

Ag Water Resources Topics: Regulations and The State Drought Plan

Kentucky Farm Bureau
Water Management Working Group

January 28, 2015

Department for Environmental Protection
Energy and Environment Cabinet



To Protect and Enhance Kentucky's Environment

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Water Resources Regulations to Consider When Developing On Farm Water Supply

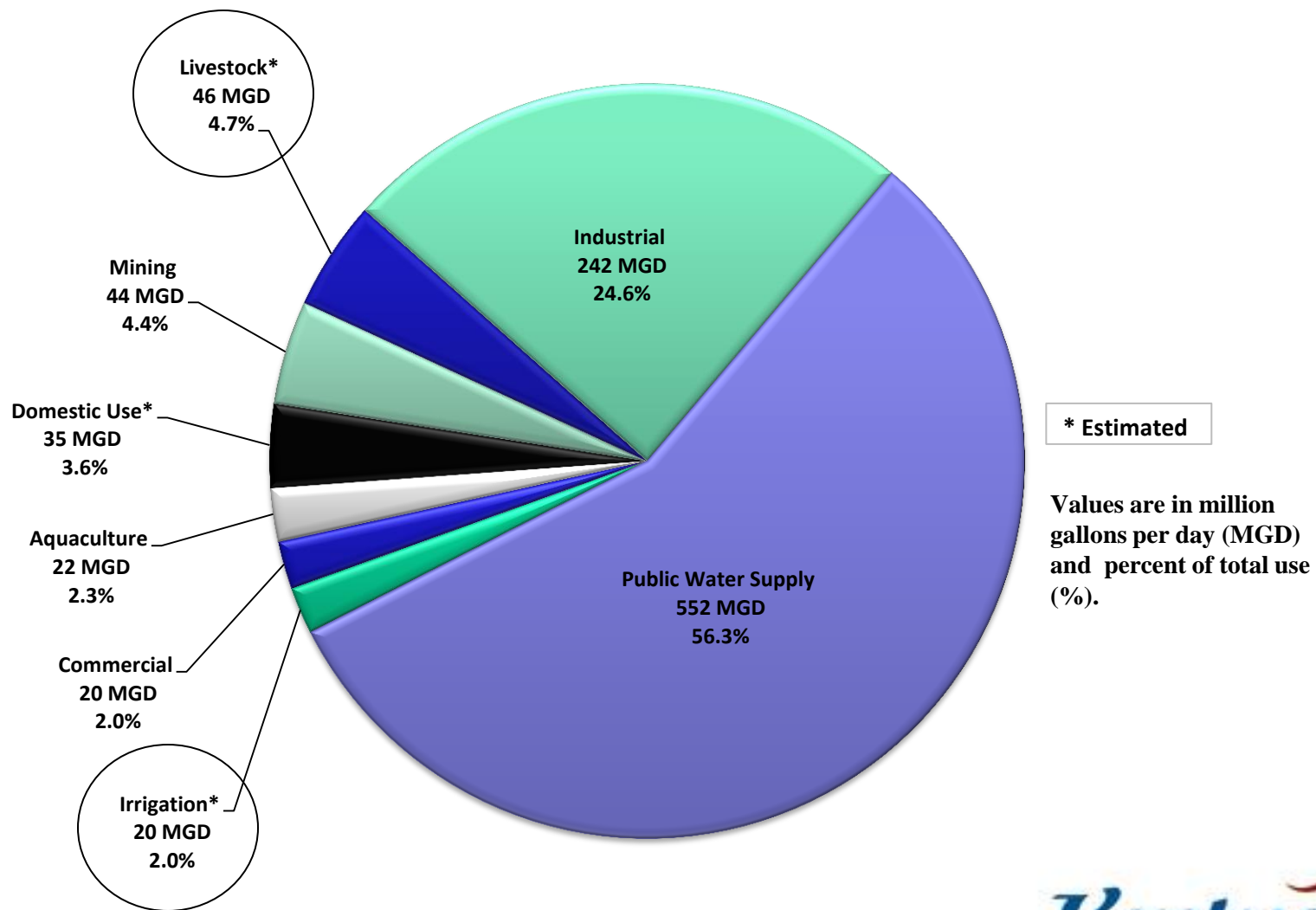


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Total Water Use in Kentucky**

(excluding thermoelectric power generation)



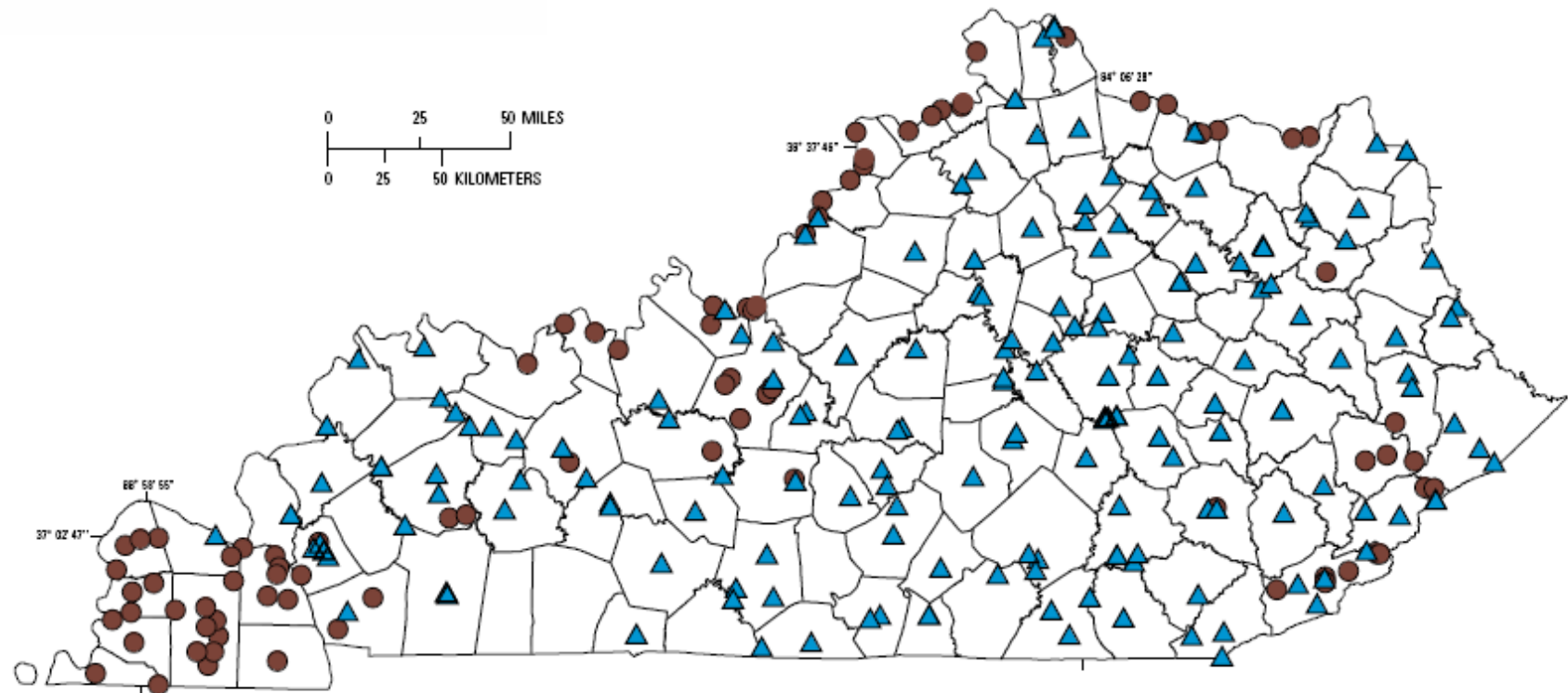
Regulated water supply withdrawals

EXPLANATION

▲ Surface-water-withdrawal site

● Ground-water-withdrawal site

Approximately 1.0 billion gallons per day



State Regulation of Agricultural Irrigation



Water
Withdrawal
Permitting

Agricultural water use is specifically EXEMPTED from water withdrawal permit and reporting requirements.
(KRS 151.140)

Nothing contained in KRS 151.140 shall interfere with the....
“use of water for agricultural and domestic purposes
including irrigation”.

Triggering State or Federal Permits

Impounding water behind a DAM (25 feet high or > 50 acre-feet)
(KRS 151.210 and KRS 151.250)

State floodplain construction permit
State water withdrawal permit

State dam construction permit
Federal 404 permit / State 401 WQC

Creating obstructions in stream that affect the flow of a stream
AND, beneficial use of the stream is adversely affected
(KRS 151.250)

State floodplain construction permit

Federal 404 permit / State 401 WQC

Placing fill or construction within a floodplain or floodway, *AND,*
beneficial use of the stream is adversely affected
(KRS 151.250)

State floodplain construction permit

Federal 404 permit / State 401 WQC

Potential Conflicts to Consider

Altering flow (*withdrawal or diversion/obstruction*) so that aquatic habitat is adversely affected. (401 KAR 10:031)

A violation of state water quality standards

All withdrawals reduce flow – avoid extended and substantial dewatering of a stream

Altering flow (or groundwater level) such that other water users are adversely affected.

Probably resolved in a civil court if taken that far.

Water shortage emergencies triggered by drought or overuse
(KRS 151.200)

Upon a declaration by the Governor, the available public water supply may temporarily allocated among water users, and restrict the rights of water withdrawal permit holders.

Water Resources Options for On-Farm Use

Access to a stream or spring or other existing body of water

Drilling a well for irrigation or livestock purposes

Constructing a lake or pond or creating an impoundment of a stream for agricultural purposes

Connecting to a potable water supply for livestock watering or other on-farm purposes

1964 Total Irrigated Acres

(across 6 agricultural districts)

Total Irrigated Acres = 14,500

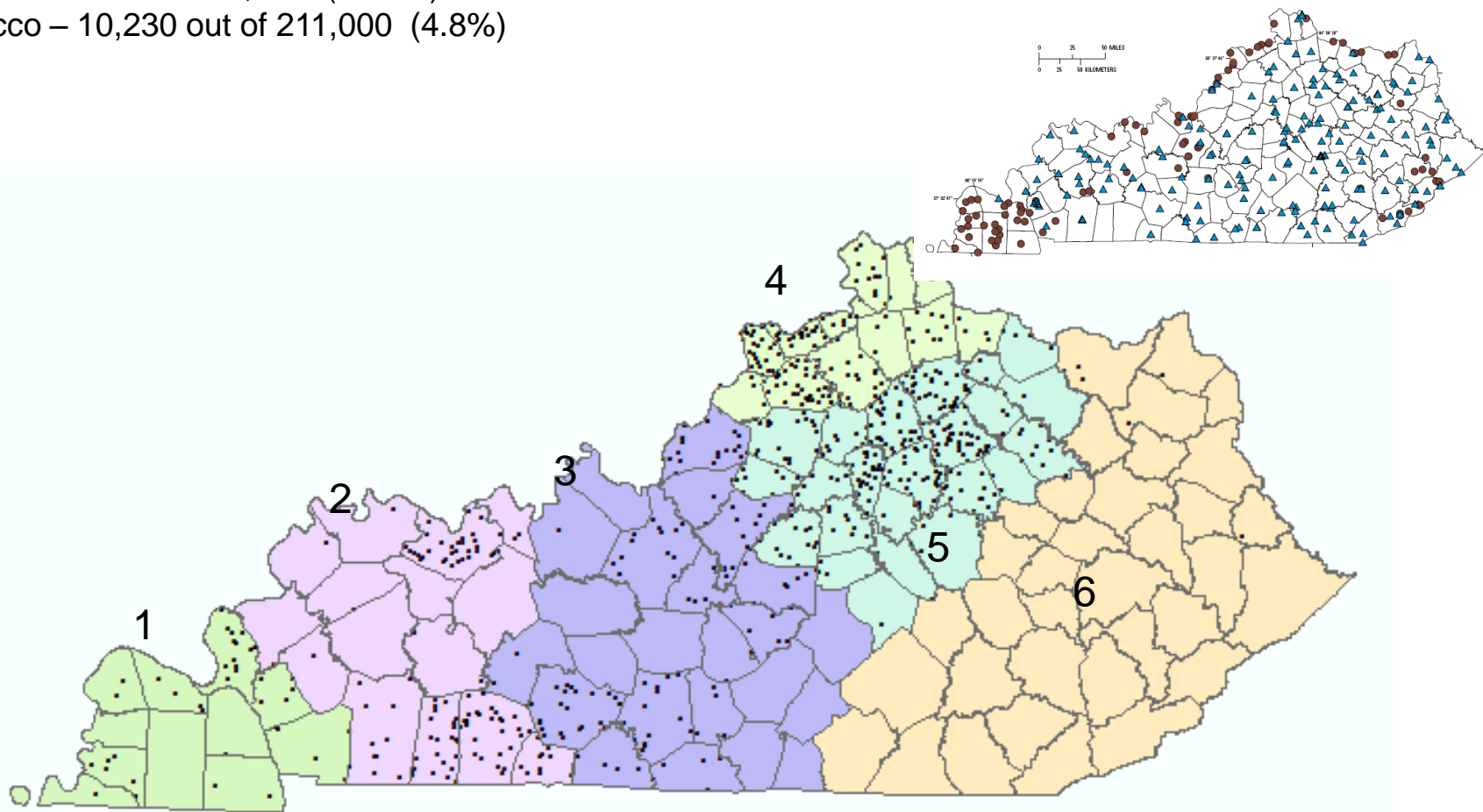
Corn – 730 out of 981,000 (0.07%)

Tobacco – 10,230 out of 211,000 (4.8%)

EXPLANATION

- ▲ Surface-water-withdrawal site
- Ground-water-withdrawal site

0 25 50 MILES
0 25 50 KILOMETERS



One dot = 20 acres

Source: USDA Census of Agriculture



2007 Total Irrigated Acres

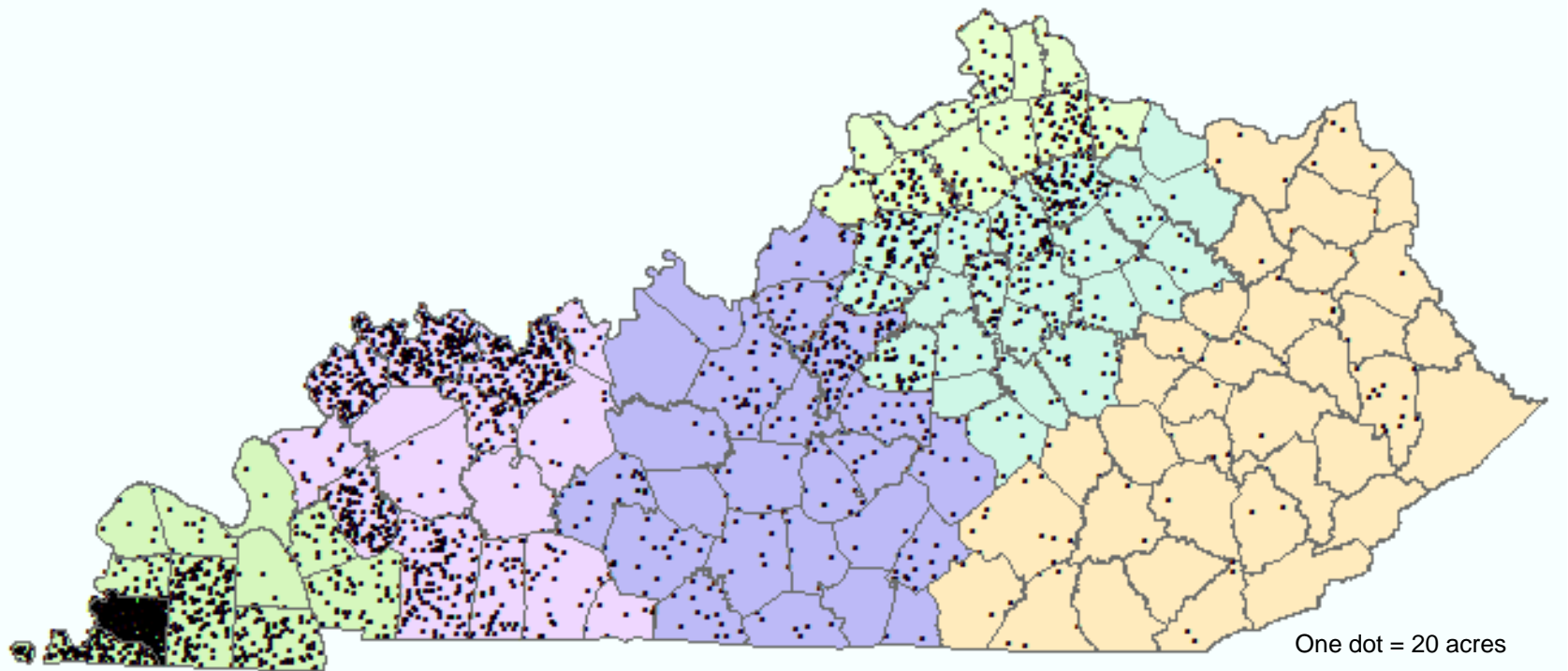
(across 6 agricultural districts)

Total Irrigated Acres = 58,700

Corn – 22,500 out of 1,310,000 (1.7% of Corn acreage)

Tobacco – 14,000 out of 87,000 (16.1% of Tobacco acreage)

Soybean – 10,000 out of 1,087,000 (0.92% of Soybean acreage)



Source: USDA Census of Agriculture

2012 Total Irrigated Acres

(across 6 agricultural districts)

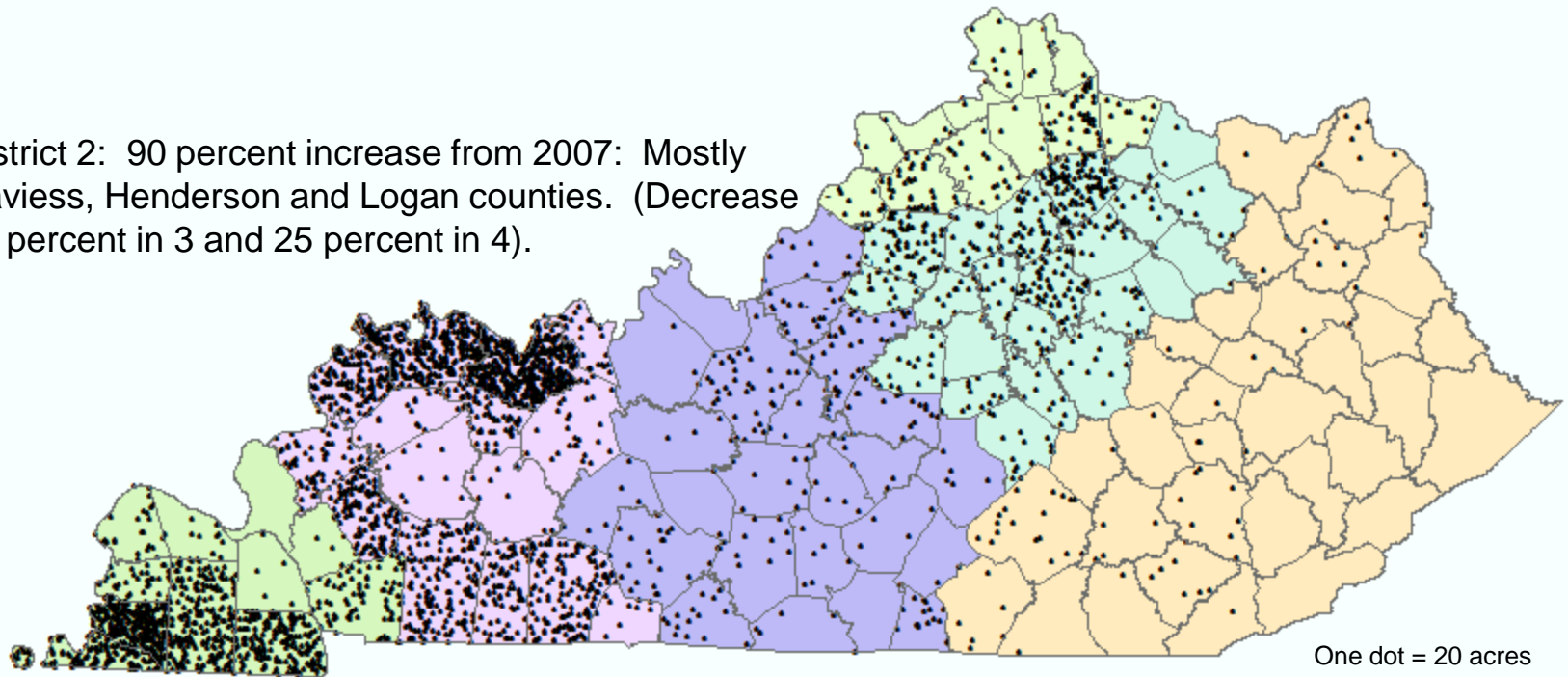
Total Irrigated Acres = 73,573 (25 percent increase over 2007)

Corn – (2.1% of corn acreage) - increase of 41 percent over 2007

Tobacco – (14.5% of Tobacco acreage) – decrease of 9 percent from 2007

Soybean – (1.1% of Soybean acreage) – increase of 63 percent over 2007

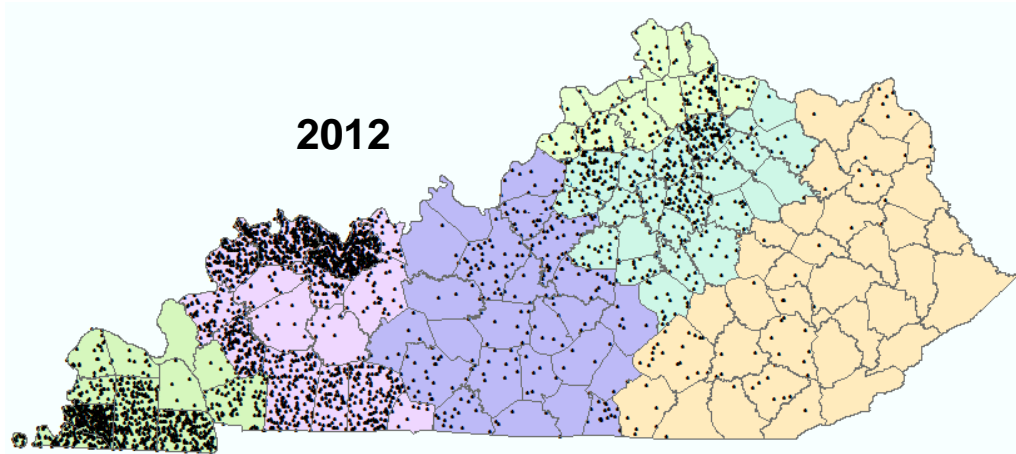
District 2: 90 percent increase from 2007: Mostly Daviess, Henderson and Logan counties. (Decrease 18 percent in 3 and 25 percent in 4).



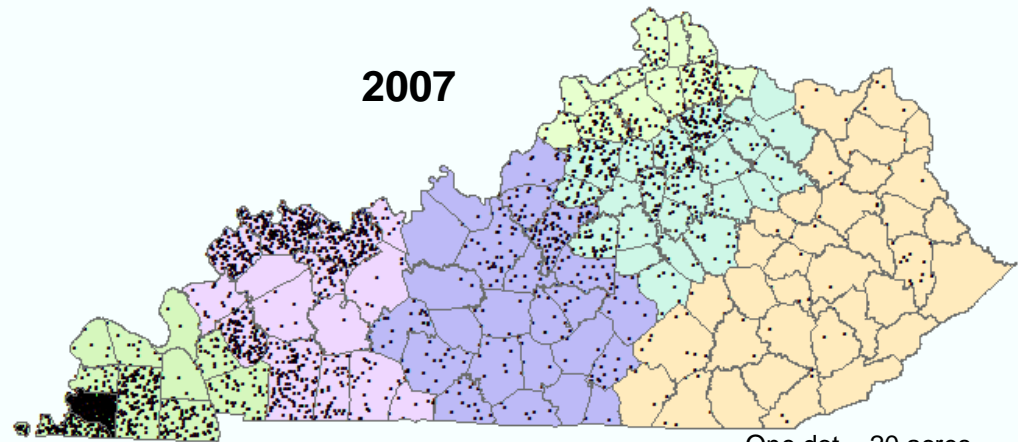
Source: USDA Census of Agriculture

Total Irrigated Acres

(across 6 agricultural districts)



Survey Year	<u>Acre-feet Applied</u>	
	Wells	Surface
1954	849	11297
1955	657	4988
1960	422	5654
1969	916	7247
1982	4012	17122
1998	9336	10395
2003	5253	4082
2008	9586	4958
2013	9043	10574

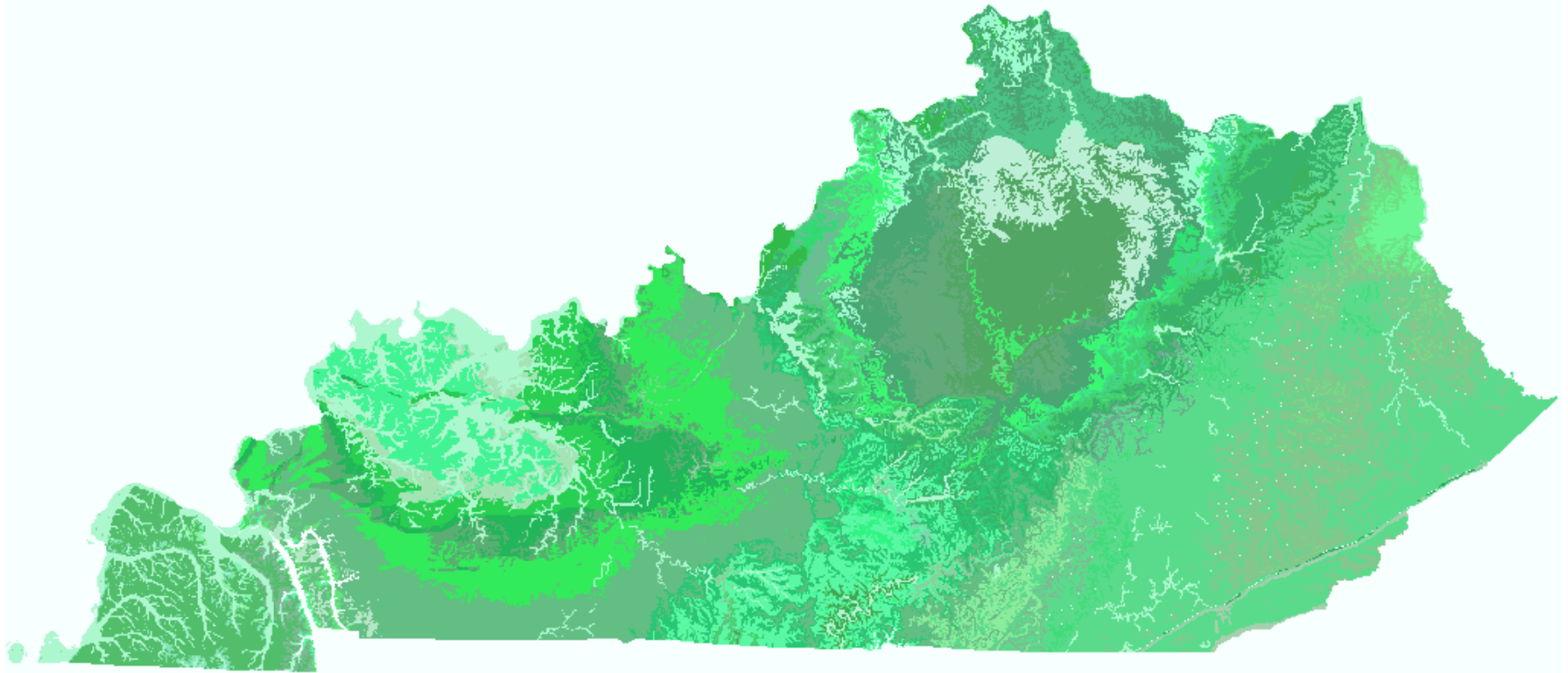


One dot = 20 acres

Source: USDA Census of Agriculture

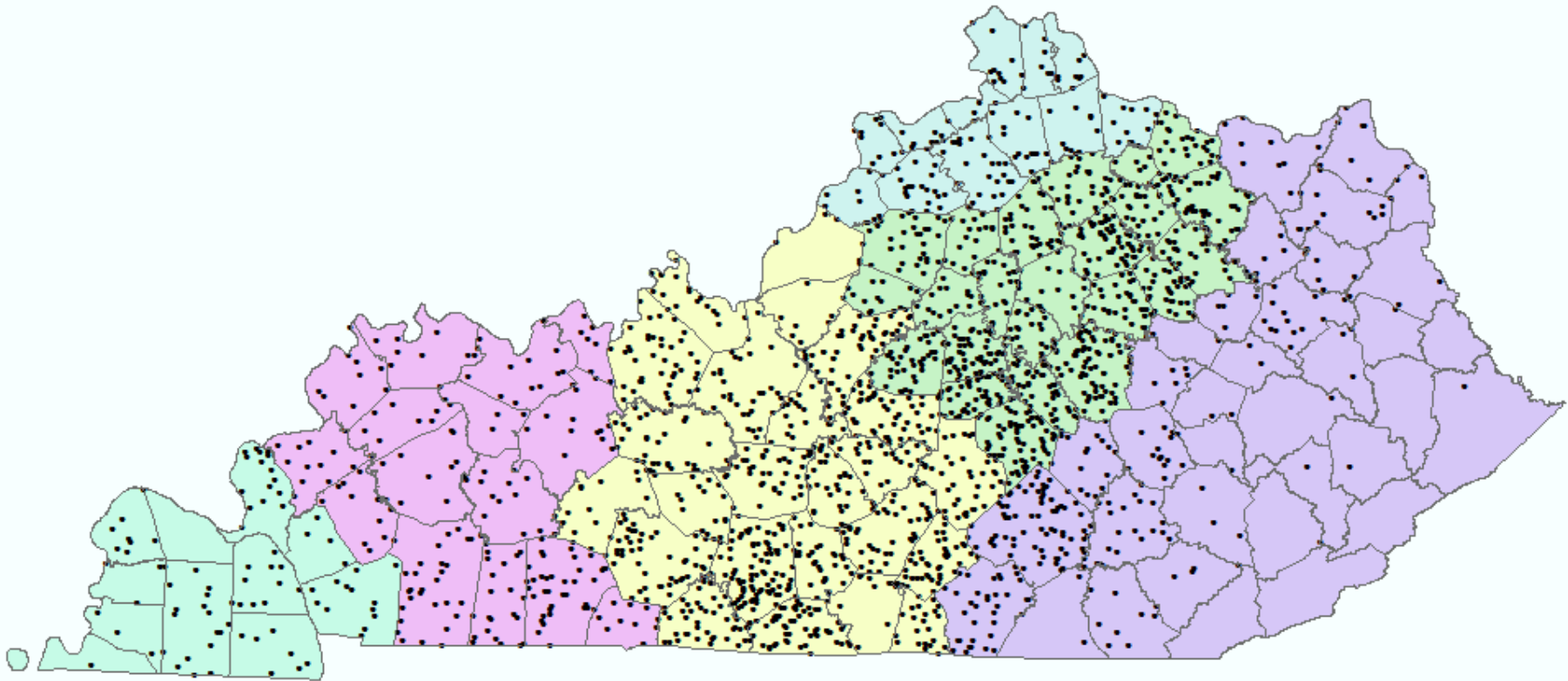


Kentucky Simplified Geology



2012 Cattle Populations per County

(across 6 agricultural districts)

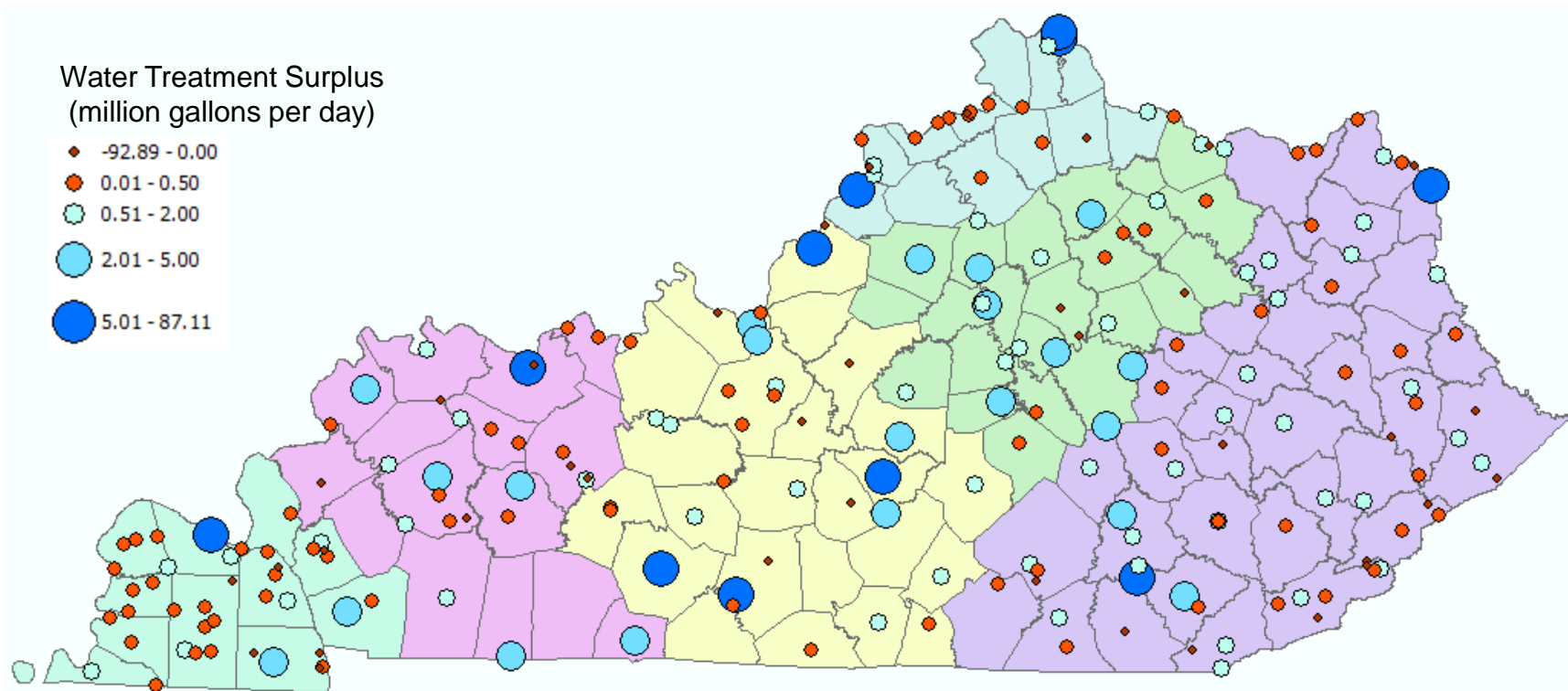


One dot = 5000 Cattle

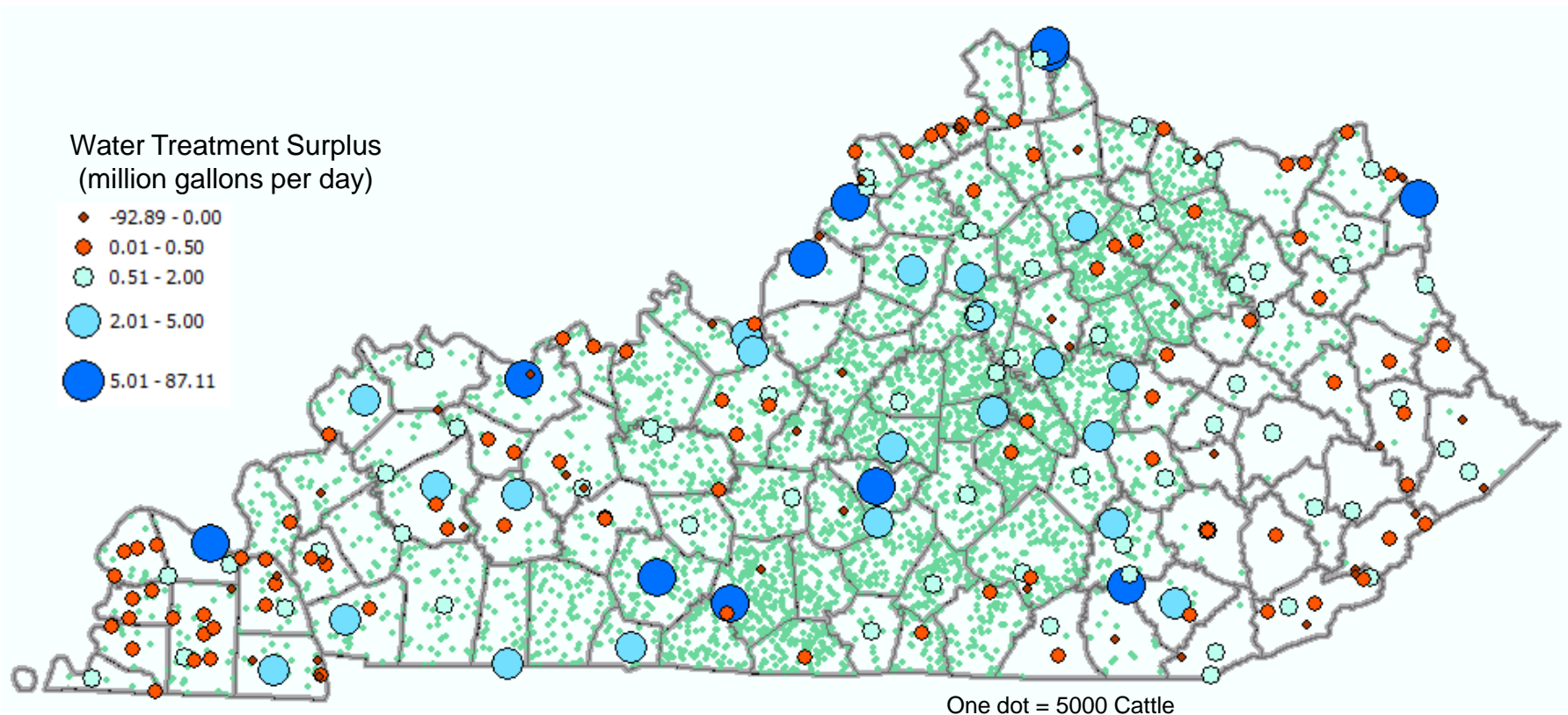
Source: USDA Census of Agriculture



Calculated Surplus of Kentucky Water Treatment Plants



Water Surplus and Livestock Demand (Cattle)



Pre-planning for Water Resources Improvements

Difficult to project future increases in irrigation but a majority will occur in agricultural districts 1 and 2.

Potential for significant increase in agricultural uses of surface waters, not just wells.

Important to project future needs (new poultry producers for example)

Planning should include assessments of

- water availability – surface water, aquifer, springs, lakes
- potential conflicts – users upstream and downstream, nearby domestic or public water supply wells, recreation.
- state and federal permits – floodplain construction, dams
- impacts to source water bodies – special use waters, impaired waters

State Drought Mitigation and Response Plan



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Drought Plan Lineage

Water Management Task Force (1982-1983)

- Inventory of state water resources
- Projection of future water demands

Citizen's Water Task Force (1985)

- Inventory of state water resources ←
- Projection of future water demands ←
- Emergency plans for back-up water supply ←

Water Management Task Force (1986-1987)

- Funding for long range water supply planning

Water Supply Task Force (1989)

- Require long range water supply planning at the local level
- Maintain a statewide water supply inventory ←
- Promote water shortage preparedness ←

Long Range Water Supply Planning: KRS 151.114 (1990)

- Inventory and assessment of public and private water resources ←
- Present water use and projected future needs ←
- Alternative approaches to meet future water supply needs ←



Area Water Management Planning (2000)

- Governor Patton's 2020 Water Management Councils
- Area water management planning (Area Development Districts/Kentucky Infrastructure Authority)
- Water needs forecasting out to the year 2020 ←
- Encouragement of mergers and consolidations

Senate Joint Resolution 109 (2007)

- State plan for drought mitigation and response



Kentucky Drought Mitigation and Response Plan



Prepared by the Energy and Environment Cabinet in partnership
with the Kentucky Drought Mitigation
and Response Advisory Council

In fulfillment of the directive of Senate Joint Resolution 109

December 31, 2008



**Pursuant to Senate Joint
Resolution 109**

**Developed by the Energy
and Environment Cabinet
and the “Kentucky Drought
Mitigation and Response
Advisory Council”**

**“Coordination and synergy
between state agencies has not
been absent, but generally
implemented on an ad hoc
basis in later stages of drought
with a “crisis management
motive”.**



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"The plan describes a simple collaborative approach to accelerate the decision-making processes of state and federal agencies that are necessary to assist local government efforts in **drought response**. It establishes a mechanism for these agencies to work together during non-drought years with various agencies and individuals outside of state government to **identify mitigation actions** that can be taken to reduce the impacts of future droughts.

State Drought Plan

Drought Management Organizational Structure

GOVERNOR

KENTUCKY
DROUGHT
MITIGATION TEAM

Climate and Water Resources Data

Monitor and evaluate climate, weather and water data; identify drought potential and drought development.

Drinking Water and Public Health

Monitor and evaluate water supplies, water utility operations and public health impacts of drought.

Agriculture and Natural Resources

Drought and Water Emergencies

Identify water suppliers and communities that have an elevated risk of an emergency water shortage; oversee on the ground drought response in the event of an emergency.



State Drought Plan

Agriculture and Natural Resources

- The Kentucky Department of Agriculture (Chair)
- The Kentucky Cooperative Extension Service
- The Division of Conservation
- The Division of Forestry
- The Governor's Office of Agricultural Policy
- The University of Kentucky Agricultural Weather Center
- The Division of Water

When activated the AGNR will begin to collect, monitor, and evaluate agricultural weather and production data as they are impacted by drought. As drought conditions progress, the AGNR will monitor the geographic extent of the affected areas and routinely report its findings to the KDMT. Functions that may be performed by the AGNR include, but are not limited to:

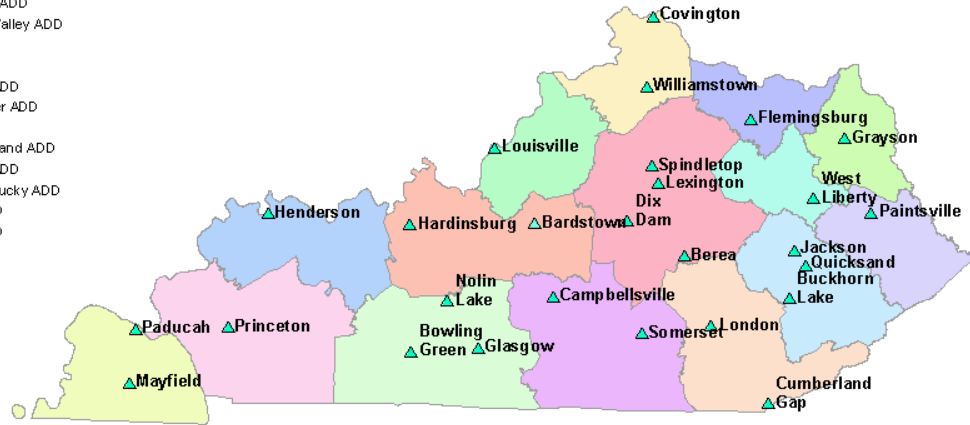
- Assessing current and potential agricultural drought severity
- Working to develop a systematic process that can effectively and rapidly gather agricultural impact assessment data from multiple sources during a drought event
- Determining the types and sources of drought impact data that will be gathered by the AGNR
- Assisting in identifying and resolving conflicts that may arise when water availability is diminished by drought
- Contributing to KDMT Drought Situation Reports
- Identifying sources of water that may be used by livestock producers for emergency livestock watering during declared agricultural drought emergencies



State of Kentucky Drought Monitoring Regions

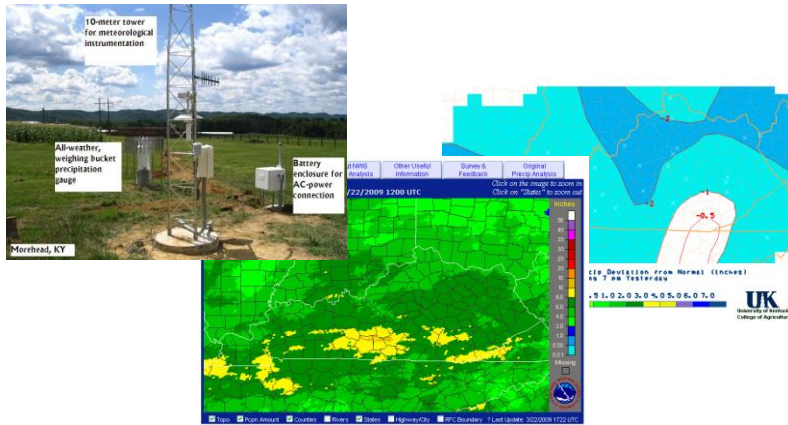
Drought Management Regions ▲ Precipitation Monitoring Locations

- Barren River ADD
- Big Sandy ADD
- Bluegrass ADD
- Buffalo Trace ADD
- Cumberland Valley ADD
- FIVCO ADD
- Gateway ADD
- Green River ADD
- Kentucky River ADD
- KIPDA ADD
- Lake Cumberland ADD
- Lincoln Trail ADD
- Northern Kentucky ADD
- Pennyrite ADD
- Purchase ADD



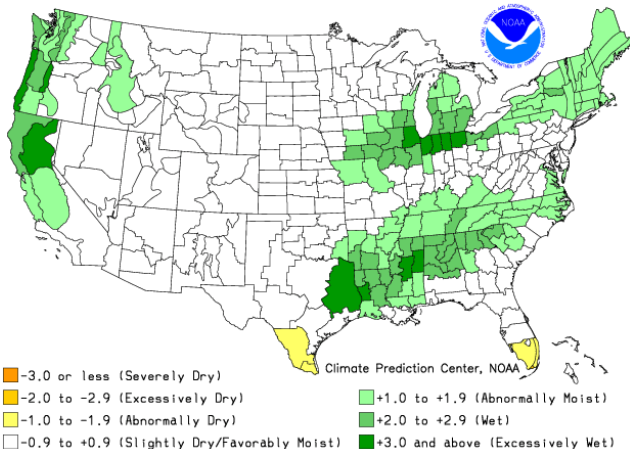
0 15 30 60 90 120 Miles

State Drought Plan: Monitoring

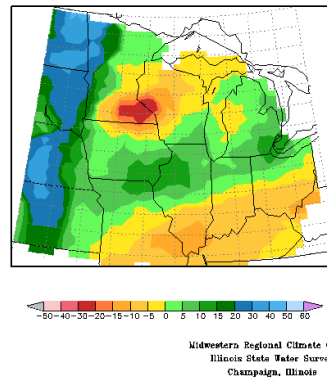


Precipitation

Crop Moisture Index by Division
Weekly Value for Period Ending MAR 14, 2009
Short Term Need vs. Available Water in 5 Ft Profile

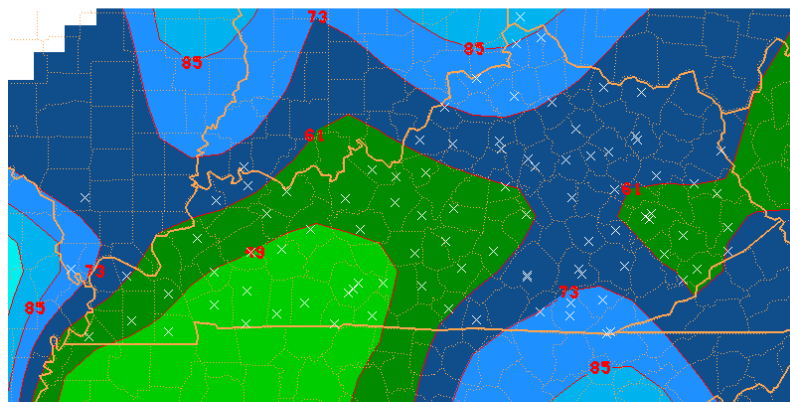


Current Soil Moisture Deviation (%), Depth = 0-72
March-22-2009



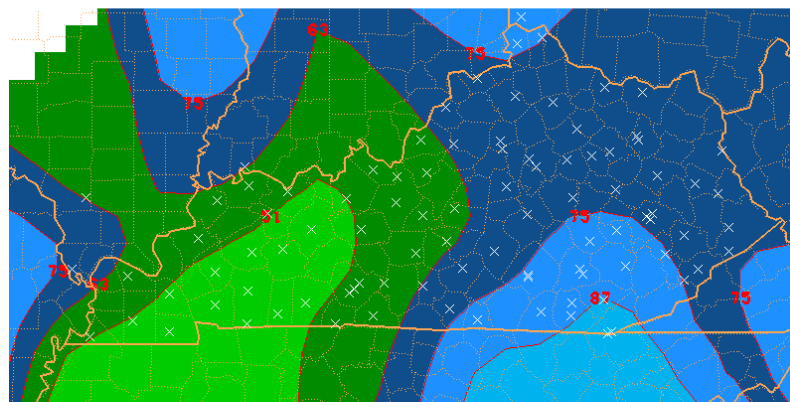
Soil Moisture

Current Precipitation Indicator



01/27/15 - Past 60 Days Percent of normal total Precipitation(*F)
Ending 7 PM

25 37 49 61 73 85 97 109 121 133

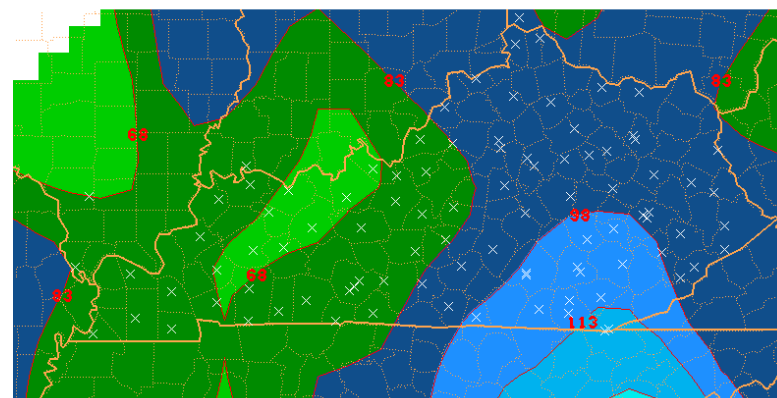


01/27/15 - Past 90 Days Percent of normal total Precipitation(*F)
Ending 7 PM

27 39 51 63 75 87 99 111 123



Cumulative Evaluation Period (days)	Drought Level			
	Advisory	Level I	Level II	Level III
	Percent of Normal Precipitation			
60	< 70%	< 60%		
90	< 74%	< 65%		
120	< 77%	< 70%		
180	---	< 75%		



01/27/15 - Past 120 Days Percent of normal total Precipitation(*F)
Ending 7 PM

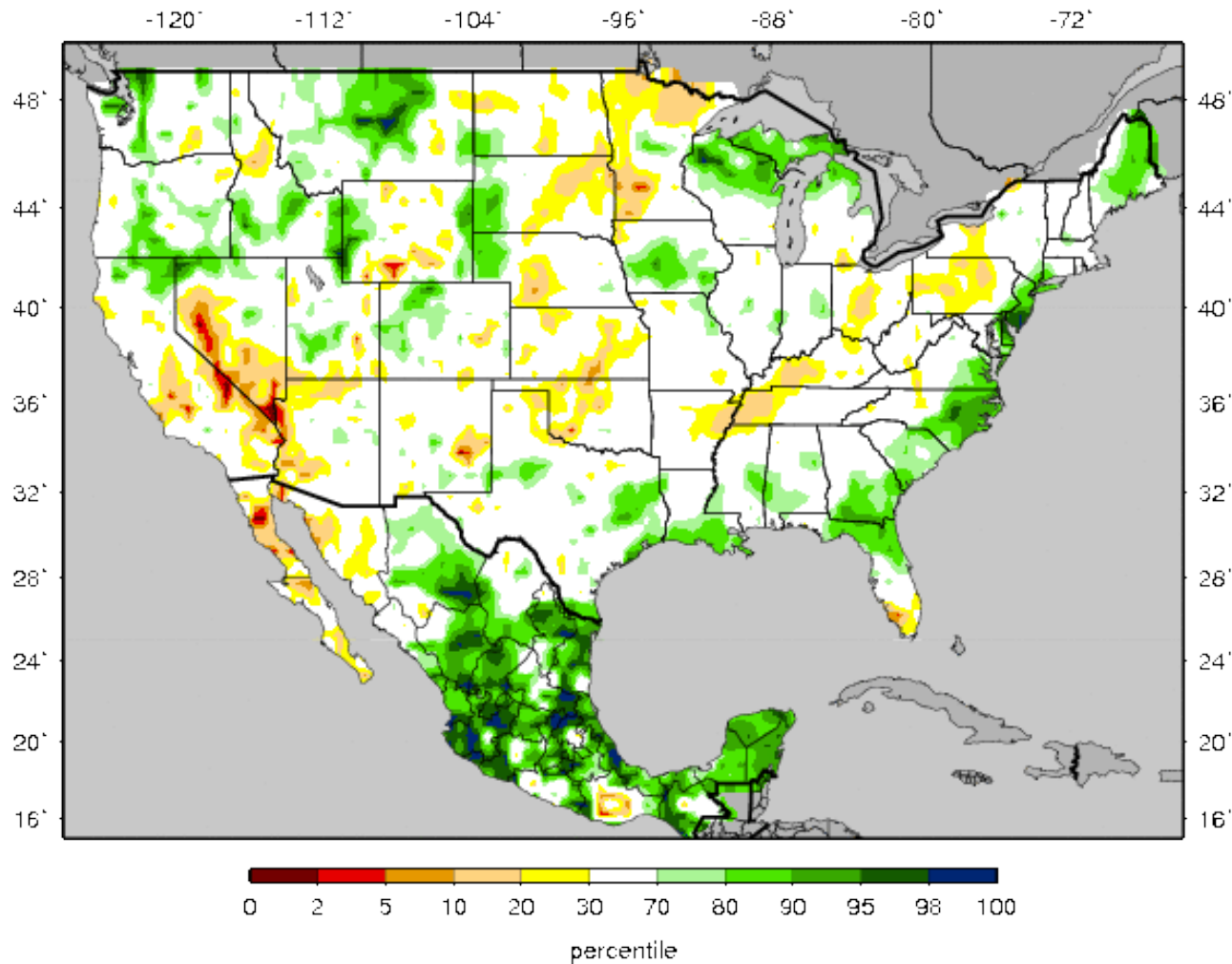
38 53 68 83 98 113 128 143 158



Current Soil Moisture Indicator

VIC Soil Moisture Percentiles (wrt/ 1916-2004)

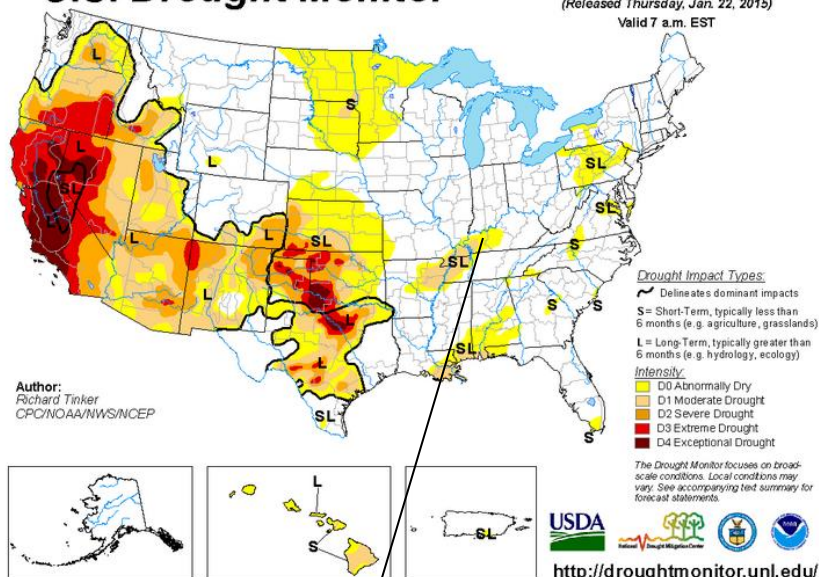
20150125



Current Drought Index Indicator

U.S. Drought Monitor

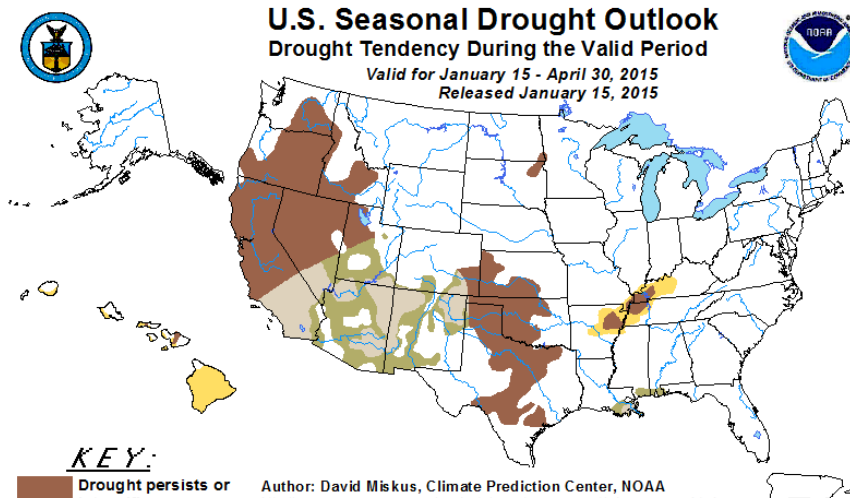
January 20, 2015
(Released Thursday, Jan. 22, 2015)
Valid 7 a.m. EST



Drought Indices

U.S. Seasonal Drought Outlook Drought Tendency During the Valid Period

Valid for January 15 - April 30, 2015
Released January 15, 2015



KEY:

- Drought persists or intensifies
- Drought remains but improves
- Drought removal likely
- Drought development likely

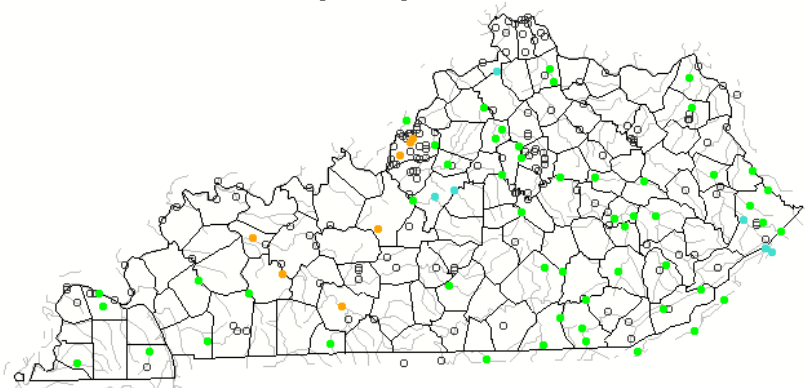
Current Streamflow Indicator

Hydrologic Conditions: Streamflow

Map of real-time streamflow compared to historical streamflow for the day of the year (Kentucky)

Kentucky or Water-Resources Regions

Tuesday, January 27, 2015 11:30ET



Choose a data retrieval option and select a location on the map

List of all stations Single station Nearest stations Peak flow

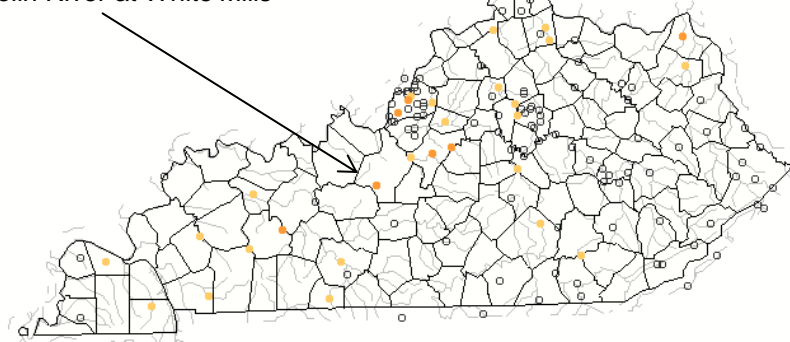
Explanation - Percentile classes							
Low	<10 Much below normal	10-24 Below normal	25-75 Normal	76-90 Above normal	>90 Much above normal	High	Not-ranked

Map of below normal 28-day average streamflow compared to historical streamflow for the day of year (Kentucky)

Kentucky or Water-Resources Regions

Monday, January 26, 2015

Nolin River at White Mills



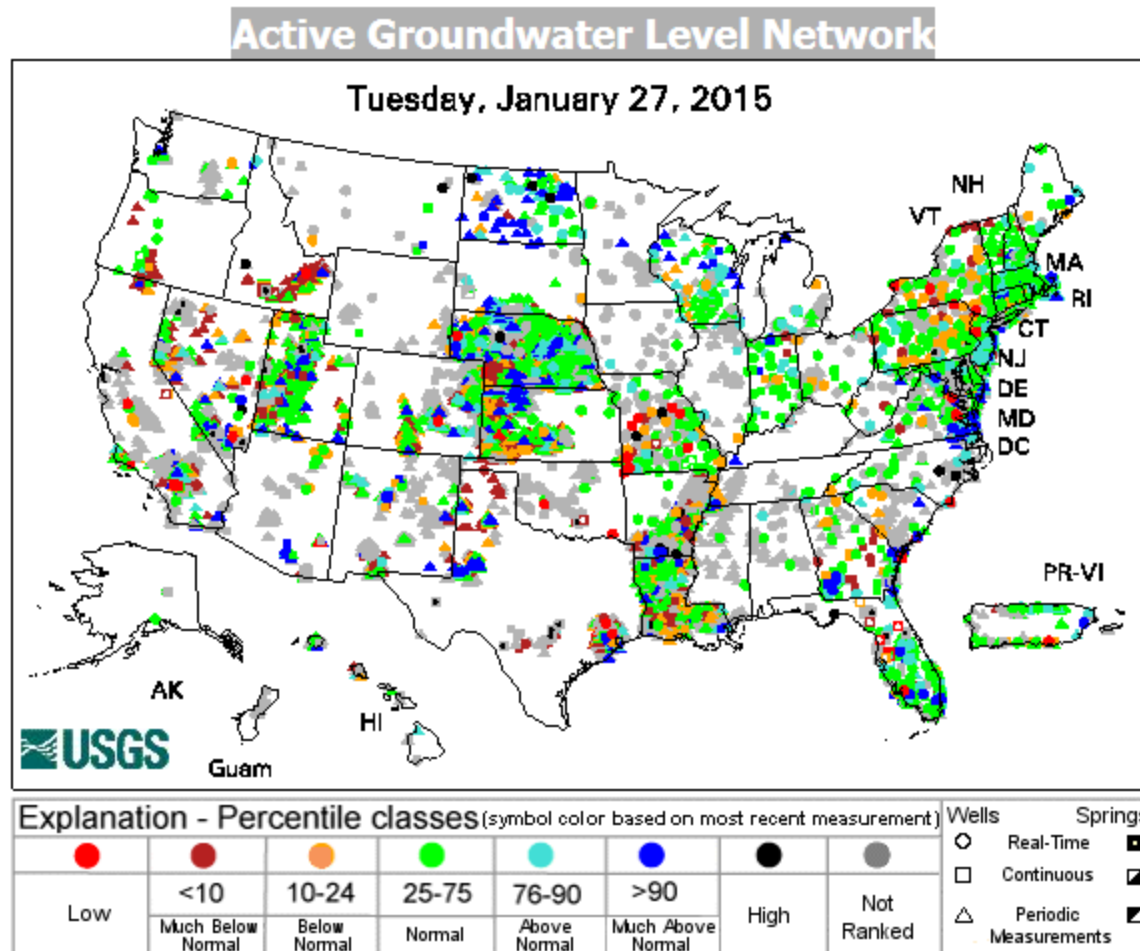
Choose a data retrieval option and select a location on the map

List of all stations Single station Nearest stations

Explanation - Percentile classes				
New low Extreme hydrologic drought	<=5 Severe hydrologic drought	6-9 Moderate hydrologic drought	10-24 Below normal	Not ranked

Current Groundwater Indicator

Hydrologic Conditions: Groundwater



State Drought Plan: Response

Drought Action Levels

Accelerated Monitoring

- Generally a routine action given the available data and resources
- Division of Water is an editor of the Drought Monitor

Drought Advisory

- ★ • Shorter term precipitation indicators: 30-90 days
- ★ • Soil moisture deficit mainly short in topsoil
- ★ • Drought Monitor: mild to moderate drought

Drought Level I

- “Official” recognition of drought
- ★ • Streamflows below a normal range: 11% to 25%
- Drought Monitor: moderate to severe
- ★ • Precipitation indicators: 60% to 75% of normal
- Drought impact(s) reported ***Agricultural impacts

State Drought Plan: Response

Drought Action Levels

Drought Level II

- Streamflows well below normal: 6% to 10% duration
- Soil moisture deficit to 72 inches short
- Drought Monitor: severe to extreme
- Observed drought impacts to water supplies

Drought Level III

- Streamflows less than a 5% duration
- Drought Monitor: severe to exceptional
- Severe drought impacts: water shortages

State Drought Plan: Response

Targeted Drought Declarations

Water Shortage Watches and Warnings

Emergency Declarations

State Declarations

Local Declarations

Agricultural Disaster Declarations

Governor to USDA by county

State Drought Plan: Response

Local Drought Response

Local Water Shortage Task Force

- Develop drought response strategy
- Evaluate vulnerability to water shortage
- Determine ability to meet demand
- Identify alternative sources of water
- Implement drought response plan

State Drought Plan: Mitigation

- Expand data collection networks and secure long-term funding
- Inventory and project the state's available water resources
- Identify and project drought vulnerabilities
- Pursue opportunities to increase available raw supplies
- Improve state and local drought response
- Become more efficient in the use of the state's water resources
- Public education, awareness and outreach

State Drought Plan: Criticism

Public notifications (press releases) from the Drought Mitigation Team are too late to alert agricultural producers to a developing drought.

Drought is progressive in nature and the drought notification system is geared toward hydrologic drought

“Early Warning” in the context of hydrologic drought is usually too far into a developing drought to be of much value to agriculture producers

There is a low level of confidence in projecting drought development based on winter and early spring climate data.



State Drought Plan: Criticism

The Drought Levels in the plan are not in sync with agriculture impacts. Severe impacts are likely before a Level I drought is declared.

See Criticism number one

Severe drought impacts can occur to agriculture without seeing severe changes in drought indicators

Severe drought impacts WILL occur sometimes well in advance of impacts to other water sensitive sectors (municipal supply, industrial or commercial)



State Drought Plan: Criticism

There are no defined mitigation actions for dealing with agriculture water or animal feed shortages, or other agriculture impacts.

This is the primary focus of the Kentucky Farm Bureau's Water Resources Group

Long-term (permanent) drought mitigation will require a process that similar to the state Water Supply Planning Process

The stated objectives of this group share common elements with the water supply planning process:

- research the status of water supplies in the state (inventory and assessment)
- examine potential action to raise the availability of water to farms (alternate supplies)
- make recommendations to the appropriate federal, state and private entities (develop a plan)



Questions