12	1210	4.69	1870
Rock R at Dixon, IL	05442300	08/01/12	1200	7.92	2030
Rock R at Latham Park, IL	05437610	08/06/12	0950	3.53	1530
Rock R at Rockton, IL	05437500	07/31/12	1200	2.55	1760
Rock R nr Como, IL	05443500	08/08/12	0910	2.75	1950
Rock R nr Como, IL	05443500	07/12/12		2.35	1680
Salt Cr nr Elk Grove Village, IL	05531044	07/13/12	1045		0
Salt Creek near Greenview, IL	05582000	08/01/12	1000	0.61	78.1
Sangamon R at Petersburg, IL	05578000	07/16/12		4.44	92.2
Sangamon R at Riverton, IL	05576500	07/19/12	1500	2.09	81.4
Sangamon River at Decatur, IL	05573540	08/16/12	1130	1.97	.64
Sangamon River at Decatur, IL	05573540	07/12/12	1000	1.93	0.13
Sangamon River at Decatur, IL	05573540	07/02/12		1.97	0.50
Sangamon River at Fisher, IL	05570910	08/16/12	0642	4.51	1.63
Sangamon River at Fisher, IL	05570910	08/01/12	1400	4.45	1.20
Sangamon River at Fisher, IL	05570910	07/02/12		4.80	7.10
Sangamon River at Monticello, IL	05572000	08/30/12	1300	4.18	7.26
Sangamon River at Monticello, IL	05572000	08/16/12	0810	3.93	0.00
Sangamon River at Monticello, IL	05572000	08/01/12	1000	3.95	0.00
Sangamon River at Monticello, IL	05572000	07/02/12		4.36	9.97

Sangamon River near Oakford, IL	05583000	08/01/12	0800	2.77	223
Sawmill Cr nr Lemont, IL	05533400	07/17/12		7.75	0.03
SB Kishwaukee at DeKalb, IL	05439000	08/30/12	1130	2.32	.043
SB Kishwaukee at DeKalb, IL	05439000	07/02/12	0705	2.75	6.79
SB Kishwaukee nr Fairdale, IL	05439500	07/02/12	0850	2.12	45.1
Senachwine Cr nr Chillicothe, IL	05559700	07/13/12			0
SF Saline R at Carrier Mills, IL	03328000	08/02/12	1000	2.78	2.57
SF Sangamon R nr Rochester, IL	05576000	07/20/12	0530	4.66	1.14
Shoal Cr nr Breese, IL	05594000	08/07/12	0815	1.56	86.5
Shoal Cr nr Pierron, IL	05593945	08/08/12		42.72	33.2
Shoal Cr nr Pierron, IL	05593945	07/05/12		42.37	11.7
Shoal Creek nr Breese, IL	05594000	07/05/12		1.08	12.5
Silver Cr nr Freeburg, IL	05594800	08/02/12	1200	0.02	7.40
Silver Cr nr Freeburg, IL	05594800	07/05/12		0.04	9.87
Silver Cr nr Troy, IL	05594450	07/18/12		4.26	0.55
Sinsiniwa R nr Menominee, IL	05414820	08/02/12	1200	4.66	14.1
Spoon R at London Mills, IL	05569500	07/18/12		1.96	72.4
Spoon R at Seville, IL	05570000	07/18/12		4.69	81.7
Spring Br at 87th St. nr Naperville, IL	05540275	08/06/12		2.65	0.92
Spring Cr at Springfield, IL	05577500	07/20/12	0811	1.25	0
St Joseph Cr at Rte 34 at Lisle, IL	05540195	07/11/12	0721	3.23	0
Sugar Cr at Milford,IL	05525500	07/10/12	0900	2.57	7.99
Sugar Cr nr Springfield, IL	05576250	07/20/12	0650	10.01	19.7
Thorn Cr nr Glenwood, IL	05536215	07/11/12	1400	2.98	19.5
Thorn Cr nr Thornton, IL	05536275	07/11/12	1545	2.64	16.3
Tinley Cr nr Palos Park, IL	05536500	07/12/12	1100	2.27	0.44
Tyler Cr at Elgin, IL	05550300	07/12/12	1023	5.23	2.68
Vermilion R above Streator, IL	xxxxxxxx	07/12/12	1030	x.xx	10.2
Vermilion R at Danville, IL	03339000	07/19/12	0700	1.83	39.5
Vermilion R at Pontiac, IL	05554500	07/12/12	0730	2.36	1.50
Vermilion R below Streator Dam, IL	xxxxxxxx	07/12/12	1300	x.xx	0.88
Vermilion R nr Leonore, IL	05555300	07/12/12	0910	2.86	12.4
W Br DuPage R nr Naperville, IL	05540130	08/13/12	1045	4.86	42.6
WB DuPage R nr Warrenville, IL	05540095	07/11/12	0840	7.20	21.1
WB DuPage R nr West Chicago, IL	05539900	07/11/12	1214	3.39	9.74

USGS
science for a changing world

Initial Results from a Reconnaissance of Cyanobacteria and Associated Toxins in Illinois, August–October 2012

By Paul J. Terrio[1], Lenna M. Ostrodka[1], Keith A. Loftin[2], Gregg Good[3], and Teri Holland[3]

Abstract

Ten lakes and two rivers in Illinois were sampled in August–October 2012 to determine the concentrations and spatial distribution of cyanobacteria and associated cyanotoxins throughout the State. The reconnaissance was a collaborative effort of the U.S. Geological Survey and the Illinois Environmental Protection Agency. Sample results indicated that concentrations of both total cyanobacterial cells and microcystin were commonly at levels likely to result in adverse human health effects, according to World Health Organization guidance values. Concentrations generally decreased from August to October following precipitation events and lower temperatures.

Introduction

Cyanobacteria, also known as blue-green algae, can be found in surface waters throughout the United States. These microscopic organisms, when present in high concentrations, can cause the water to have a pea-soup appearance or they can accumulate as floating masses of blue- or green-colored scum, commonly called cyanobacterial blooms. Elevated nutrient concentrations, slow-moving water, warm temperatures, and sunlight are all thought to be conducive to the growth of cyanobacteria.

The presence of cyanobacteria in lakes and rivers can pose risks to human and ecological health. Some species of cyanobacteria produce toxins, known as cyanotoxins, which can cause gastroenteritic problems if ingested or inhaled. Cyanotoxins can also cause allergic reactions following bodily contact (Graham and others, 2009). In addition to toxin production, cyanobacteria also can produce taste-and-odor compounds, which increase the cost of water treatment (Graham and others, 2008). Consequently, cyanobacteria in Illinois lakes and rivers may hinder recreational activities, contaminate drinking-water supplies, and pose health risks.

A reconnaissance was conducted by the U.S. Geological Survey (USGS) and the Illinois Environmental Protection Agency (EPA) during August–October 2012 to (1) confirm recent detections of high cyanotoxin concentrations, (2) assess the spatial extent, concentrations, and characteristics of cyanobacterial blooms in Illinois, and (3) provide data to support State and local agencies in managing water resources to protect human, animal, and ecological health. This report summarizes initial results from this effort for informational and discussion purposes. A more detailed publication with all methods, analytical results, and interpretations is planned. In late August 2012, concerns arose after samples analyzed from a private lake indicated elevated concentrations of cyanotoxins and several observations of cyanobacterial blooms in northern Illinois were reported. The two agencies made an effort to collect a substantial number of samples prior to both the Labor Day weekend and imminent rainfall and cooler temperatures (remnants of Hurricane Isaac), which could potentially alter the cyanobacterial communities and cyanotoxin concentrations. Illinois EPA field screening for cyanotoxins earlier in 2012 and in previous years detected few concentrations of concern. An extended drought in 2012 and accompanying high temperatures might have provided conditions facilitating cyanobacterial dominance and associated cyanotoxin production.

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Methods

Study design

Between August 29 and September 4, 2012, ten lakes and two rivers were sampled for cyanobacteria, cyanotoxins, nutrients, and chlorophyll *a* (fig. 1). The water bodies sampled were selected based on reports of current cyanobacterial blooms, where cyanobacterial blooms had been observed in the past, where other field efforts already were being conducted, and where additional sites would improve longitudinal distribution of sample locations throughout Illinois. Additional samples were collected on October 24, 2012, at four sites (three lakes and one river) where some of the highest cyanotoxin concentrations were determined in August–September samples.

Field measurements

Field measurements of water temperature, specific conductance, dissolved oxygen, and pH were collected by using multi-meter sensors. All sensors were calibrated according to individual agency protocols the day of the sampling. Field measurements were made approximately 1 foot below the water surface and within 10 feet of the water-sampling location, so as not to disturb the water column at the point of sample collection. Field measurement values reported here are considered preliminary pending agency review and approval.

Sample collection

Cyanobacterial samples from lakes were collected at or near the shoreline or from a dock. Samples from rivers were collected near the banks or from a bridge at the center of the stream. All samples were collected from observed cyanobacterial blooms or areas of cyanobacterial accumulation, if present. Samples were collected by immersing and subsequently filling

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polyethylene bottles by hand or by using a weighted-bottle sampler. Samples were collected at the surface of the water. To minimize sample disturbance, bottles were pre-rinsed in the target lake or river away from where samples were collected. Samples were placed in a dark cooler with ice to be analyzed for cyanotoxins, cyanobacteria identification and enumeration, total nutrients, and chlorophyll *a*.

Laboratory analyses

Samples collected for cyanotoxin analyses were frozen to arrest cyanobacerial growth and chemical alteration before being sent for analysis to the USGS Organic Geochemical Research Laboratory (OGRL), Lawrence, Kansas. Samples were analyzed by using enzyme-linked immunosorbent assays (ELISA) to determine the presence of three cyanotoxins: microcystins, saxitoxins, and cylindrospermopsins. Subsequent tandem mass spectrometry was run on selected samples to determine the concentrations of several additional cyanotoxins, in addition to a verification of the ELISA results, where possible.

Cyanobacteria samples from each water body were collected in 500-milliliter (mL) polyethylene bottles and preserved with approximately 5 mL of Lugol's solution. The samples were subsequently shipped to GreenWater Laboratories, Palatka, Florida, for cyanobacterial species identification and enumeration.

Water samples to be analyzed for nutrients were also collected as grab samples and were preserved with sulfuric acid before shipment to the Illinois EPA laboratory in Springfield, Illinois. These samples were analyzed for total phosphorous, total inorganic nitrogen, total organic plus ammonia nitrogen, and total ammonia nitrogen using Illinois EPA-approved methods.

Chlorophyll *a* samples were collected in polyethylene bottles and filtered onsite onto a glass-fiber filter by using a hand vacuum pump. The sample filters were subsequently frozen before being shipped to the Illinois EPA laboratory for analysis per approved methods.

Results and Discussion

Samples collected in late August and early September had a wide range of cyanotoxin concentrations and total cyanobacterial cell counts (table 1). Results from the ELISA analyses showed that microcystins were the most frequently detected cyanotoxin and were found in 85 percent of the water bodies. Cylindrospermopsins were detected in 3 samples and at concentrations near the detection limit, and saxatoxins were not detected at any sampling site. Preliminary results from the mass spectroscopy analyses also indicated that microcystins were the predominant cyanotoxin present in the samples and were found in samples from 11 of the 13 sampling sites.

The highest total microcystin concentration (4,800 µg/L) was found in a northern Illinois lake—one of the lakes where concerns about cyanobacterial blooms was first expressed. Lower concentrations (less than 2 µg/L) of total microcystin were found in six lakes and all rivers. Total cyanobacterial cell counts also ranged broadly from the lowest count of 11,050 cells/mL in the Vermilion River to the highest count of 84,570,000 cells/mL in a northern Illinois lake.

The World Health Organization (WHO) developed guidance values for the relative probability of adverse human health effects from recreational exposure to microsytin-LR (a common microcystin variant) and total cyanobacteria (Chorus and Bartram, 1999). The explanation on figure 1 shows these guidance values and the likelihood of associated adverse health effects designated as low, moderate, high, and very high probabilities. By comparison with these guidance values, four lakes but no rivers were found to have high probabilities of health effects due to microcystin. For total cyanobacterial cell counts, virtually all of the water bodies had high or very high probabilities of associated health effects; the exceptions were a private lake in western Illinois and the Vermilion River.

Preliminary results from the October 2012 samples indicate that both total microcystin concentrations and total cyanobacterial counts decreased from late August or early September to October, 2012. Both total microcystin concentrations and total cyanobacterial cell counts decreased approximately one order of magnitude in samples collected from these two periods; microcystin concentrations for Westlake decreased approximately one-hundredfold. Both water temperature and pH were observed to have decreased at several sites between the August and October sample-collection dates.

The results from 13 water bodies sampled in 2012 indicate that cyanobacteria and associated cyanotoxins are a concern for Illinois residents and water-resource managers and agencies. The drought conditions and accompanying hot temperatures present during much of the summer in 2012 might have affected the development and persistence of cyanobacterial blooms. However, relatively little is still understood about the specific conditions that cause cyanobacterial blooms to occur and what causes the cyanotoxin. Further study and monitoring of the development and distribution of cyanobacterial blooms is needed to determine the best approaches and practices to managing Illinois surface waters.

Acknowledgments

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Table 1. Cyanobacterial toxin concentrations, cyanobacterial cell counts, and preliminary field measurements at selected lakes and rivers in Illinois, August–October 2012.

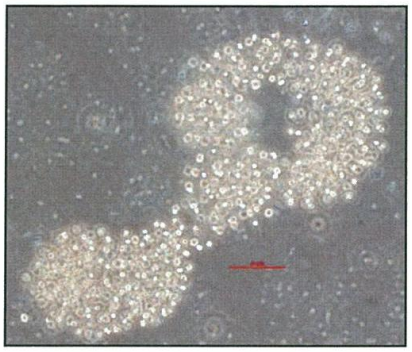
[NA, not analyzed; RP, results pending; >, greater than; <, less than; ELISA, enzyme-linked immunosorbent assay; µg/L, micrograms per liter; mg/L, milligrams per liter; mL, milliliter; µS/cm², microsiemes per square centimeter; °C, degrees Celsius]

Site	Collection Date	Microcystin ELISA[1] (µg/L)	Cylindrospermopsin ELISA[1] (µg/L)	Saxitoxin ELISA[1] (µg/L)	Total Cyanobacteria[2] (cells /mL)	pH[3] (standard units)	Specific Conductance[3] (µS/cm²)	Dissolved Oxygen[3] (mg/L)	Water Temperature[3] (°C)
Camp Walter Scott Lake (beach)	9/4/2012	1,500	0.03	< 0.05	3,529,000	NA	NA	NA	NA
Camp Walter Scott Lake (beach)	10/24/2012	> 50	RP	0.02	2,397,000	8.0	213	9.9	17.0
Wonder Lake (bay)	9/4/2012	0.88	< 0.02	< 0.05	467,600	8.3	854	4.3	27.3
Wonder Lake (N bay)	9/4/2012	0.56	< 0.02	< 0.05	NA	8.6	841	12.0	31.0
Wonder Lake (SW bay)	9/4/2012	0.93	< 0.02	< 0.05	NA	8.7	856	8.7	30.1
Fox River at Algonquin, IL (left bank)	8/30/2012	1.4	< 0.02	< 0.05	2,206,000	8.7	908	6.6	25.1
Fox River at Algonquin, IL (right bank)	8/30/2012	1.1	< 0.02	< 0.05	NA	8.5	1,110	7.5	24.8
Fox River at Algonquin, IL (left bank)	10/24/2012	0.11	<0.05	<0.02	473,800	8.6	924	14.7	15.5
Fox River at Algonquin, IL (right bank)	10/24/2012	0.14	<0.05	<0.02	509,800	8.5	926	12.4	15.2
Candlewick Lake	8/29/2012	4,800	0.04	< 0.05	84,570,000	9.6	367	21.6	30.1
Candlewick Lake (boat ramp)	10/24/2012	> 50	<0.05	RP	1,058,000	8.6	394	9.4	15.6
Candlewick Lake (bay)	10/24/2012	40	<0.05	<0.02	697,000	8.5	405	8.6	16.8
Westlake (near beach)	8/29/2012	62	< 0.02	< 0.05	NA	8.8	615	11.9	24.3
Westlake (N bay)	8/29/2012	1,700	< 0.02	< 0.05	302,500	9.4	596	19.3	25.5
Westlake (N bay)	10/24/2012	1.8	< 0.05	<0.02	27,730	8.0	703	8.0	13.8
Lake Le-Aqua-Na (near beach)	8/29/2012	6.7	< 0.02	< 0.05	1,179,000	9.3	376	22.0	31.0
Herrin-New Reservoir (boat ramp)	8/29/2012	0.23	0.02	< 0.05	185,800	NA	NA	NA	NA
Patriot's Park Lake (boat ramp)	8/30/2012	9.8	< 0.02	< 0.05	572,000	9.3	282	3.0	26.4
Marion Lake (boat ramp)	8/29/2012	< 0.10	< 0.02	< 0.05	240,400	NA	NA	NA	NA
Vermilion River at Pontiac, IL (right bank)	8/29/2012	< 0.10	< 0.02	< 0.05	11,050	8.6	589	8.1	25.3
Vermilion River at Pontiac, IL (left bank)	8/29/2012	< 0.10	< 0.02	< 0.05	NA	8.5	591	8.5	26.1
Fox River at Montgomery, IL (left bank)	8/30/2012	0.95	< 0.02	< 0.05	2,030,000	9.4	1,080	13.4	26.1
Fox River at Montgomery, IL (bridge)	8/30/2012	0.62	< 0.02	< 0.05	NA	9.2	1,090	13.3	26.3
Fox River at Montgomery, IL (culvert)	8/30/2012	0.17	< 0.02	< 0.05	NA	9.2	875	12.8	25.4
private lake	8/29/2012	0.13	<0.05	0.02	70,900	8.2	1,379	8.4	26.1
Lake Storey	8/30/2012	20	<0.05	<0.02	472,000	8.3	452	8.2	18.1

[1] Algal toxin analyses performed by the U.S. Geological Survey Organic Geochemistry Research Laboratory, Lawrence, Kansas.

[2] Total cyanobacterial cell counts determined at GreenWater Laboratories, Palatka, Florida.

[3] Preliminary field measurements collected by Illinois Environmental Protection Agency and U.S. Geological Survey field personnel.



Top: *Cylindrospermopsis raciborskii* (photo reproduced with permission from GreenWater Laboratories)

Middle: *Microcystis aeruginosa* (photo reproduced with permission from GreenWater Laboratories)

Bottom: Algae on Patriot's Park Lake (photo by Mike Bundren, Illinois EPA)

EXPLANATION

Marion Lake — **Site with Microsystin-LR advisory level (top), Total Cyanobacteria advisory level (bottom), and name**

World Health Organization (WHO) guidance values for the relative probablility of acute health effects during recreational exposure to microcystins and cyanobacteria, based on information presented in Chorus and Bartram, 1999, and Graham and others, 2009.

Relative Probability of Acute Health Effects (Advisory Level)	Microsystin-LR (ug/L)	Total Cyanobacterial (cells/mL)
Low	<10	<20,000
Moderate	10–20	20,000–100,000
High	20–2,000	100,000–10,000,000
Very High	>2,000	>10,000,000

Figure 1. Cyanobacteria sampling sites in Illinois showing relative probability of acute health effects from microcystins and cyanobacterial cells based on maximum levels found in samples collected in 2012.

ILLINOIS DEPARTMENT OF AGRICULTURE

Agricultural Report
Drought of 2012

The Drought of 2012 brought far-reaching impacts to the agricultural industry and virtually all facets of agriculture were touched by the event. The following identifies the agriculture related issues caused by the drought, those issues which persist currently and those issues that may continue to be problematic in the immediate future.

Crops

All regions of Illinois sustained major damages to crops; the most severe was in the southern third of the State. According to the USDA National Agricultural Statistics Service, statewide 2012 corn and soybean yields are estimated to be down 36% and 9%, respectively, as compared to 2011.

Aflatoxin levels in harvested corn have been a concern since the chemicals that produce aflatoxin exist in higher concentrations during hot, dry summers. The Illinois Department of Agriculture, Grain and Feed Association of Illinois, Illinois Corn Growers Association, Illinois Pork Producers, Illinois Beef Association, Illinois Poultry Council and the Illinois Milk Producers Association worked together to raise awareness of the potential aflatoxin problem in corn and the needed steps to ensure a safe supply of corn for production agriculture and commerce. Accordingly, the IDA issued written guidance to grain elevators, grain processors and feel mills on procedures to properly handle aflatoxin affected corn. The Department also petitioned the US Food and Drug Administration to temporarily allow the blending of corn containing more than 20 parts per billion of aflatoxin with corn found to have lower or negative levels of aflatoxin for livestock feed exclusively. The FDA approved the Department's request and the blended corn can conditionally be fed to mature poultry, breeding swine, finishing swine exceeding 100 pounds, plus to breeding and finishing cattle. The Department continues to closely monitor aflatoxin affected corn around Illinois.

Livestock

Livestock producers were also negatively impacted by the severe drought conditions. Pastures dried up quickly and producers resorted to feeding stored hay early. Hay growth was significantly curtailed, greatly reducing the hay crop. Consequently, some producers liquidated all or some of their beef cattle herds. Producers accessed the Department's Hay and Straw Directory to locate new sources of hay. A shortage of hay this winter in Illinois could cause hay prices to escalate. Illinois' pork producers were hit particularly hard by the drought as well. In response, Governor Quinn directed that the next major State purchase of meat include a 30% increase in the purchase of pork and that it be exclusively State raised and produced. The higher pork purchase will have relatively little effect on other State meat purchases. Some livestock producers experienced a shortage of well water. These producers had to haul water on a regular basis throughout the summer and fall to sustain their herds. Some deepened existing wells or

dug new wells. Some wells are going dry for the first time in November. Well water supplies could be stretched very thin this winter without adequate rainfall.

Commercial Navigation

The drought has also had a dramatic effect on water levels in the lower Mississippi River in Illinois. The low water level is adversely impacting the shipment of commodities (agricultural/other) to the Gulf of Mexico and to ports beyond. The middle Mississippi from St. Louis to Cairo is particularly problematic due to low water and “rock pinnacles”. In some instances, barge operators have had to use the “light load” technique to safely and successfully navigate the river. Implementation of flow restrictions on the Missouri River, an annual practice, could exacerbate the problem. Since the drought in many of the states west of Illinois is forecasted to extend into 2013, the Corps of Engineers believes that this portion of the river could suffer record low water levels this winter, thereby disrupting commercial navigation. If the river is closed or restrictions are placed on barge loadings, other modes of transportation may have to be relied upon for the timely shipment of commodities to their destinations.

DROUGHT RELATED PROGRAMS AND ACTIVITIES UNIVERSITY OF ILLINOIS EXTENSION 2012

In early June 2012, University of Illinois Extension Specialists recognized that conditions were developing that had the potential to lead to a drought and began to take action to help producers identify ways to minimize the impact if the drought should in fact develop. Owing to the fact that the problem was developing during a time period when farmers are busy with other activities on the farm, the Extension Specialists put most of their effort into developing programs that producers could view at home at night, including news releases and web page displays. Field meetings at University of Illinois Research Centers or at farmer fields were kept to a minimum. The first news release provided producers with an understanding of the impact of drought at different stages of growth for corn and soybean. As the drought progressed and it became obvious that some fields would have little if any production, the emphasis of the educational materials shifted to salvaging the crop for livestock feed. Producers were cautioned to be on the alert for high nitrate in corn grown on fields that would have little if any grain production. They were warned that ensiling high nitrate corn could result in toxic gases being released from the silo, a situation that could cause human illness or even death and/ or if fed, high nitrate silage could result in animal health problems. Attached please find copies of the list of news release articles and of the hits on the web pages.

As the season progressed further into the fall, drought affected corn developed toxins that presented a threat to the feed, food, and ethanol industries. Some of that corn is still isolated in on farm structures, awaiting a solution to allow them to use the product. As each new challenge developed from the drought, University of Illinois Extension was ready to respond with research based information.

Extension also responded to concerns related to the impact of the drought on lawn and garden problems. The full extent of the damage to some of the perennial plants may not be realized until next year. Extension will be prepared to provide guidance if and when those situations arise.

While the drought cycle appears to be broken in some areas of Illinois, there are other areas where subsoil moisture has not been replenished. If those areas do not receive adequate moisture to replenish the subsoil between now and planting season next year, a repeat of the devastation to crops is possible.

Drought related problems that producers will face in 2013 because of the 2012 drought include volunteer plants in field which were not harvested in 2012, with many of those volunteer plants carrying genetics for herbicide resistance; inability to accurately predict nutrient carryover, especially of N; and complicated marketing decisions.

Illinois Finance Authority
Drought Assistance Financing

As crops come in from the field, we are beginning to see the true economic impact of the 2012 drought. Illinois lending institutions are a key resource to help farmers bounce back from this period of hardship and plan for next year. And the Illinois Finance Authority (IFA) is here to help.

The IFA has already helped finance more than 500 agricultural projects across Illinois through its guarantee, loan and bond programs. IFA programs that help farmers achieve lines of credit, carry over debt, and restructure existing debt, include:

- **Agricultural Restructuring Debt Guarantee Program** provides 85% guarantee with a term up to 30 years on a local bank loan up to $500,000 used to consolidate existing debt and spread payments out over a longer period;

- **Working Capital Guarantee Program** provides 85% guarantee with a **commitment** up to 3 years on a local bank loan up to $250,000 used for input costs related to planting and raising agricultural crops;

- **Agricultural Loan Participation Program** provides IFA purchase of up to $500,000 of a customer's bank loan to reduce interest rate with a loan term up to 10 years;

- **Rural Development Loan Program** provides loans under a relending program from the U.S. Department of Agriculture-Rural Development from $50,000 to $250,000 for economic development financing in communities with less than 25,000 population

These programs are designed with the needs of Illinois farmers and agricultural lenders in mind.

Other activities outside of financing, IFA has been busy in promoting and communicating the efforts of the Drought Relief Task Force through various media tools. Director Meister has performed several news interviews via radio, television and on-site which span across the State from Northern Illinois to Southern Illinois. A clip tracker of IFA media surrounding the drought relief effort follows this overview.

Two key partners with Illinois Finance Authority Drought Relief efforts have been the Illinois Bankers Association and the Community Bankers Association of Illinois. Both groups have been instrumental by serving as liaisons and, in effect, members of the IFA sales team by engaging bankers and lenders through information and opportunities to increase the lenders' level of knowledge and understanding of Ag programs. We have also invited input from both Groups on ways to further improve IFA Ag programs to reach their full potential as tools to support and stabilize Illinois farms and agribusinesses.

IFA has met with each associations Agriculture committees and attended their annual Ag Banking Conference over the past several months. Illinois Bankers Associations and Community Bankers Association of Illinois partnership will continue to be a valuable asset in long term success in expanding the pipeline of Lenders to market IFA drought financing programs.

Continued efforts, IFA is committed in support of the Illinois Drought Relief Task Force over the next several months include:

- Calling on Ag bankers, related association leaders and legislators to introduce IFA programs,
- Direct mailings of programs available for Drought financing options,
- Post IFA program information on partner websites,
- Send e-blasts to member groups,
- Updated brochures to share with customers,
- Website content regularly updated,
- E-blasts for ongoing dialogue; and with continued efforts in
- Media placement: such as articles in Ag Week about banker-government alliance
- News conferences in target markets as appropriate
- Interviews with select editorial boards and radio and TV stations in ag communities

IFA is committed to continued agriculture financing to help farmers and communities affected by the 2012 drought.

Drought Relief Coverage

Date	*Publication/Outlet*	*Headline*	*Message*	*Link*
10.25.12	*The Daily Illini*	State Senator Frerichs speaks to ISS	"We are working on some ways to help farmers through IFA to make sure we can provide bridge loans for people," Sen. Frerichs said.	http://www.dailyillini.com/news/campus/article_7cf3eeb6-1e60-11e2-b1c9-001a4bcf6878.html
10.31.12	*IFA Press Release*	Illinois Finance Authority Supports State Farms with Low-Cost Lending as 2012 Drought Losses are Tallied	Details all the ways in which IFA is helping farmers deal with the effects of the drought	Internal Document
11.01.12	*The State Journal-Register*	Federal government: The drought is over in central Illinois	Ran the same story as The Peoria Star, Lincoln Courier, and Prairie State Outdoors mentioning Director Meister's quote: "These programs offer low-cost financing so farmers can make it through the next growing season."	http://www.sj-r.com/breaking/x481715163/Federal-government-The-drought-is-over-in-central-Illinois
11.01.12	*The Peoria Star*	Federal government: The drought is over in central Illinois	See State Journal-Register, Lincoln Courier, and Prairie State Outdoors	http://www.pjstar.com/news/x481715170/Federal-government-The-drought-is-over-in central-Illinois

11.01.12	*Prairie State Outdo*	Federal government: The drought is over in central Illinois	See State Journal-Register, Lincoln Courier, and Peoria Star	http://www.prairiestateoutdoors.com/index.php?/pso/article/federal_government_the_drought_is_over_in_central_illinois/
11.02.12	*Lincoln Courier*	Logan, Mason Counties remain in moderate drought	See State Journal-Register, Praire State Outdoors, and Peoria Star	http://www.lincolncourier.com/newsnow/x1272749980/Logan-Mason-Counties-remain-in-moderate-drought
11.05.12	*Illinois Ag Connect*	Illinois Finance Authority Supports State Farmers	"Farmers have had to cope with one of the worst droughts on record, and they'll need all the resources they can get to help them weather this year's catastrophe and enter 2013 ready to recover their losses," said Meister.	http://www.illinoisagconnection.com/story-state.php?Id=1116&yr=2012
11.06.12	*FarmweekNow.com of RFD Radio Network*	Illinois Finance Authority waives fees	"Farmers who face drought-related losses may consider IFA's lending programs," Meister said.	http://farmweeknow.com/story.aspx/illinois-finance-authority-waives-fees-1-64661
11.07.12	*U.S. soybean harvest expected to beat forecast*	U.S. soybean harvest expected to beat forecast	IFA is offering low-cost lending programs to help farmers cope with drought-related losses — and waiving application fees for the programs until Jan. 31, 2013.	http://www.news-gazette.com/news/agriculture/2012-11-07/us-soybean-harvest-expected-beat-forecast.html
11.16.12	*RFD Network, WILL*	Closing Market Report	IFA offers low-cost financing for drought relief.	https://www.yousendit.com/dl?phi_action=app/orchestrateDownload&rurl=http%253A%252F%252Fwww.yousendit.com%252Ftransfer.php%253Faction%253Dbatch_download%2526batch_id%253DWUJieEVYTkF6RS9WUThUQw

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

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PAT QUINN, GOVERNOR JOHN J. KIM, INTERIM DIRECTOR

DROUGHT REPORT

During the State Water Plan Task Force (SWPTF) meeting on June 19, 2012, the membership of the SWPTF agreed that it was time to activate the Drought Response Task Force (DRTF). The Illinois Environmental Protection Agency (Illinois EPA) was selected as co-chair with the Illinois Department of Natural Resources (DNR). Coordination was done with the Governor's Office through Department/Agency directors to initiate the Governor's DRTF.

Prior to activation of the DRTF, the Illinois EPA's Division of Public Water Supplied (DPWS) had already begun contacting community water systems (CWS) using surface water sources in each of our seven regional offices starting in March 2012. A tracking spreadsheet was used to record water level conditions at each of the CWS (128) using surface water (161 intakes). The systems using impounded reservoirs and side channel intakes on streams are the most vulnerable during the initial phases of hydrologic droughts. The Illinois State Water Survey (ISWS) had recently evaluated several of these systems (i.e. Decatur and Springfield) to show that they are at risk during droughts. Illinois EPA began developing weekly reports for the Governor's Office highlighting relevant information from the detailed report. After the DRTF was initiated the detailed and weekly summary report was also shared with the Office of Water Resources at DNR and the ISWS. A public water supply report was also given at each of the DRTF meetings. Moreover, we updated the United States Environmental Protection Agency on a routine basis.

The CWS that were the most stressed during the drought included:

- Decatur (Macon County);
- LaHarpe (Hancock County);
- Vienna Correctional Center (VCC); and
- Vienna (Johnson County).

Illinois EPA and DNR coordinated outreach and assistance to LaHarpe and VCC. DNR developed updated bathymetric surveys for reservoirs at these systems. DNR also helped facilitate excavation around one of the intakes at VCC. Illinois EPA has had extensive meetings and conducted technical reviews to assist Decatur with their short and long-term issues. Recent rainfalls have alleviated Decatur's short-term issues, but it is recommended that they continue down the path of implementing long-term plans due to being an at risk system.

Illinois EPA staff encouraged water use restrictions be implemented at CWS, and also offered emergency permits to deal with drought situations. A fact sheet was developed and posted on the Drought.Illinois.gov web site to provide examples of where communities were implementing restrictions to conserve water http://www2.illinois.gov/gov/drought/Pages/WaterConservation.aspx.

Groundwater level trends from north to south have shown declines below normal, but some recovery. We will have a better idea next spring what the impacts to CWS using groundwater are attributable to the drought.

DNR digitized the state-wide map of the seven day ten year low flow (7Q10) streams. This information was shared with the Illinois EPA's Clean Water Act programs that base effluent limits in discharge permits on the 7Q10. There were numerous facilities that could not meet the thermal standards and sought provisional variances over the summer.

It is recommended that a conference be convened that focuses on at risk CWS to discuss long-term drought planning and implementation.

2012 DROUGHT RESPONSE TASK FORCE SUMMARY REPORT

INVESTOR-OWNED WATER UTILITIES
ILLINOIS COMMERCE COMMISSION
WATER ENGINEERING PROGRAM

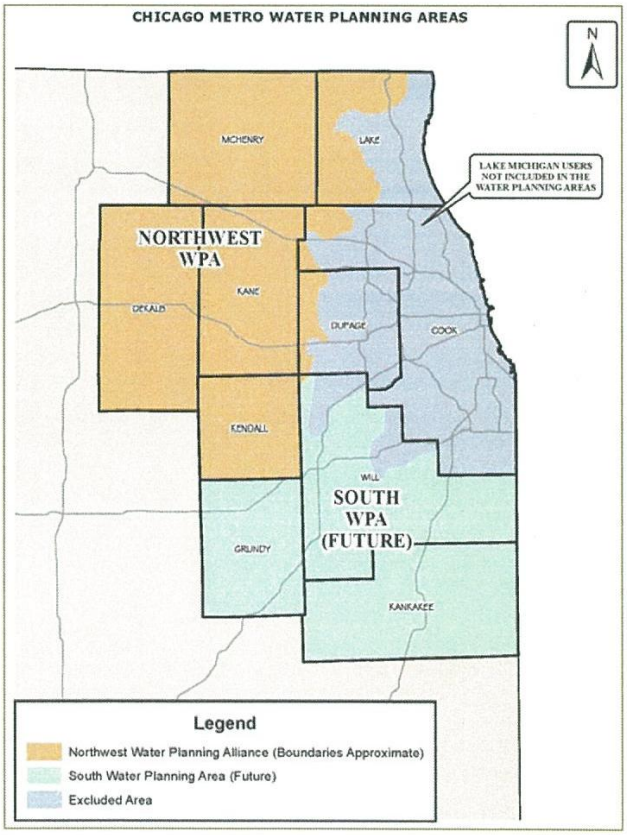
There was one drought-related incident for investor-owned water utilities in 2012. Illinois-American Water Company reported that they experienced a drought-related water incident at its Cairo District. Due to low Ohio River levels in Cairo, the Cairo District water intake pumps had lost prime. A partially closed gate valve in the water intake was found to be the cause, and the valve was re-opened. Illinois-American Water Company has restored water service to customers in its Cairo District. A boil water order was issued due to a temporary interruption in water service. The boil water order has been lifted.

NORTHWEST WATER PLANNING ALLIANCE

2012 DROUGHT SUMMARY REPORT

NORTHWEST WATER PLANNING ALLIANCE

The Northwest Water Planning Alliance (NWPA) is a coalition of five counties (Lake, McHenry, Kane, Kendall and DeKalb) and five COGs (Lake County Municipal League, McHenry County Council of Governments, Northwest Municipal Conference, Barrington Area Council of Governments and Metro West Council of Government) representing approximately 80 communities and 1.3 million people.



The NWPA consists of groundwater and surface water (Fox River) dependent communities in northeastern Illinois. Currently NWPA is managed under the direction of an Executive Committee consisting of 14 elected public officials and chaired by Aurora Mayor Thomas Weisner. NWPA is also supported by a Technical Advisory Committee (TAC) which provides technical support. The TAC is chaired by Mr. Peter Wallers and is comprised of members appointed by the NWPA: local water professionals, Public Works Directors, County and Municipal Representatives and various consulting members including Metropolitan Planning Council (MPC), Illinois State Water Survey (ISWS), Chicago Metropolitan Agency for Planning (CMAP), et al.

All those involved in the organization serve as volunteers; NWPA does not have any paid positions.

43 West Galena Boulevard, Aurora, IL 60506 ~ (630) 859-1331 ~ www.nwpa.us

At the request of the Illinois Department of Natural Resources, Mayor Weisner and Mr. Wallers served as Technical Advisors to the Governor's Drought Management Task Force. They have participated in most of the bi-weekly Task Force meetings.

NWPA Area Activities Related to the Drought

- At the monthly TAC meetings, the TAC reviewed the current condition of the drought in northeastern Illinois and discussed issues related to water suppliers. Suppliers reported the status of their systems, peak water use and any conditions or concerns related to the drought. Summary information was relayed to the Drought Task Force as part of the Task Force meetings.

- In specific response to the 2012 drought and consistent with the on-going concern for a sustainable water supply throughout the NWPA region, the TAC developed a Model Lawn Watering Conservation Ordinance.

  The ordinance, which was approved unanimously by the Executive Committee in November of 2012, is being distributed for implementation in our region. A copy is attached for reference.

  Additionally, NWPA has partnered with CMAP to prepare an "Outdoor Water Conservation Manual". This manual was adapted for the NWPA region by Margaret Schneemann with CMAP and will help all of our residents more effectively utilize discretionary water resources for lawn care now and in the future. This publication will be available early in 2013.

NWPA Water Supply

- During the drought of 2012 both Elgin and Aurora continued to withdraw water from the Fox River. Both communities indicated that the Fox River had adequate hydraulic capacity to meet their needs; however, both communities commented that the water quality was poor for most of the summer and fall resulting in increased costs of treatment. City of Aurora did utilize a higher blending rate with their deep aquifer resources during most of the drought period to mitigate the reduced water quality in the Fox River.

  Groundwater dependent communities were able to provide adequate supplies to their users. The communities supplied by the deep aquifers reported no significant problems with supply; however various communities did adopt water restrictions to help manage peak demand.

  Communities utilizing shallow groundwater resources monitored water levels and managed accordingly. In some cases this required the enactment of more stringent outdoor water use restrictions.

  In general, NWPA water suppliers were able to effectively manage their supplies throughout the drought.

Next Steps

NWPA has partnered with CMAP and MPC for a Local Technical Assistance (LTA) Grant to prepare a Drought Management Plan for the NWPA region. This effort has been initiated and will continue through 2013.

NORTHWEST WATER PLANNING ALLIANCE

NWPA Regional Water Conservation Lawn Watering Ordinance

Outdoor limitation on the use of water

A. Purpose: Based on research from the Illinois State Water Survey, the Chicago Metropolitan Agency for Planning, local counties and other organizations, [Name of local government] recognizes that potable water is a finite natural resource; that communities within the Northwest Water Planning Alliance rely on shared groundwater and river water sources; and that water conservation is a necessary component of a sustainable water supply.

B. Definitions: The following words and phrases when used in this section shall, for the purpose this section, have the following meanings:

CITY or VILLAGE: [name of local government]

DRIP IRRIGATION SYSTEM: An IRRIGATION SYSTEM that saves water by allowing wat to drip slowly to the roots of plants, either onto the soil surface or directly onto the zone. Such systems include but are not limited to soaker hoses.

HANDHELD WATERING DEVICE: A means of watering that requires the watering dev to be held in order to operate, including watering cans, buckets, and hoses equippe with automatic shutoff valves. This also includes the handheld use of a hose, provid is continuously attended.

HARVESTED RAINWATER: Water that is accumulated and stored during times of precipitation, such as through rain barrels and cistern systems, is prevented from entering the stormwater treatment system, and is redirected for reuse onsite.

IRRIGATION SYSTEM: A system consisting of pipes, valves and sprayers connected to potable water supply to manually or automatically irrigate lawns or landscaping.

LANDSCAPE: The area of the property planted with vegetation other than grass.

LAWN: The area of the property planted with grass.

LAWN SPRINKLER: A device attached to a hose designed to allow for the unattended watering of lawns or landscaping, but does not include a drip irrigation system.

LAWN WATERING: Any means or methods of applying water to a lawn.

NORTHWEST WATER PLANNING ALLIANCE (NWPA): An interjurisdictional alliance of counties, five councils of government, and roughly 80 municipalities that collaborate and cooperate on regional water resource planning issues, particularly concerning shared groundwater aquifer resources.

PERSON: Any individual, firm, partnership, association, corporation, company, organization or entity of any kind.

RECLAIMED GREYWATER: Water that is produced by treating onsite wastewater generated by household activities, such as laundry, dishwashing, and bathing, is

prevented from entering the municipal wastewater treatment system, and is redirected for reuse onsite.

RECYCLED EFFLUENT: Water that was formerly municipal wastewater and has been treated to remove solids and impurities for reuse for non-potable purposes.

C. Application Of Regulations:
   1. The provisions of this section shall apply to any person using water within [name of local government], and:
      a. the property is supplied by the [city or village]'s water system, regardless of whether:
         i. the property is located within the municipal boundaries of the [city or village]or
         ii. the person using the water has a contract for service with the [city or village]; or
      b. the property is located with the municipal boundaries of the [city or village] and uses water other than municipal water that is supplied by the same aquifers as the municipal water supply.
   2. The provisions of subsection (D) of this section shall apply year-round, subject to any modifications thereof, including application of these or other regulations during this or any other time, by an emergency proclamation.

D. Permitted Hours And Days For Specified Uses:
   1. All persons using water shall adhere to the following schedules for lawn watering:
      a. All properties with even numbered street addresses (i.e., numbers ending in 0, 2, 4, 6 or 8) may use water for lawn sprinkling only on even numbered calendar dates between the hours of six o'clock (6:00) A.M. and nine o'clock (9:00) A.M., or six o'clock (6:00) P.M. and nine o'clock (9:00) P.M.
      b. All properties with odd numbered street addresses (i.e., numbers ending in 1, 3, 5, 7 or 9) may use water for lawn sprinkling only on odd numbered calendar dates between the hours of six o'clock (6:00) A.M. and nine o'clock (9:00) A.M., or six o'clock (6:00) P.M. and nine o'clock (9:00) P.M.
      c. All properties which cannot be readily identified as having even-or odd-numbered street addresses are hereby designated as even-numbered for water conservation purposes.
      d. No property will be allowed to use water for lawn sprinkling on July 31 and August 31 of the calendar year.
   2. There shall be no restrictions as to hours or days when water may be used for any of the following:
      a. Lawn watering where such watering is done using reclaimed greywater, recycled effluent, or harvested rainwater;

b. The watering of landscape, such as trees, shrubs, flowers and gardens, with a handheld hose not larger than one-inch diameter or by means of an automatic root feed or drip irrigation system;

c. Lawn watering where such watering is done with the proper, attended use of a handheld watering device;

d. Vehicle or equipment washing, provided that all water hoses are equipped with positive shutoff nozzles; or

e. Any other lawful use of water such as bathing, clothes washing, or other normal household uses not otherwise specifically restricted by the provisions of this section.

E. Sod Laying And Seeded Lawn Installation Restrictions And Permit Requirements:

1. Notwithstanding the above provisions, sod laying, lawn seeding, and the planting of other landscaping for the establishment of a new lawn or new landscaping is prohibited from July 1 through August 31 each year, unless the source of watering for said sod, lawn seeding or planting of landscaping is derived from reclaimed greywater, recycled effluent, or harvested rainwater. The prohibition shall not apply to soil erosion and sedimentation plans required pursuant to city ordinances (with approved plans) or for restorations due to required repairs of public utilities (e.g., water main breaks).
2. Except for the period of July 1 through August 31 of each year or during an emergency proclamation event, water from the city water distribution system or private wells may be used for the establishment of sod or seeded turf lawns planted or installed in the current year, only as follows:
    a. A permit issued by the [director of public works] (or his designated representative) is required for the installation of all seeded and sodded lawns. The application shall include the following information:
        i. The address of the property where the sod is to be laid;
        ii. The name and address of the owner of said property;
        iii. The name and address of the contractor;
        iv. The number of square feet of sod to be laid; and
        v. The date on which the sod is to be laid.
    b. On the day new sod or seed has been placed on a property, a person may use a lawn sprinkler to apply water to the sod or seed for a total period of time not to exceed eight (8) hours. For the next nine (9) days thereafter, a person may use a lawn sprinkler to apply water to said sod or seed each day during permitted hours of water use. Following the first ten (10) days after the sod or seed is placed, the provisions of subsection (C) and (D) of this section shall apply.

NORTHWEST WATER PLANNING ALLIANCE

F. Waste of Water Prohibited: No person shall allow a continuous stream of water to run off into any gutter, ditch, drain, or street inlet while using water for restricted purposes, nor shall a person spray or sprinkle streets or sidewalks.

G. Exceptions: The provisions of this section shall not apply to any commercial or industrial entity for which the use of water is necessary to continue normal business operations, or to maintain stock or inventory. This exception shall not apply to any uses of water not essential to normal business operations or maintenance of inventory or stock, and specifically shall not apply to lawn watering.

H. Emergency Proclamation: Whenever the water supply is diminished from any cause, including, but not limited to, prolonged dry period or drought, increased water demand, equipment failure, or water quality concerns, to an amount which in the opinion of the city engineer or director of public works is or is likely to become dangerous to the health and safety of the public, the [mayor or manager] is hereby authorized and empowered to issue an emergency proclamation specifying different or additional regulations on the use of water.

1. In the case of regional dry periods or drought, the mayor shall take into account the recommendations of the regional water supply planning group, the Northwest Water Planning Alliance (NWPA), on making the decision to issue an emergency proclamation.
2. Such regulations may provide for limitations on the usage of water, limitations on days and hours of use of water for some or all purposes, and the prohibition of specified uses of water. The following shall constitute the default emergency regulations:
    a. In the case of moderate to severe drought conditions or similar regional water supply constraints as advised by the NWPA, the use of sprinkler systems shall be prohibited. Outdoor use of water shall still be allowed for those exempted uses in subsection (D)(2) and do not have to follow hour or day restrictions.
    b. In the case of extreme to exceptional drought conditions or similar regional water supply constraints as advised by the NWPA, the use of water outdoors for any purpose shall be prohibited.
3. Upon issuing such proclamation, the [mayor or manager] shall make the contents thereof known to the public by posting a copy at the [city or village] hall, and by news release to local newspapers and radio media, and may also endeavor to notify the [city or village] residents and other persons in any other practical manner that he or she shall devise. Further, the [mayor or manager] shall immediately deliver notice of such proclamation, and the regulations that have been imposed by such proclamation, to all members of the [city council or village board].
4. The emergency proclamation of the [mayor or manager], and the regulations imposed thereby, shall remain in full force and effect until any one of the following shall first occur:

a. The [mayor or manager] determines that the emergency no longer exists and that the emergency proclamation, and the regulations imposed thereby, shall no longer continue in effect.
b. The [city council or village board] modifies or repeals the emergency proclamation, and the regulations imposed thereby, by means of an ordinance enacted at any regular or special meeting of the [city council or village board].

5. Any [city or village] employee or officer may, at the direction of the [mayor or manager], notify and warn any person of the effect of said emergency proclamation and direct said person to comply with said watering or sprinkling restrictions. If any said person, after having first been warned about said restrictions of the emergency proclamation, shall continue to violate said restrictions of the proclamation, they shall be deemed to be in violation of this section.

I. Authority: The authority to prohibit and further regulate the sprinkling of lawns, shrubbery and gardens shall be expressly reserved and may be amended from time to time, as necessary, by the [mayor or manager] and [city council or village board].

J. Violation And Penalty:

1. Any person who violates, disobeys, neglects, fails to comply with or resists enforcement of the provisions of this ordinance shall, within ten (10) days of receiving notice of such violation, pay the [city or village] a fine, as follows:
    a. Fifty dollars ($50.00) for a first offense;
    b. One hundred dollars ($100.00) for a second offense; and
    c. Two hundred dollars ($200.00) for each subsequent offense.
2. Each day a violation occurs or continues shall be considered a separate violation for purposes of this section.
3. In addition to penalties provided herein, the city may recover reasonable attorney fees, court costs, court reporter fees and other expenses of litigation.

Alternatively, the ordinance may be constructed as a color-coded ordinance, whereby subsection (D)(1) would be adjusted to add language about "Condition 'Green,'" and subsections (H)(2)(a) and (b) would be adjusted to add language about "Condition 'Yellow'" and "Condition 'Red,'" respectively and to remove language about the process for issuing an emergency proclamation. In addition, the following section would be added:

K. Signs: The [city or village] shall cause signs to be posted in conspicuous public places at entrances to the [city or village], as well as posting information on the [city or village] website, advising residents of the watering conditions then in effect.

REPORT OF ACTIVITIES OF THE EAST CENTRAL ILLINOIS REGIONAL WATER SUPPLY PLANNING COMMITTEE IN RELATION TO THE DROUGHT OF 2012

The East Central Illinois Regional Water Supply Planning Committee (RWSPC) met May 18, July 13, and September 14 and heard reports on the actions of its Drought Response Subcommittee (DRS) each time. Meetings also included updates from the Illinois State Water and Geological Surveys on current conditions of ground and surface water supplies.

The DRS produced two reports (attached) that were delivered to a list of stakeholders. The first report provided information on the likelihood and characteristics of droughts in East Central Illinois. The second produced a list of municipalities with "at-risk" supplies and why they were considered at risk. Both reports relied heavily on work done and data provided by the surveys.

The DRS thought that one of the potentially most useful things it could do would be to develop a model drought (or other water supply emergency) ordinance that a community or district could adopt as a pre-event preparation, so the community would have in mind what it would do if such an emergency were to arise. Similarly, it worked on developing a model ordinance that could coordinate community government authority to respond to a water emergency in an area served by a private utility, which does not have authority to restrict its customers' usage.

A draft of the second type of ordinance has been submitted to the Champaign County Regional Plan Commission, which will review, adapt and hopefully submit it to the County Board for adoption. Since Illinois American Water serves several communities and unincorporated areas, the DRS thought it would be important to work regionally to avoid having regulations in place for one community, but not for another where both are served by Illinois American.

The RWSPC is actively pursuing funding to be able to update its adopted Water Supply & Demand Reports from 2009. The original report recommended updates on 5 year intervals, but the executive order that initiated development of the report didn't fund future updates, and in fact didn't deliver the original amount committed to develop the report. The drought highlighted the importance of water supply planning and the RWSPC is committed to acquiring funding and updating the report.

The RWSPC also sees education and outreach on water supply planning issues as major focuses for their efforts. Pamphlets, DVDs, and other materials are being distributed and committee members all make themselves available to present relevant information upon request.

EAST-CENTRAL ILLINOIS WATER SUPPLIES VULNERABLE TO DROUGHTS OF RECORD

DROUGHT SUBCOMMITTEE of the REGIONAL WATER SUPPLY PLANNING COMMITTEE (RWSPC)

Recent rainfall has eased the drought situation somewhat, but precipitation for the year remains considerably below normal. The Drought Subcommittee has compiled a list of water supplies judged by the Illinois State Water Survey to be vulnerable to the possible recurrence of droughts of record. Droughts of record are identified from the historical records and are not predictions for the next twelve months. Nevertheless, we know that climate conditions that have occurred in the past can recur in the future. It is prudent to assess the risks and be prepared.

SURFACE WATER

Springfield

Lake Springfield was completed in 1935 and provides water for 133,000 people (2008). Lake water also is used to generate municipal electricity.

The drought of record occurred from June 1894 through December 1895 (19 months).

Nature of the risk: Inadequate water supply, i.e., there is greater than a 50 per cent probability that the system will be unable to meet projected water use with recurrence of a drought of record. Most of the city's electricity generating units would need to be shut down. The city's higher priority potable water supply is considered marginal to at-risk, i.e. there is less than 10 per cent probability that the system will fail to meet demands.

Bloomington

Lake Bloomington, completed in 1930, and Lake Evergreen, completed in 1971, provide water for 72,330 people (2008).

The drought of record occurred from July 1939 through March 1941 (20 months).

Nature of the risk: At-risk water supply, i.e., there is a 0-50 per cent probability that the system will be able to meet projected water use with recurrence of a drought of record. By 2020, the system will be inadequate to meet demand, i.e., there will be greater than a 50 per cent probability that the system will be unable to meet projected water use with recurrence of a drought of record.

Decatur

Lake Decatur was completed in 1922 and provides water for 90,243 people (2008). Private companies such as Archer Daniel Midland and Tate and Lyle also withdraw water from Lake Decatur.

The drought of record occurred from 15 July 1930 through 20 April 1931 (280 days).

Nature of the risk: At-risk water supply, i.e., there is 10-50 per cent probability that the system will be unable to meet projected water use with recurrence of drought of record. By 2020 the system will be inadequate to meet demand, i.e., there will be greater than a 50 per cent probability that the system will be unable to meet projected water use with recurrence of a drought of record.

Danville

Lake Vermilion was completed in 1971 and provides water for 55,000 people (2008).

The drought of record occurred from 1930 through 1931.

Nature of the risk: The system is currently adequate, but is projected to become at-risk by 2040, i.e., there will be a 10-50 per cent probability that the system will be unable to meet projected water use with recurrence of a drought of record.

GROUNDWATER

The impacts of drought on recharge to aquifers are less well-documented or understood.

i) Groundwater supplies developed from buried aquifers are relatively immune to droughts. However, the Mahomet Aquifer does appear to respond to droughts, e.g., the historical record shows step-wise declines in head at Petro North during droughts, but the mechanisms for the response have not been clearly established.

None of the current groundwater users obtaining water from the Mahomet Aquifer is considered at risk of future water shortage during a worst case drought.

Impacts from increased pumping during droughts include reductions in stream baseflow and reductions in head in wells constructed in the Mahomet and shallower aquifers. Reductions in stream baseflow indicate that surface and groundwater systems are linked and pumping groundwater can reduce surface water availability.

ii) Water levels in wells finished in unconfined portions of the Mahomet Aquifer, e.g., Havana Lowlands, drop during droughts, but water shortages can be avoided by ensuring that wells and pumps are sufficiently deep.

iii) Shallow aquifers do not have water stored in overlying deposits from which they can draw during times of drought. Therefore, water levels in such aquifers are more sensitive to climatic conditions and will decline in response to dry weather. The situation can be exacerbated by the effects of well interference.

Alluvial valley aquifers often are in hydraulic communication with the streams occupying the valleys in which the aquifer is situated. If streamflow is affected by drought, well yields can also be affected adversely.

Groundwater flow models are a good way to assess groundwater susceptibility to drought conditions, but it is simply not practical for the ISWS to develop detailed flow models for each of these supplies.

The ISWS has prioritized community groundwater supplies at risk to drought conditions based on a number of criteria [note: drought severity is not defined]: well depth; proximity to surface waters; well density; population served; and uncertainties. Private groundwater supplies from shallow aquifers and in areas where no aquifer exist are also susceptible to drought conditions. In 2006, the following communities in East-Central Illinois were deemed potentially vulnerable to drought conditions [well number; depth (ft); population served]:

CASS:
Chandlerville; 3; 65; 704
4; 60; 704

IROQUOIS:
Milford; 7; 78; 1369
8; 80; 1369

LOGAN:
Broadwell; 1, 48; 150
2; 53; 150
4; 52; 150
Illinois American Water – Lincoln; 11; 50; 15200
12; 50; 15200
14; 54; 15200
16; 52; 15200
18; 54; 15200
Mount Pulaski; 4; 34; 1800
5; 32; 1800
6; 39; 1800

McLEAN:
Heyworth; 1; 62; 2431
2; 59; 2431
3; 50; 2431

MENARD:
Athens; 3; 53; 4350
4; 57; 4350
Tallula; 3; 52; 900
4; 52; 900

SANGAMON:
Curran Gardner PWD; 1; 50; 4800
4; 55; 4800
5; 44; 4800

Dawson; 1; 36; 2220
2; 54; 2220
3; 41; 2220
5; 54; 2220
Pleasant Plains; 2; 60; 1236
3; 61; 1236
4; 61; 1236

TAZEWELL:

Groveland Township Water District; 1; 84; 2430
2; 85; 2430
Lake Windermere Estates subd; 1; 32; 300
3; 55; 300

WOODFORD:

Roanoke; 3; 52; 1994
5; 51; 1994

TOTAL GROUNDWATER: 38 wells serving some 40,000 people are at-risk public water supply systems. Other towns may need to be added due to heavy drought demands for nearby users, such as Weldon near Decatur's DeWitt wellfield. Some 110,000 people in the region have private water supplies and many of these also are at risk.

TOTAL SURFACE AND GROUNDWATER: Water supplies for some 400,000 people in the region are inadequate or at-risk during a drought of record and with population growth there could be 50, 000 more by 2040.

CONCLUSIONS

Unless more adequate water supplies are provided, about half a million people could be at risk of water shortages during a worst-case drought by 2050. If temperature increases, water demand could increase further, putting additional strains on water supplies.

Water shortages can be prevented by preparing for droughts in advance and by activating drought response plans when they occur. The costs of action can be weighed against the costs of no action.

Conservation measures are most effective for systems that are only marginally vulnerable to drought, but should never be viewed as a substitute when an additional or augmented source of supply is needed. For most communities classified as inadequate or at-risk, the development of supplemental sources of water and interconnection with larger systems having surplus yield are seen as solutions to resolve drought vulnerability issues.

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IDPH Drought Response Task Force 3rd Quarter 2012 Report

1. Local Health Departments reported that low water tables had the following impacts on shallow private water wells:

   a. There was an overall trend of increased permits for new wells and deepening existing wells.

   b. There was a noticed increase of well servicing calls to lower pumps.

   c. Numerous private well owners are hauling bulk water from alternate supplies. Several municipal water supplies are not selling bulk water and others are restricting sales.

2. Lee and Whiteside County report agricultural irrigation has been associated with drops in local aquifers resulting in localized instances of a few shallow private wells running dry. Irrigation generally ceases in September.

3. The Department's Division of Food Drugs and Dairies has determined the need to resume aflatoxin sampling for milk. The mycotoxins found in grain are more predominant during a drought season and many corn fields being harvested for silage. Dairy cows that eat feed containing 20 parts per billion or greater of aflatoxins may produce milk that exceeds the tolerance level for aflatoxins. The guideline for allowing milk into the supply is a level less than 0.5 parts per billion. Aflatoxins are carcinogenic to animals and possibly humans, and thus shall be monitored closely. Therefore, sampling and testing will be conducted in September 2012 and January 2013.

   Final reports for the sampling and testing conducted statewide in September 2012 have been completed. Of the 315 total samples collected and tested, only two samples screened received a positive result for Aflatoxin M-1 with a result of >0.0005 mg/L. Sampling and testing will be conducted again in January 2013.

Illinois Department of Natural Resources

The mission statement for the Department of Natural Resources states:
To manage, conserve and protect Illinois' natural, recreational and cultural resources, further the public's understanding and appreciation of those resources, and promote the education, science and public safety of Illinois' natural resources for present and future generations.
Drought conditions create challenges to the Department's mission as described herein/

Aquatic Species Impacts

Numerous fish kills have occurred on the rivers and lakes in Illinois. Fish kills have been recorded on the Mississippi, Rock, Fox, Kankakee, Des Plaines, Embarrass, Little Wabash, Vermillion, Illinois, Sangamon, Little Wabash, and Big Muddy Rivers. Fish kills have been recorded in the following public access lakes: Clinton, Sangchris, Heidecke, Braidwood, Powerton, Harris, and Marion City Lakes. Table 1 details the kills by week, location, and type of fish. Fish kills are precipitated by low flows, low dissolved oxygen, and high water temperatures. There has also been substantial loss of mussels in the Fox River and some in the Kankakee River. Loss of mussels occurs when the mussel bed is exposed to air as the water recedes due to low flows.

Table 1 - Summary of fish kills- Drought of 2012

Water body	Location	Numbers	Species
Week of July 9-15			
Rivers and Streams			
Sugar Creek	Sangamon Co	Hundreds	Asian carp, common carp
Spring Creek-backwater	Sangamon Co	Hundreds	Asian carp, common carp
IL River backwater	Fulton Co	Thousands	Asian carp
Vermillion River-Streator		Thousands	Asian carp
L. Wabash River- Wynoose		Hundreds	All species
L. Wabash River- Mt. Erie			
L. Wabash River- S. of Effingham	Effingham Co	Hundreds	All species
Embarras River- Charleston	Coles Co	Hundreds	Mussel species
Embarras River- Lawrenceville	Lawrence Co	Hundreds	Shad, Flathead catfish Buffalo and Suckers
Mississippi River- Pools 13-15	Multiple Co's	Dozens	Northern Pike, Muskies
Rock River- Sterling		Dozens	Northern Pike, Muskies
Fox River- Aurora		Hundreds	Suckers, Northern Pike Muskies
Fox River- Silver Springs-Montgomery	Multiple Co's	Hundreds	Suckers, Northern Pike Muskies
Des Plaines River- Riverside- Lyons		Dozens	Suckers, Muskies

Water body	Location	Numbers	Species
Public Lakes			
Clinton Lake	Dewitt Co.	Thousands	Hybrid striped bass, Largemouth bass, Channel and Floathead catfish, Shar
Sangchris Lake	Christian Co	Thousands	Striped bass, Largemouth bass, White bass, Shad Channel and Flathead Catfish
Heidecke Lake	Grundy Co	Dozens	
Braidwood Lake		Dozens	
La Salle Lake		Hundreds	
Powerton Lake	Tazewell Co	Thousands	Largemouth and Smallmouth bass, Hybrid Striped bass, Channel and Flathead Catfish, Shad
Sugar Creek Lake - Shawnee Forest		Thousands	Largemouth bass, Channel Catfish, Bluegill
Harris Pond, Kendal Co FPD	Kendall	Thousands	Largemouth bass, Bluegill Crappie
Private lakes and ponds			
13 ponds	Statewide		
Week of July 16-22			
Rivers and Streams			
Fox River	Multiple Co's	Hundreds	Mussel species
Kankakee River	Multiple Co's	Dozens	Mussel species
Sangamon River- Decatur	Macon Co	Hundreds	Asian carp
Public Lakes			
None			
Private lakes and ponds			
15 ponds	Statewide		
Week of July 23-29			
Rivers and Streams			
Big Muddy River- below Rend Lake			Asian carp, Common Carp, Buffalo, Gar, Drum A few sport fish
Private lakes and ponds			
4 ponds	Statewide		

Water body	Location	Numbers	Species
Week of July 30-Aug 6			
Rivers and Streams			
Whitley Creek	Moultrie		
Private ponds			
6 ponds	Statewide		
Rivers and Streams			
None			
Week of Aug 7-13			
Private lakes and ponds			
Echo Lake	Lake Co		Largemouth bass, Bluegill Carp, Channel catfish
8 ponds	Statewide		
Week of Aug 14-20			
Rivers and Streams			
None			
Public Lakes			
Marion City Lake		Thousands	Largemouth bass, Bluegill Redear sunfish, Crappie sp., Channel and bullhead catfish
Private lakes and ponds			
A few ponds were reported	Statewide		
Week of Aug 21-27			
Rivers and Streams			
Kaskaskia River	Clinton Co	Hundreds	None listed
Public Lakes			
Horseshoe Lake	Alexander Co	Hundreds	Asian carp, Buffalo sp.
Private Lakes and ponds			
A few ponds were reported	Statewide		
Week of Sept 25-Oct 1			
Rivers and Streams			
Illinois River- Anderson Lake	Fulton	Hundreds	Asian carp
Illinois River- Crabtree Creek	Fulton	Thousands	Asian carp
Public Lakes			
None			
Private lakes and ponds			
None			

Land Management Concerns

Illinois Department of Natural Resources manages and maintains 324 state-owned and leased state parks, fish and wildlife areas, state forests, state trails, natural areas and recreational sites; with 45 million visits annually. These sites contribute nearly $1 billion in visitor spending and support 8,500 jobs statewide. Outdoor recreation opportunities such as boating, camping, fishing, hunting, picnicking, sightseeing, wildlife observation, swimming and trail use create a $3.2 billion annual economic impact in Illinois, supporting 33,000 jobs statewide.

Recreation impacts started with fire bans at all State Parks. The ban included charcoal grills and all open fires. Wildland fire potential was assessed as above normal over the entire state for the month of August. With rains increasing soil moisture, these bans were lifted on a case-by-case basis.

Recreational opportunities have been hindered by low water levels in the lakes and rivers. Submerged trees and debris have been exposed on the periphery of lakes. Warm water temperatures discourage boating and swimming during the extremely hot days.

Filling of water fowl hunting sites was problematic at some locations. The ground for the water fowl sites was abnormally dry so it required additional water. A few of the sites rely on small streams and surface water reservoirs which did not have adequate water to fill these sites. Pumping costs to fill these sites were higher than normal**.**

Industrial Impacts

Coal Industry

The coal industry utilizes large volumes of water to process the coal. One coal company in Randolph County was running out of water in their reservoir. The company has requested authority to utilize water in IDNR ponds. Without a source to augment their water supply, the coal mine will shut down resulting in layoffs and reducing exports from Illinois. Due to the low water levels in the rivers and the resulting limitations on the amount of coal that can be loaded on a barge the transportation cost of coal has increased. Another coal company has reduced coal production due to lesser demand from their client.

Power Industry

Steam electric power plants utilize surface water to operate the plant equipment. With above normal temperatures for the entire year to date, the water temperatures of the surface waters have been well above normal. Under their NPDES permits for release to the rivers, power plants cannot release water above specified temperatures based on the time of year. Starting in March, the temperatures in the receiving rivers were higher than water temperatures allowed by the permits for their releases. Therefore, IEPA granted several power plants temporary variances to release the heated water into the rivers where temperatures were already elevated, due to prolonged warm weather and low flow conditions. Even with this regulatory relief, many plants needed to reduce electrical output to continue to remain in compliance with environmental/regulatory restrictions.

Water withdrawals from Public Waters are limited at low flows to protect the in-stream habitat through the Office of Water Resources permit process. The Illinois and Kankakee Rivers dropped to flows below the withdrawal limits of some power plants for a short time period. When practicable based on site land use restraints, the power plants with cooling ponds have on-site storage reservoirs; for example the Braidwood plant has a 30 day supply in their reservoir. There is an alternate site for water augmentation at Braidwood, but it adds only 1 week of water supply. Kendall Station has a seven to14 day reservoir reserve depending upon load conditions. Other power plants, however, do not have these types of reserves, and therefore need to be able to utilize river water in order to continue operations.

Reducing power outputs of power plants because of water that is too hot or of insufficient quantity limits the amount of power that can be produced with potential electrical distribution impacts to Illinois residents and industry. Many power plants within Illinois were required to reduce their power output because of water that was too hot or of insufficient quantity in 2012. Several generating units in Illinois were required to be shut down for days, and in some cases, weeks, in the face of these drought conditions, in order to continue to meet regulatory limitations on either temperature or water use or both.

Ethanol Production

Ethanol production uses an unknown quantity of water. Industrial usage of water in Decatur accounts for 75% of the total water usage from Lake Decatur and ADM is the largest single user of the water supply. The first level of water restriction for Lake Decatur is for industry to lower their use of the water supply by 10%. The 10% reduction in supply can be absorbed by ADM without severe impacts to their operations. The next level of water restrictions for Lake Decatur is for industry to lower their water usage by 15%. At the 15% reduction level in water usage ADM reports layoffs will be necessary and production of ethanol will be moved to plants outside Illinois. Both ADM and City of Decatur are seeking alternate water sources including groundwater and surface supplies to augment Lake Decatur. State-wide production of ethanol in 2012 was influenced by lack of water and by the cost of corn

Authorities and Regulations

Illinois Water Law

The laws regarding use and control of water in Illinois during drought conditions are expressed in many different statutes, regulations, and court cases. The primary laws are listed below. Please remember that the language of the laws must be understood within the context of judicial and administrative interpretations, only some of which are included here. Federal laws, such as the Clean Water Act (CWA), also affect the use of water in Illinois. Go to http://www.isws.illinois.edu/wsp/law.asp for information and links.

Authorities and Need for Emergency Powers during Drought Conditions

(Source – "Broad Based Changes to Illinois Water Law" Report to the Water Resources Advisory Committee, September 2000, IDNR Office of Water Resources)

The issue of drought response and management was reviewed extensively by the State Water Plan Task Force in 1983. The recommendations of the Water Plan Task Force for drought response have been followed by the State through the activation of the interagency Drought Response Task Force. Two activities in 1996 also reviewed the State's response to drought emergencies. The Global Climate Change Task Force published recommendations in January of 1996, which were updated in February of 1999, and the C-2000 consultant on water quantity issues published recommendations in July of 1996. The following description of the drought response and management issue by the Global Climate Change Task Force in their 1996 report summarizes current concerns regarding the need for improved state response.

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

Options developed by the State Water Plan Task Force

(Source: Assessment of Illinois Water Quantity Law, July, 1996)

Option 1 - Seek a directive from the Governor to the Department of Natural Resources to prepare a drought response plan that would become part of a "comprehensive plan and program for the emergency management of the State. Estimated cost: $125,000.

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

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

Suggested draft legislation for option number 3.

Option number 3 can be implemented by amending the water resources powers already exercised by the Department of Natural Resources Office of Water Resources. Amend Section 5-10 of the Department of Natural Resources Act of the Civil Administrative Code by adding at the end of Section 5-10e [20ILCS 801/5-10e] the following sections:

f) *To declare, following consultation with the Illinois Environmental Protection Agency, that a water shortage emergency exists when available sources of surface and groundwater in a watershed, aquifer, or urban county are insufficient to supply public water utilities, self-supplied commercial and industrial users, and self-supplied domestic users;*

g) *To restrict water withdrawals and water use within a region enclosing aquifers, watersheds, or urban counties affected by a water shortage emergency and authorize inter-basin or inter-system transfers of water;*

h) *To conduct rule making, investigation and adjudicative hearings, issue subpoenas and administrative orders, and seek judicial enforcement of orders for declaration, administration, and termination of a water shortage emergency.*

Rules to implement this authority must consider interagency input into the determination of facts supporting a water emergency declaration. Rules must also consider the significance of all water conservation activities and drought response activities, either authorized, approved and/or underway by all water users, and inter-system transfers of water can only be authorized under this legislation on a temporary basis and only during a water shortage emergency.

Option 3 is the preferred option by the Department of Natural Resources (in September 2000).

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Instream Flow Protection

(Source – "Broad Based Changes to Illinois Water Law" Report to the Water Resources Advisory Committee, September 2000, IDNR Office of Water Resources)

The issue of instream flow protection has been investigated extensively by the State Water Plan Task Force (1983) and by the Interagency Instream Flow Protection Committee mandated under Public Act 86-191 (1991). The C-2000 consultant's report on water quantity issues also discussed the public concern for this issue, along with legal issues and legal options for further consideration. The issue of protecting critical flows in rivers and streams was the number three priority recommendation of the Land and Water Management Committee of Conservation Congress III.

The Interagency Instream Flow Protection Committee summarized the instream flow protection issue in its 1991 report as follows:

"The protection of minimum instream flows within the rivers and streams of Illinois is a significant water resources management issue that has been widely recognized since the mid 1970's. With each new drought and burst of economic development and growth in Illinois, numerous additional demands for the offstream use of the State's surface water resources occur. The development of these resources occurs across the State and can cause significant negative impacts to streams of any size and at any location. Without the provision for the protection of some levels of minimum streamflows, the resource values, uses, and benefits of these aquatic resources are significantly impaired. In addition, it is now becoming recognized that most of the streams in Illinois cannot meet

the demands of all users at all times. Therefore, developers of the surface water resources of the State of Illinois must recognize the need to cease withdrawals at various times to protect the values of instream uses. They must also recognize that most water supply developments in Illinois will require that additional storage or alternative sources of supply be developed as a necessary part of any secure water resources development project."

Recommendations of the Water Plan Task Force

Option 1. Seek legislation either that establishes minimum or required streamflows or that specifically authorizes an agency to establish such flows beyond the existing statutory law. (Reference to existing law is the Rivers, Lakes and Streams Act where DNR has "natural conditions" protection authority over the public waters of Illinois - 2,503 miles of streams out of a statewide total of 33,000 miles. Source: C-2000 Assessment of Illinois Water Quantity Law, July, 1996) The 18 key issues and questions identified in the Interagency Instream Flow Protection Committee report could be addressed in the rule-making process following passage of the recommended legislation. Cost: $125,000 to draft initial rules plus one new staff position.

Suggested draft legislation for option number 1 would strike just two words in the existing Rivers, Lakes and Streams Act.

Amendment to Section 23 of the Rivers, Lakes and Streams Act [615 ILCS 5/23] to Establish and Preserve Minimum Flows in Streams

§23. It shall be the duty of the Department of Natural Resources to maintain stream gauge stations, **…** and to establish by regulations water levels below which water cannot be drawn down **behind dams** from any stream or river in the State of Illinois, in order to retain enough water in such streams to preserve the fish and other aquatic life in the stream, and to safeguard the health of the community. 16

Option 2. Draft a new instream flow protection act that will regulate downstream releases from new reservoirs as well as direct stream withdrawals by new users. Legislation to implement this regulatory program for new water users and impoundments will authorize the development of aquatic life protection rules for submittal and approval to the Illinois Pollution Control Board.

Option 1 was the preferred option by the Department of Natural Resources (in September 2000).

Groundwater Management and Regulation

(Source – "Broad Based Changes to Illinois Water Law" Report to the Water Resources Advisory Committee, September 2000, IDNR Office of Water Resources)

The issue of groundwater management and regulation was reviewed extensively by a subcommittee of the State Water Plan Task Force in 1989 and by the water law consultant in the C-2000 water law studies published in 1996. Draft legislation was introduced in 1989 and 1990 based on the recommendations of the State Water Plan Task Force, and although these legislative initiatives generated significant debate and issue resolution, the initiatives eventually failed when the Farm Bureau and Municipal League mutually agreed to lift their support from any administration bill for groundwater management. The groundwater regulatory and management issues defined by the Water Plan Task Force subcommittee and by the C-2000 water law consultant are basically identical, and are as follows:

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

2) A major issue in the development of groundwater resources is the resolution of well interference issues. This issue mainly occurs when the development of a high capacity well negatively impacts on the operation of a nearby smaller well, most generally in use by a rural household.

3) Political aspects of competition among and between urban and rural users of ground water. This issue was manifested in the drought of 1988 and 1989 between irrigators and rural homeowners in Kankakee County and between Municipalities and newly formed Water Authorities that were created to provide protection for rural areas located over the Mahomet aquifer system.

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

The selected proposal for groundwater management that was ultimately developed by the State Water Plan Task Force involved a procedure for a locally developed groundwater management and regulatory program that would be implemented on a regional basis with state agency oversight and approval. This form of groundwater management program was also recommended as a legislative option in the ASCE Model Water Code published in 1997.

Interests in Northeastern Illinois such as Lake County, the Chicago Metropolitan Agency for Planning, the Metropolitan Planning Council and the Barrington Area Council of Governments have recently expressed concerns regarding the inadequacy of current groundwater laws to deal with major development issues, which are now generating concern in the collar counties of the Chicago metropolitan area. The Department of Natural Resources proposes to work with these interests and others in Northeastern Illinois to develop needed and supportable revisions to Illinois groundwater law.

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Public Water Supply Regulations

The following statutory and regulatory provisions require adequate quantity:

(415 ILCS 5/3)

Sec. 3.105. Agency. "Agency" is the Environmental Protection Agency established by this Act.

Sec. 3.365. Public water supply. "Public water supply" means all mains, pipes and structures through which water is obtained and distributed to the public, including wells and well structures, intakes and cribs, pumping stations, treatment plants, reservoirs, storage tanks and appurtenances, collectively or severally, actually used or intended for use for the purpose of furnishing water for drinking or general domestic use and which serve at least 15 service connections or which regularly serve at least 25 persons at least 60 days per year. A public water supply is either a "community water supply" or a "non-community water supply".

(415 ILCS 5/18)

Sec. 18. Prohibitions; plugging requirements.

(a) No person shall:

(1) Knowingly cause, threaten, or allow the distribution of water from any public water supply of such quality or **quantity** as to be injurious to human health; or

(2) Violate regulations or standards adopted by the Agency pursuant to Section 15(b) of this Act or by the Board under this Act; or

(3) Construct, install, or operate any public water supply without a permit granted by the Agency, or in violation of any condition imposed by such a permit.

(415 ILCS 5/19) (from Ch. 111 1/2, par. 1019)

Sec. 19. Owners or official custodians of public water supplies shall submit such samples of water for analysis and such reports of operation pertaining to the sanitary quality, mineral quality, **or adequacy** of such supplies as may be requested by the Agency. Such samples and reports shall be submitted within 15 days after demand by the Agency. (Source: P.A. 76-2429.)

In regard to regulatory requirements, first 35 Ill. Adm. Code 601.101:

Owners and official custodians of a public water supply in the State of Illinois shall provide pursuant to the
Environmental Protection Act [415 ILCS 5] (Act), the Pollution Control Board (Board) Rules, and the Safe
Drinking Water Act (42 U.S.C. 300f et seq.) continuous operation and maintenance of public water supply
facilities so that the water shall be assuredly safe in quality, clean, **adequate in quantity**, and of satisfactory
mineral characteristics for ordinary domestic consumption.

Secondly, under the Board's permit regulations:

Section 602.115 Design, Operation, and Maintenance Criteria

a) The Agency may adopt criteria in rules for the design, operation, and maintenance of public water supply facilities as necessary to insure safe, **adequate**, and clean water. These criteria shall be revised

from time to time to reflect current engineering judgment and advances in the state of the art.
Third, under the Agency rules referenced above:
Section 652.101 Construction Permit Requirements
a) Construction permits shall be obtained by the official custodian of a community water supply prior to beginning construction of any proposed community water supply and prior to all alterations, changes or additions to an existing community water supply which may affect the sanitary quality, mineral quality, or **adequacy of the supply** including changes pursuant to 35 Ill. Adm. Code 653.115.
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Further, State Standards include the following design provisions:
1.1.5 Water use data, including
a. a description of the population trends as indicated by available records, and the estimated population which will be served by the proposed water supply system or expanded system 20 years in the future in five-year intervals or over the useful life of critical structures/equipment,
b. present water consumption and the projected average and maximum daily demands, including fire flow demand (see Section 1.1.6),
c. present and/or estimated yield of the sources of supply,
d. unusual occurrences.
1.1.6 Flow requirements, including
a. hydraulic analyses based on flow demands and pressure requirements (See Section 8.1.1)
b. fire flows, when fire protection is provided, meeting the recommendations of the Insurance Services Office or other similar agency for the service area involved.
1.1.7 Sources of water supply
Describe the proposed source or sources of water supply to be developed, the reasons for their selection, and provide information as follows:
1.1.7.1 Surface water sources, including
a. hydrological data, stream flow and weather records,
b. safe yield, including all factors that may affect it,
c. maximum flood flow, together with approval for safety features of the spillway and dam from the appropriate reviewing authority,
d. description of the watershed, noting any existing or potential sources of contamination (such as highways, railroads, chemical facilities, etc.) that may affect water quality,
e. summarized quality of the raw water with special reference to fluctuations in quality, changing meteorological conditions, etc.
f. source water protection issues or measures that need to be considered or implemented.

Illinois Lake Michigan Water Allocation Program

Lake Michigan, the single largest source of water in Illinois, supplies Chicago and approximately 200 other public water supply systems in northeastern Illinois. On average, over 1 billion gallons of water are withdrawn from Lake Michigan each day for public water supply needs. However, the amount of water Illinois is allowed to divert from Lake Michigan for all purposes (public water supply, to operate and maintain the Chicago Waterway System, and stormwater runoff from the diverted watershed) is limited by a U.S. Supreme Court decree to 3200 cubic feet per second (cfs) or 2.1 billion gallons per day. This is a fixed amount and does not increase in the future. Illinois' diversion of water from Lake Michigan is the only major diversion out of the Great Lakes basin, and remains a contentious issue for Illinois, other lake states, and Canada.
Public water supply intakes along the Illinois shoreline of Lake Michigan have been designed to accommodate fluctuating water levels on Lake Michigan, which can vary by up to 6 feet. This fact, combined with the enormous storage volume of Lake Michigan, means that Lake Michigan is a very drought resistant source of public water supply.
In response to the 1967 U.S. Supreme Court Decree limiting Illinois' diversion of water from Lake Michigan, the General Assembly tasked the Illinois Department of Natural Resources (IDNR) with

developing an ongoing program to equitably allocate Illinois' supply of Lake Michigan water. The importance of wise, long-term water resource planning and the large investments that must be made to secure new water supply sources requires that the objectives of an allocation program clearly address the 19
problems to be solved. In Illinois' case, the objectives must also address the specific requirements of the U.S. Supreme Court Decree. The objectives, or goals, of Illinois' allocation program can be summarized as follows:

- To make the greatest amount of Lake Michigan water available for domestic water supply.
- To use Lake Michigan water allocations as a tool to preserve groundwater resources for communities in northeastern Illinois who will not have access to a Lake Michigan water supply.
- To make long-term allocations so that communities receiving an allocation for the first time can secure the needed financing to construct regional water distribution systems.
- To carefully consider the competing needs of all water users in the region so that allocations promote the efficient development of water supplies in the region in light of long-range needs and objectives.
- To require all users of Lake Michigan water to conserve and manage this resource.

Allocation Process - A successful water allocation program must combine a technically defensible methodology with an administrative process that follows legally defensible procedures and treats all applicants fairly. To achieve this goal, Illinois' allocation process consists of the following key elements:

- An active public participation program.
- An identification of available water supply sources.
- A long-range water demand forecasting methodology.
- Formal allocation hearings on all requests.
- Issuance of an Allocation Order.
- Ongoing monitoring of water use and consumption by all permittees.
- Formal process to make adjustments in allocations.

The "Rules and Regulations for the Allocation of Water from Lake Michigan" describe the allocation process and contain the criteria used to evaluate applications for a water allocation and water conservation practices and other permit conditions required of allocation permit holders http://www.dnr.illinois.gov/WaterResources/Pages/Permits.aspx. Water allocations are made through a hearing and order procedure. Entities receiving an allocation of Lake Michigan water receive an allocation permit.

Lake Michigan Diversion Status/Allocation Outlook

Illinois is currently in compliance with the Supreme Court Decree. As of Water Year 2007 (the latest year in which Illinois' diversion has been certified by the U.S. Army Corps of Engineers), Illinois' 40-year running average diversion is 3171 cubic feet per second (cfs), which is 29 cfs below the Court limit of 3200 cfs. The cumulative deviation (a water bank) is 774 cfs-years. Unofficial estimates of Illinois' diversion through Water Year 2010 continue the trend of staying below the Court limit and increasing the cumulative deviation.

The IDNR has noted an overall decrease in per capita use within the Lake Michigan service area. This is especially apparent in the City of Chicago, where water use has declined by over 200 million gallons per day over the past 15 to 20 years.

In 2008, the IDNR issued a new water allocation order extending water allocations out to the year 2030. With a continued emphasis on conservation and efficient use, there is reason to be optimistic that the future water supply needs within the Lake Michigan water service area can be met while staying in compliance with the Court Decree. The IDNR also anticipates that there will be some continued interest in expanding the Lake Michigan water service area where it can be shown to be cost effective. Lake

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Michigan water will continue to play a very important role in ensuring that the entire northeastern Illinois region has an adequate supply of water.

Water Withdrawal Reporting

Illinois Water Inventory Program (IWIP). Documentation of annual water withdrawals (water use) for all of Illinois began in 1978 by the Illinois State Water Survey (ISWS) under a cooperative agreement with the U.S. Geological Survey (USGS). For each water-using facility inventoried, the database includes locations and amounts of water withdrawn from surface water and groundwater sources, as well as significant amounts of water purchased from other facilities. All public water supplies and major self supplied
industries, irrigation, fish and wildlife, and conservation uses (withdrawals > 100,000 gallons per day) are inventoried. Data can be summarized geographically by county, township, and drainage basin, as well as by various water use and water source categories for inclusion in the National Water Use Data System.
Current uses of the data collected through the IWIP program include:

- Determination of community water supply usage
- Determination of aquifer-wide withdrawals
- Assessment of groundwater-level observations with respect to groundwater withdrawals (for example, comparisons of potentiometric surface maps of the Cambrian-Ordovician aquifer system and pumpage from that aquifer system)
- Water use projections
- Comparisons of aquifer withdrawals to estimated aquifer recharge
- Regional and site-specific groundwater flow modeling
- Determination of groundwater withdrawals for the U.S. Army Corps of Engineers' Lake Michigan Diversion Accounting Program
- Impact of high-capacity wells on neighboring wells

As of January 1, 2010, annual reporting of withdrawals from wells and surface water intakes that pump at a rate of 70 gallons per minute or greater (100,000 gallons per day) is mandatory in Illinois, according to Public Act 096-0222. A notable exception to the mandated reporting is the use of high-capacity well and intake use in agricultural irrigation. Agricultural irrigators are exempt from reporting for the first five years of the act (until January 1, 2015). However, individual farm irrigators with good records of irrigation water use are encouraged to report their annual water use prior to that date so their operations may serve as benchmark farms to aid in developing irrigation estimation coefficients. The Act may be viewed at http://www.ilga.gov/legislation/publicacts/fulltext.asp?Name=096-0222.