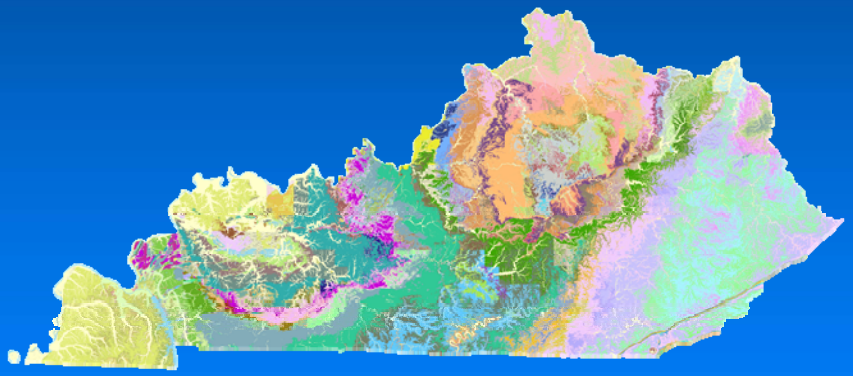
Strategy and Considerations for A Statewide Groundwater Monitoring Network

Kentucky Geological Survey Annual Meeting, May 16, 2014

Charles J. Taylor, Water Resources Section,
Kentucky Geological Survey, University of Kentucky



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KGS Legislatively Mandated Responsibilities:

KRS151.625 Establishment of long-term groundwater monitoring network --

"…for the purpose of characterizing the quality, quantity, and distribution of Kentucky's groundwater resources."

"…shall include:

"(a) Representative sites sampled by various agencies."

"(b) New monitoring wells installed in areas of demonstrated need."

"(c) …shall collect information on a statewide basis and provide long-term data collection…"

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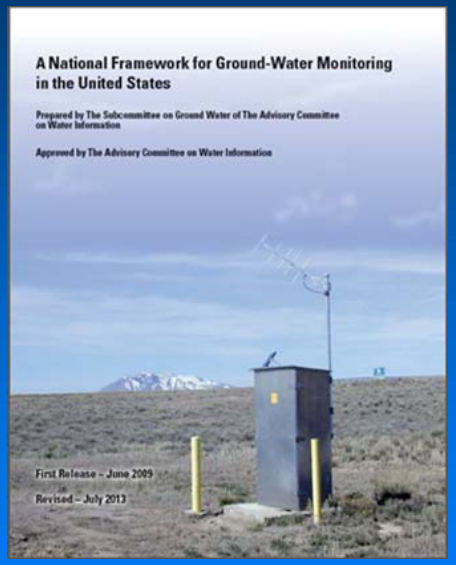
Recommended Components of a Groundwater Monitoring Program



Groundwater Monitoring Network
(Groundwater Level and Quality Data)

Baseline Monitoring Period
(5 year minimum recommended)

Surveillance Sites
(Synoptic sites)

For single or periodic measurement of water levels and groundwater quality at many locations → Geographic Distribution or Snapshot-in- Time Data.

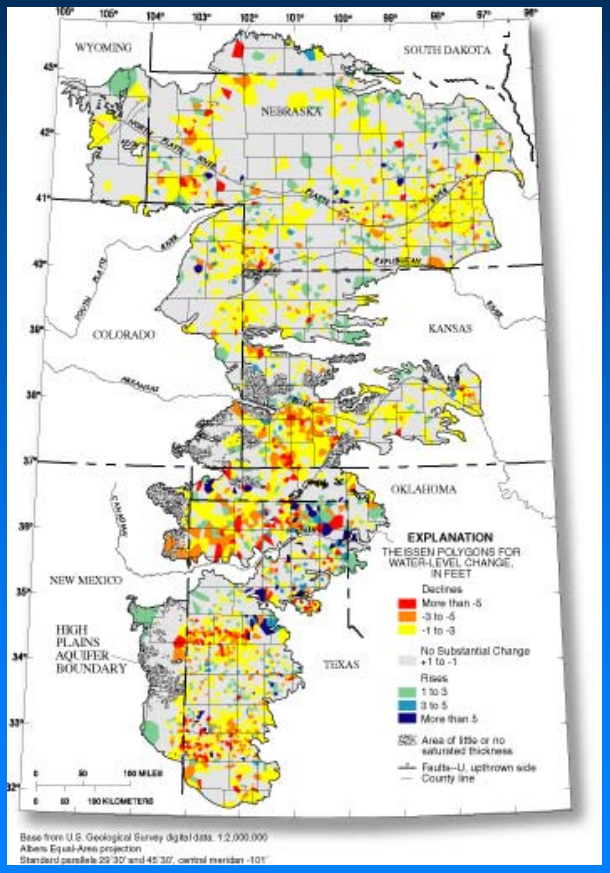
Special Studies

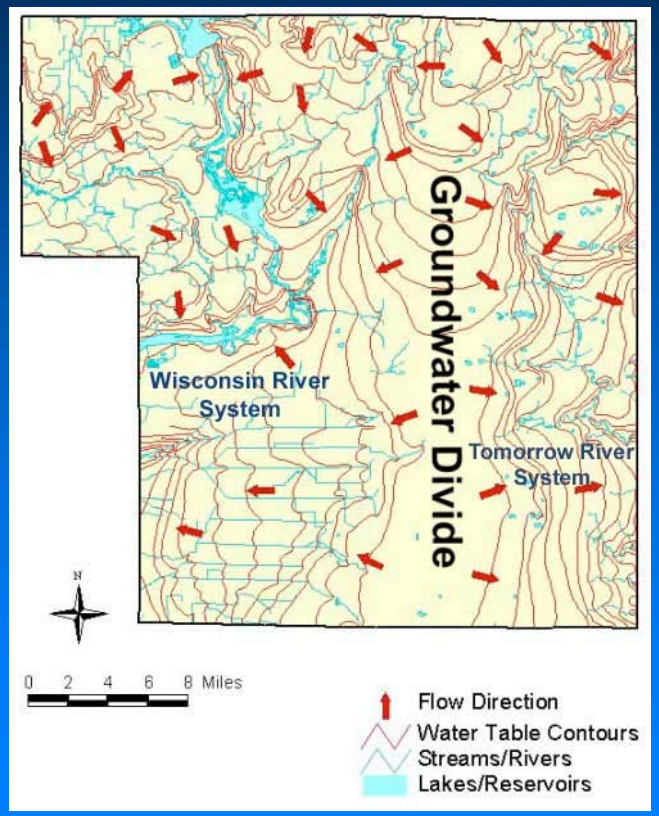
Targeted groundwater investigations conducted as needed or of interest.

Trend Sites
(Continuous sites)

For tracking temporal changes (short and long term) at relatively few targeted locations. Subnetworks recommended for unstressed and impacted aquifers.

Selecting Groundwater Monitoring Sites: If only it were this simple!

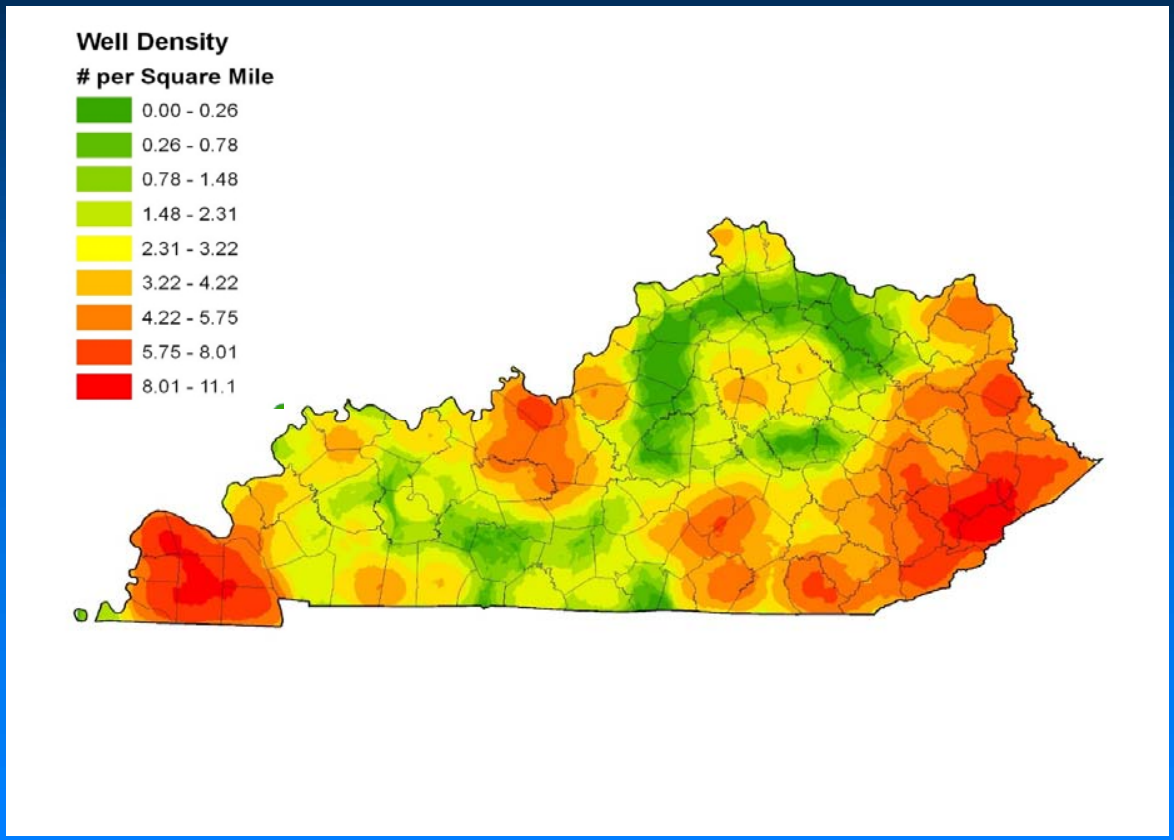




Areas in Kentucky Having Obvious Need for Water-Level Monitoring: Distribution of Water-Withdrawal Wells

Network strategy should seek to locate trend wells in unstressed aquifers to assess “background” conditions.

And use trend and surveillance monitoring wells in areas of large or increasing groundwater withdrawals.



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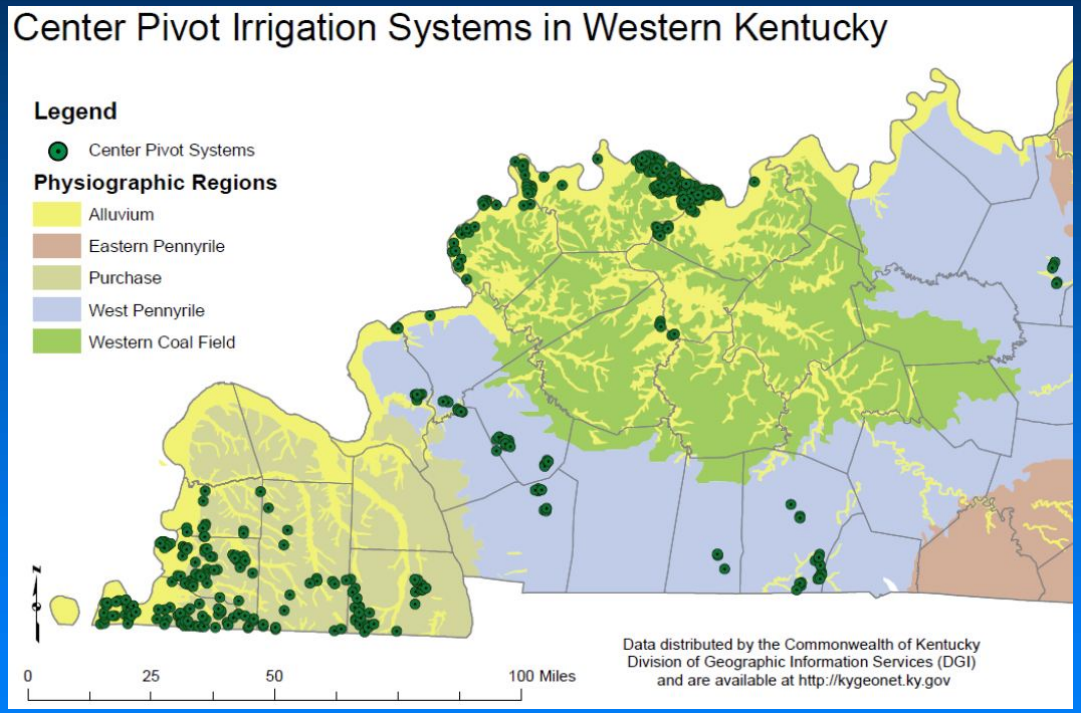
Groundwater Availability and Sustainability for Agriculture in Western Kentucky

Center-pivot irrigation wells being installed in Western Kentucky require 300-1,200 gpm, and average 1.1 million gpd withdrawal.

- Numbers of irrigation wells are increasing every year.
- Can the aquifers provide sufficient water?
- Can well yields be sustained with increased anticipated demands?
- What are any possible long-term impacts?

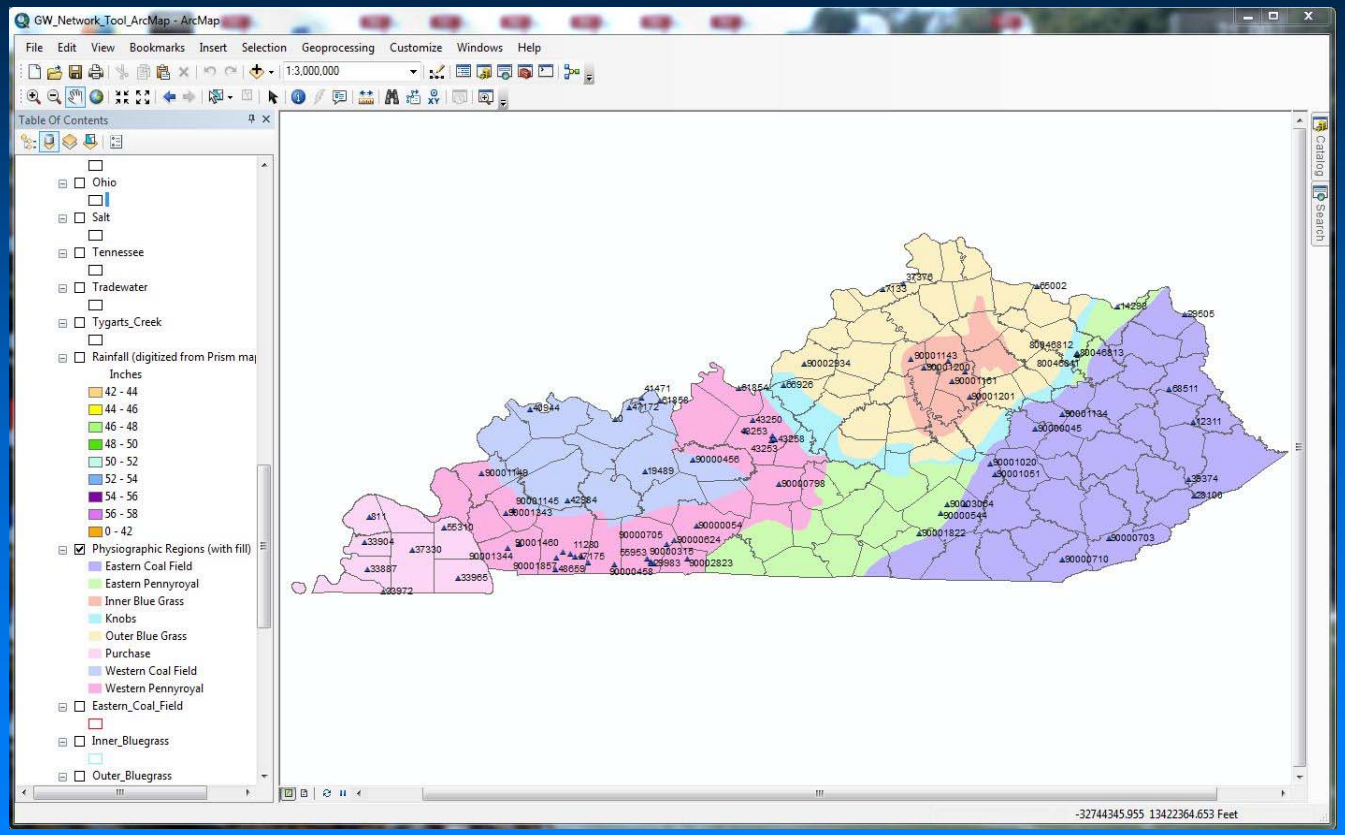


Jessica Moore, KDOW, 2014

A New GIS Groundwater Network Decision-Support Tool Will Be Helpful

Includes data layers to enable evaluation of various geographic and hydrogeological characteristics and help guide placement of specific monitoring sites:

- Physiographic regions
- Precipitation zones
- NHD streams and watersheds
- KDOW designated wellhead protection areas
- KDOW-ITAC groundwater-quality sampling sites.
- USGS stream gages (active and inactive).
- Statewide digital (surficial) geology.



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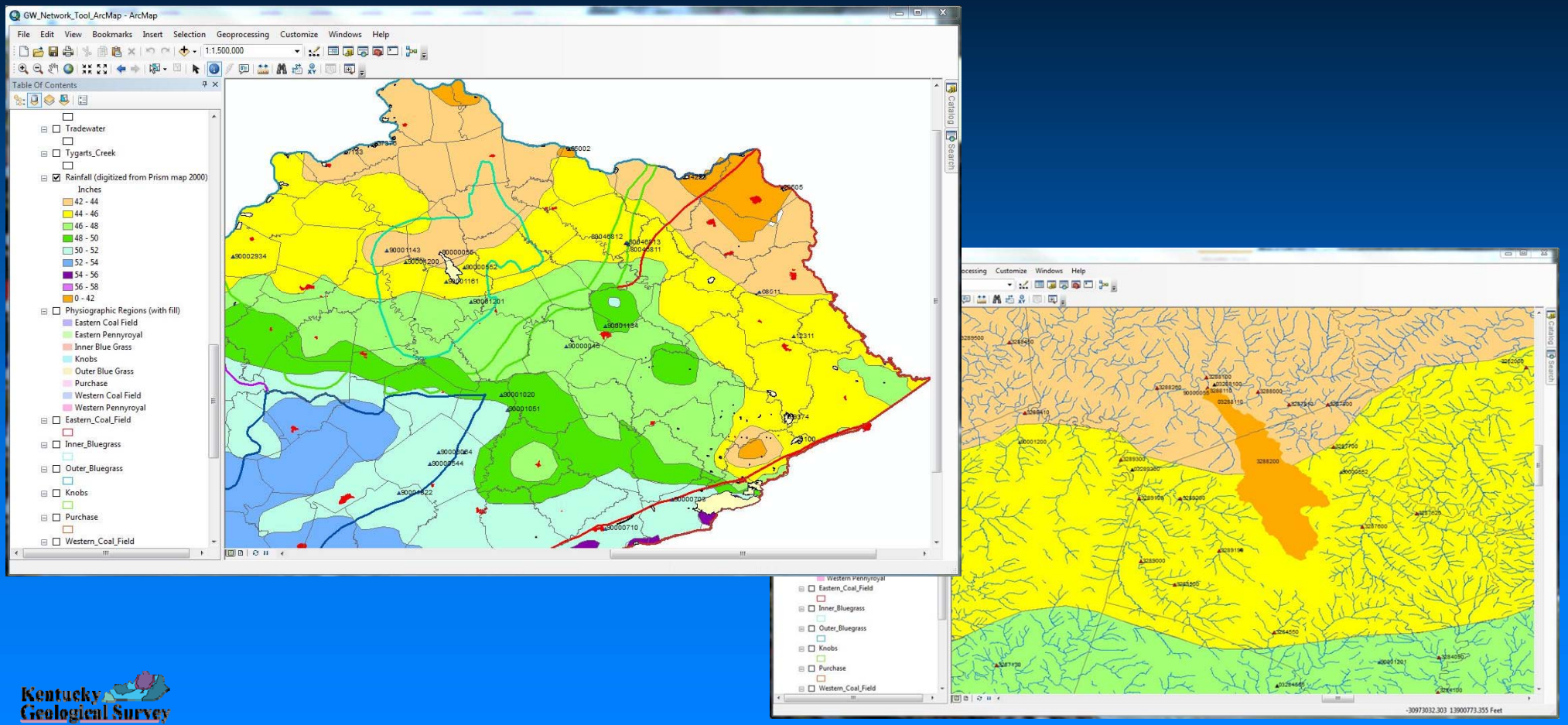
Examples of the Tool's Data Layers, Eastern and Central Kentucky



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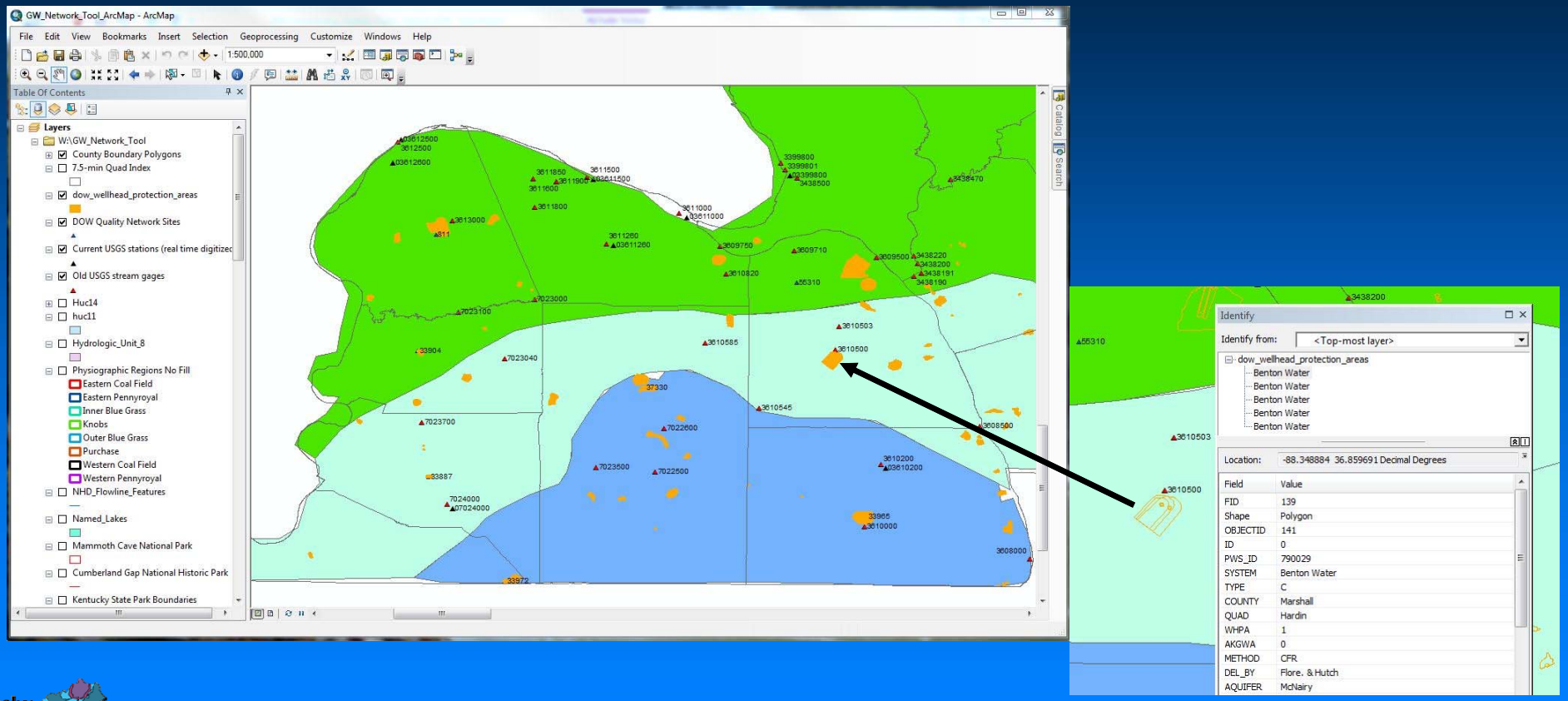
Another Example: Rainfall Belts and Wellhead Protection Areas in Jackson Purchase Area



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KGS Overall Strategy for Building a Better Statewide Groundwater Monitoring Network

- Target, as priority areas, parts of state where groundwater withdrawals are relatively dense and known or anticipated to be increasing.
- Consult and collaborate with state and federal partners individually and through technical advisory groups (ITAC and KASMC) .
- Using the Groundwater Network Decision-Support Tool, evaluate and select specific locations where new monitoring sites would be most beneficial.
- Following the framework described by the National Subcommittee on Groundwater, begin implementation of these three groundwater monitoring network components:

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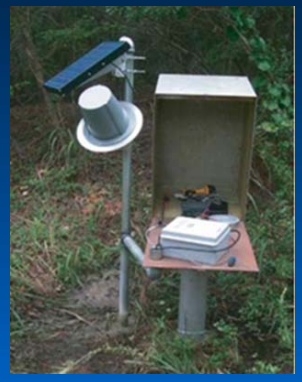
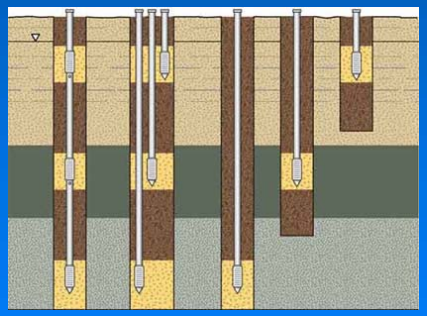
Trend Sites (Continuous sites)





- The primary focus of this network component is expanded groundwater-level monitoring.
- Initiate monitoring at 12-15 sites in mostly unstressed aquifer locations.
- Track ambient water levels for 3 years minimum, as needed for groundwater resource and recharge assessment, drought monitoring, groundwater-surface water interaction.
- Well clusters are anticipated in some locations having multiple discrete aquifer zones or karst (KYHP, WKU Crumps Cave field station).
- May include monitoring of discharge from at least one karst spring.
- Create GWDR webpage to make Trend Site's water-level data publicly accessible.
- Eventually increase Trend Sites to about 24 total wells, dependent on additional funding.

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Surveillance Sites (Synoptic sites)

At present, only two activities are anticipated:

- Synoptic water-level survey for Jackson Purchase Area (stressed aquifers, areal extent partly dependent on additional outside funding).
- Groundwater-quality/geochemical sampling of wells selected for Trend Sites (continuous water-level monitoring).
- Eventually we would like to expand synoptic water-level surveys to Ohio River alluvial aquifer along western Kentucky (agricultural irrigation belt) and parts of Western Kentucky karst.
- Also, would like to repeat Jackson Purchase Area survey every 3-5 years to evaluate any significant regional changes in groundwater availability there.

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Special Studies

- Good aquifer test data are very sparse and often insufficient to help predict yields to wells.
- Conduct slug tests or specific capacity tests on all network wells used as Trend Sites.
- Conduct or obtain additional borehole logging as possible to begin building a subsurface hydrostratigraphy database.
- Collect additional aquifer test data as opportunities arise as part of network activities.
- Compile aquifer test data from other sources to add to the Ground Water Data Repository.

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- Laura Knoth—Kentucky Corn Growers Association
- Stuart Foster, Jason Polk—Western Kentucky University

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Questions?

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