

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 reservoir 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 than 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.

Lake Michigan and the Mississippi River

Lake Michigan and the Mississippi River between St. Louis and Cairo are both experiencing very low water levels this winter; however, only to a lesser degree are such water levels directly influenced by drought conditions in Illinois. The low flow levels in the Mississippi River represent the collective effect of dry conditions and low runoff rates throughout the Midwest and Great Plains states; and many of these other states, particularly those to the west, are considerably deeper in drought than Illinois. Earlier this January, the river stage in the Mississippi River at Thebes in southern Illinois fell to its eighth lowest level in the past 100 years, and there is the potential that similar levels may also be reached in February. Those low stages at Thebes raised concerns that commercial navigation operations on the river might need to cease if the 9-foot draft (depth of water) needed by many barges could not be maintained, but the U.S. Army Corps of Engineers has stated that they expect the river will remain open to navigation given projected flow rates in the river from upstream sources. It is noted that the flow amounts experienced in the Mississippi River this year are not as low as for many past severe droughts; in particular the unregulated contribution of flow from the Upper Mississippi River (north of St. Louis), while low, is still considered to be in its average flow range for this time of year.

This month, Lake Michigan has experienced its lowest levels ever and most likely will experience slightly lower levels next month. However, this condition is not simply the result of the 2012 drought; rather Lake Michigan levels have generally been below their long-term average level for the past 25 years. Very little of the Great Lakes watershed is in Illinois, and the Lake Michigan level is instead more directly associated with general climatic conditions and runoff amounts over Ontario, Michigan, and the northern parts of Wisconsin and Minnesota. It is believed that gradual increases in average winter air temperatures over the past decades are also a contributing factor, resulting in less ice coverage over the Great Lakes and thus greater evaporation from the lakes. The extremely warm winter of 2011-2012, in particular, may have resulted in a considerable net loss in lake storage.

Accumulated Precipitation (in)
December 17, 2012 to January 25, 2013

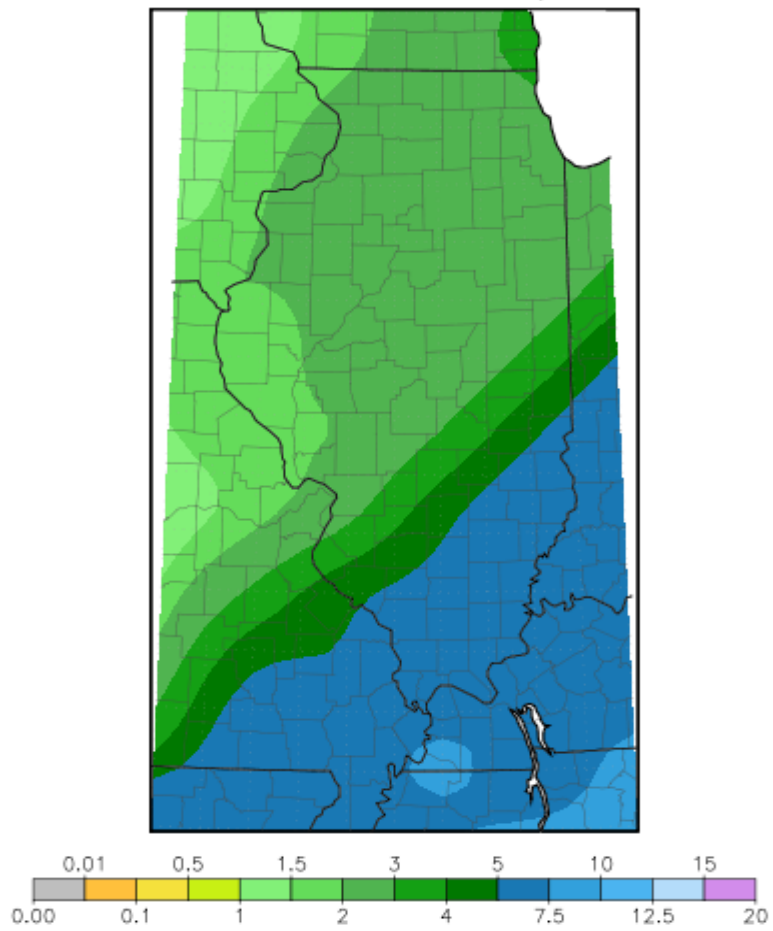


Figure 1. Shown are the accumulated precipitation amounts from December 17, 2012, to January 25, 2013. Map prepared by the ISWS using data from the Midwestern Regional Climate Center.

Accumulated Precipitation (in): Departure from Mean
December 17, 2012 to January 25, 2013

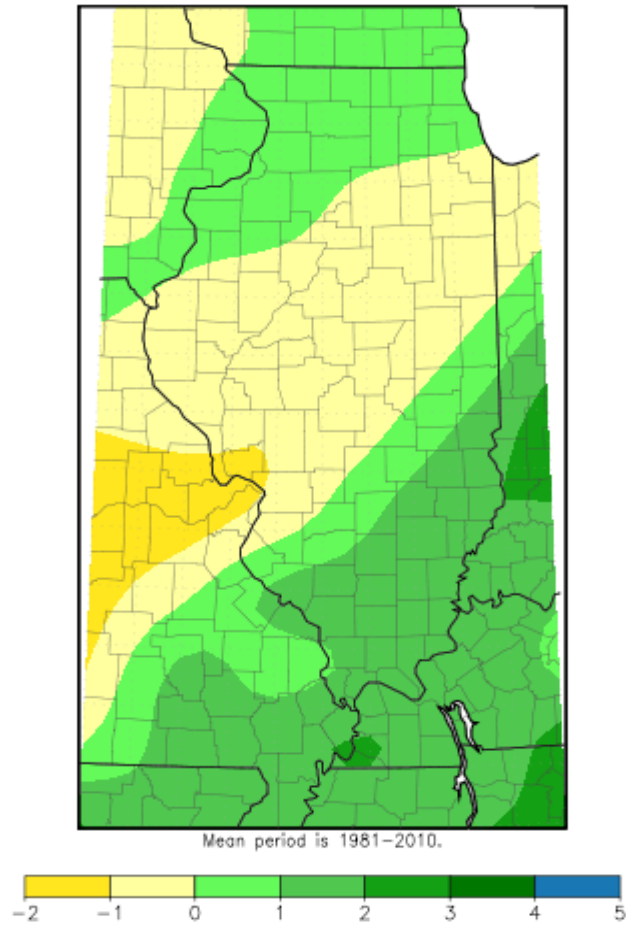


Figure 2. Shown are the accumulated precipitation departures from average from December 17, 2012, to January 25, 2013. Map prepared by the ISWS using data from the Midwestern Regional Climate Center.

Monthly Precipitation Departure for Illinois

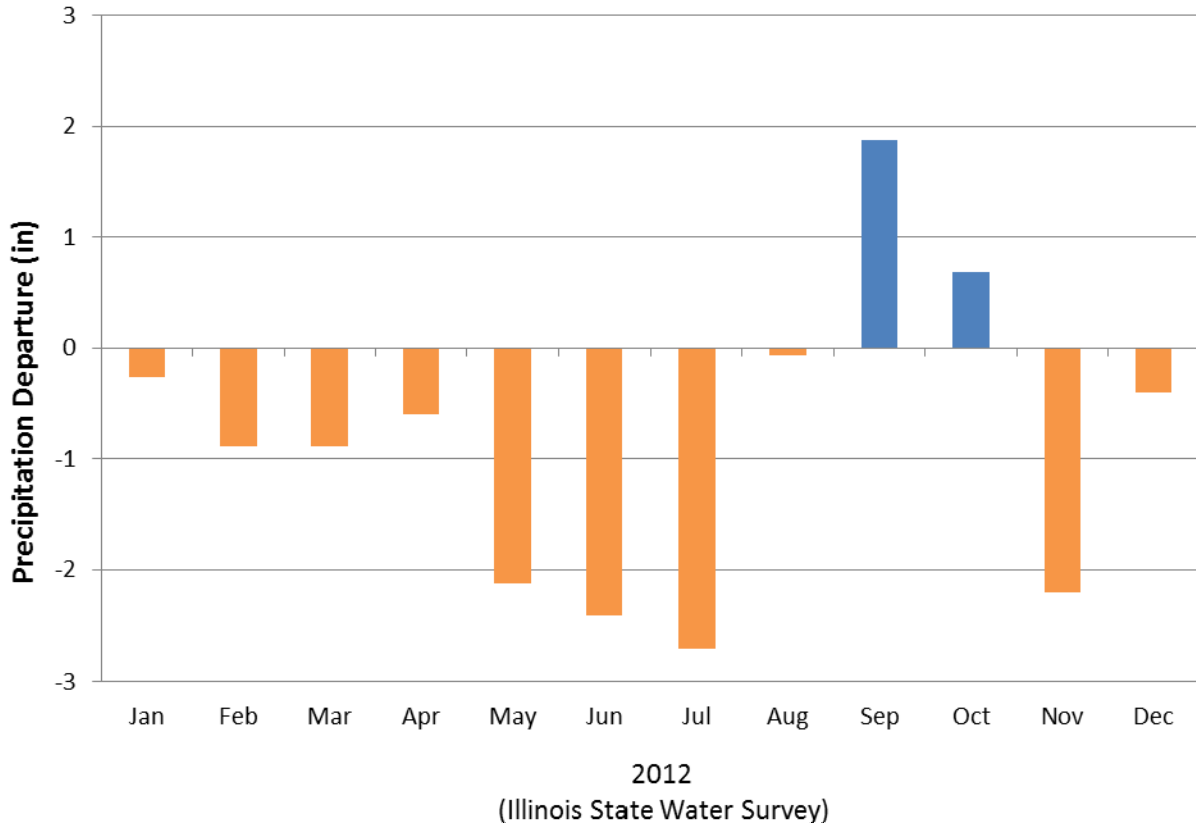


Figure 3. Statewide average precipitation departures from average for 2012 in Illinois. Orange bars indicate a deficit while blue bars indicate a surplus of precipitation for the month.

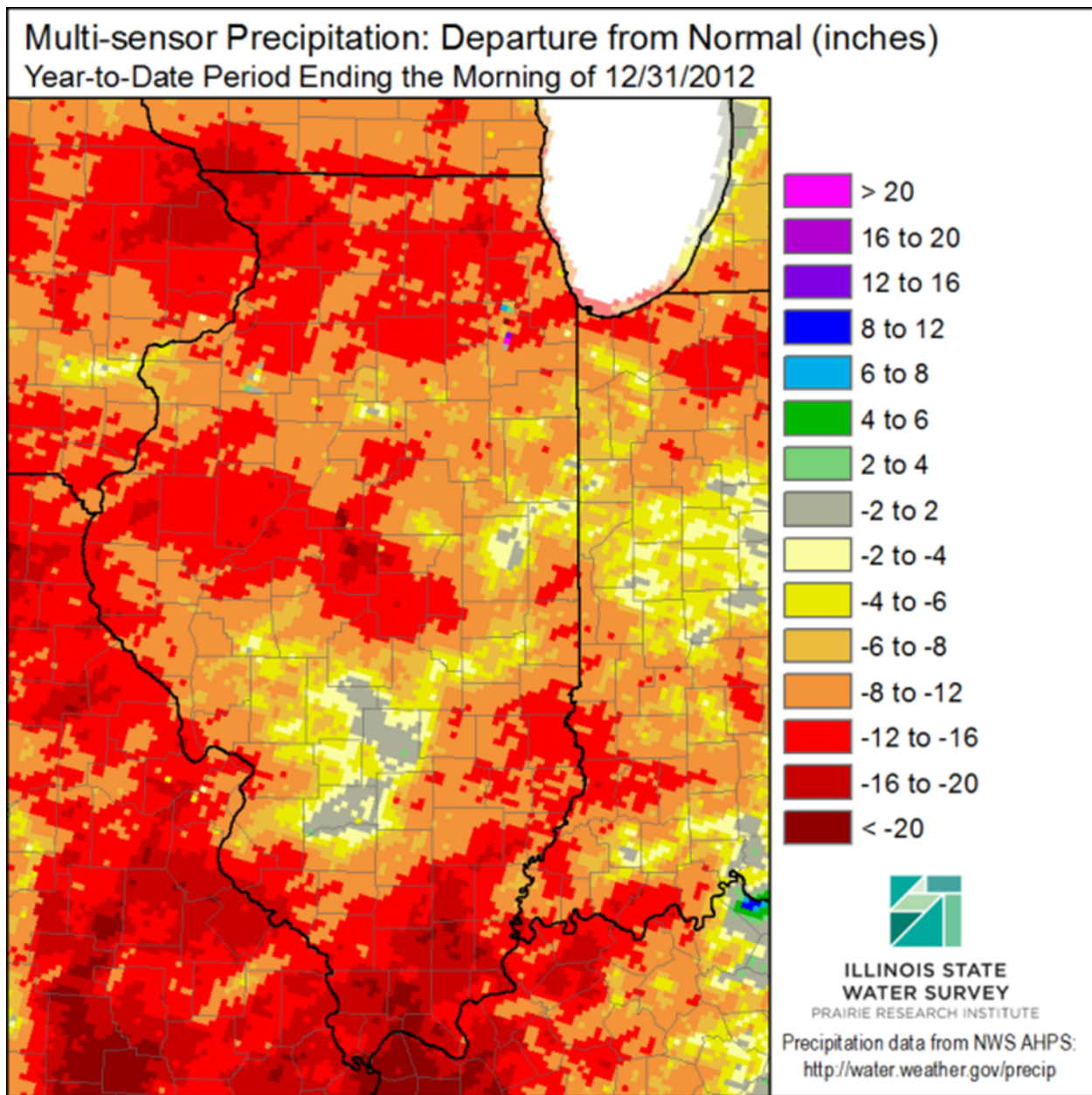


Figure 4. Shown are the January 1 to December 31, 2012, rainfall departures from normal, based on the radar/raingauge data from the Advanced Hydrologic Prediction Service (AHPS) of the NWS and prepared by the ISWS.

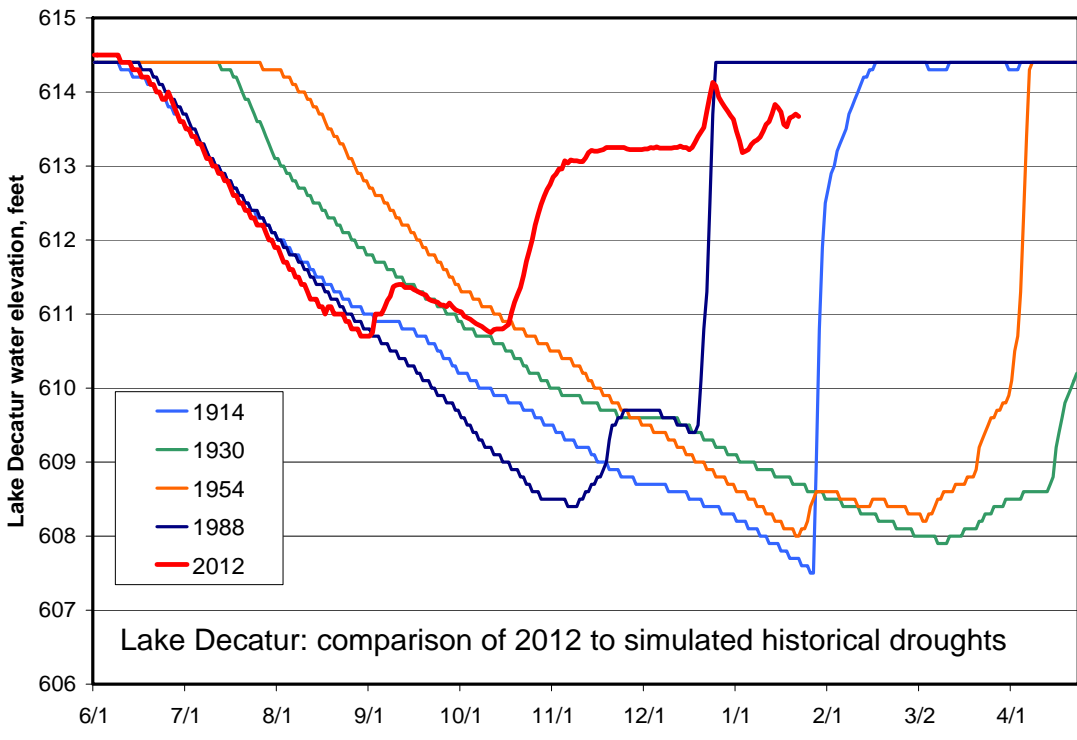


Figure 5. Water level in Lake Decatur in 2012 compared to simulated levels illustrating how Decatur’s current water system would react if faced with conditions similar to major historical droughts.

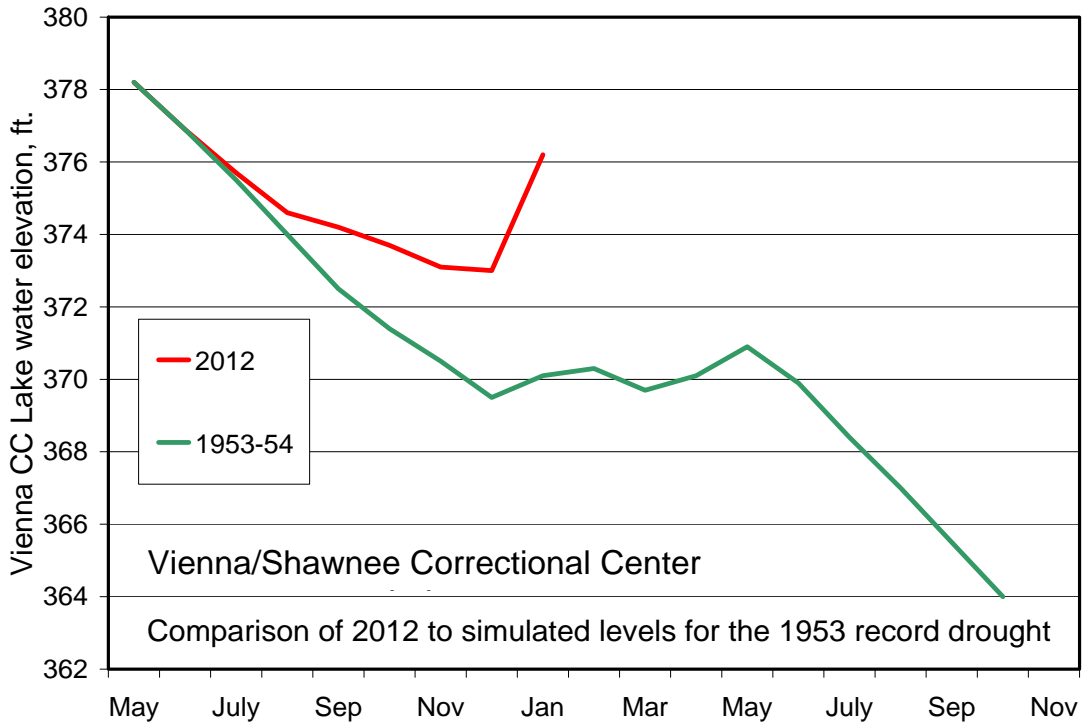


Figure 6. Water level in the Vienna Correctional Center Lake in 2012 compared to conditions during a drought similar to the 1953-54 drought of record.

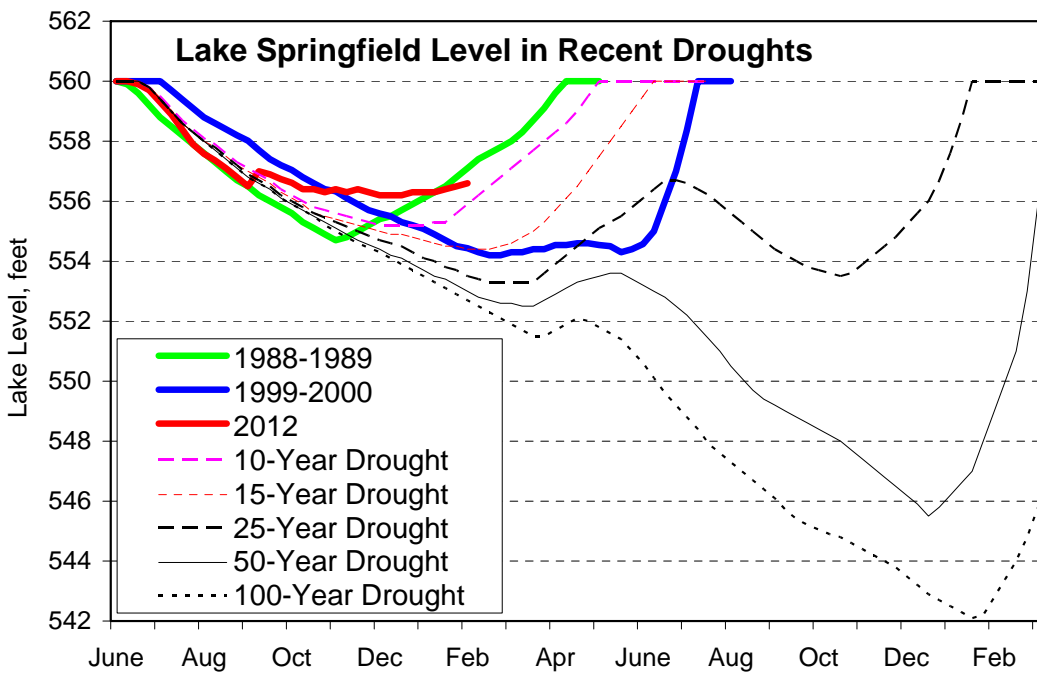
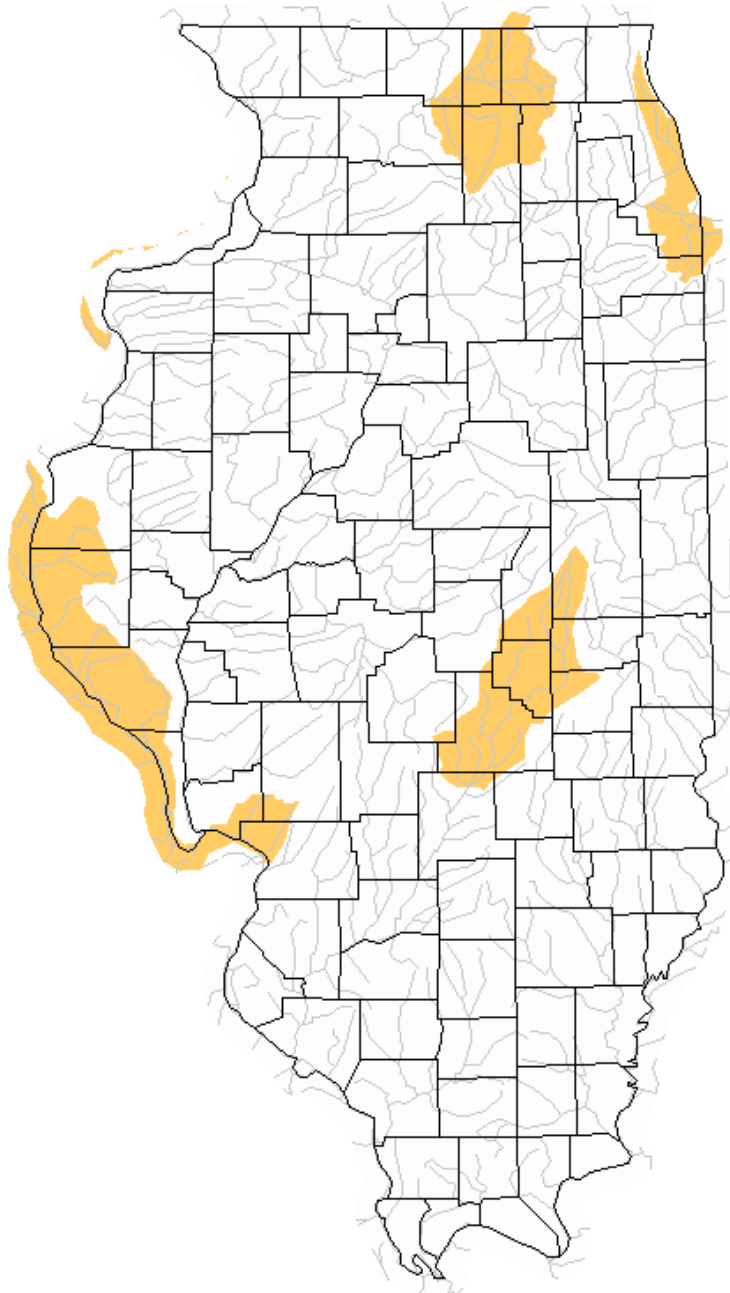


Figure 7. Water level in Lake Springfield in 2012 compared to: a) that from recent drought episodes, and b) levels expected with major droughts of varying severity or frequency.

Thursday, January 24, 2013



Explanation - Percentile classes				
Low	≤5	6-9	10-24	Insufficient data for a hydrologic region
Extreme hydrologic drought	Severe hydrologic drought	Moderate hydrologic drought	Below normal	

Figure 8. Portions of Illinois currently experiencing below normal streamflow (U.S. Geological Survey, January 24, 2013).