

“The National Ground-Water Monitoring Network”

NWQMC Sixth National Monitoring Conference
Atlantic City, NJ
May 20, 2008

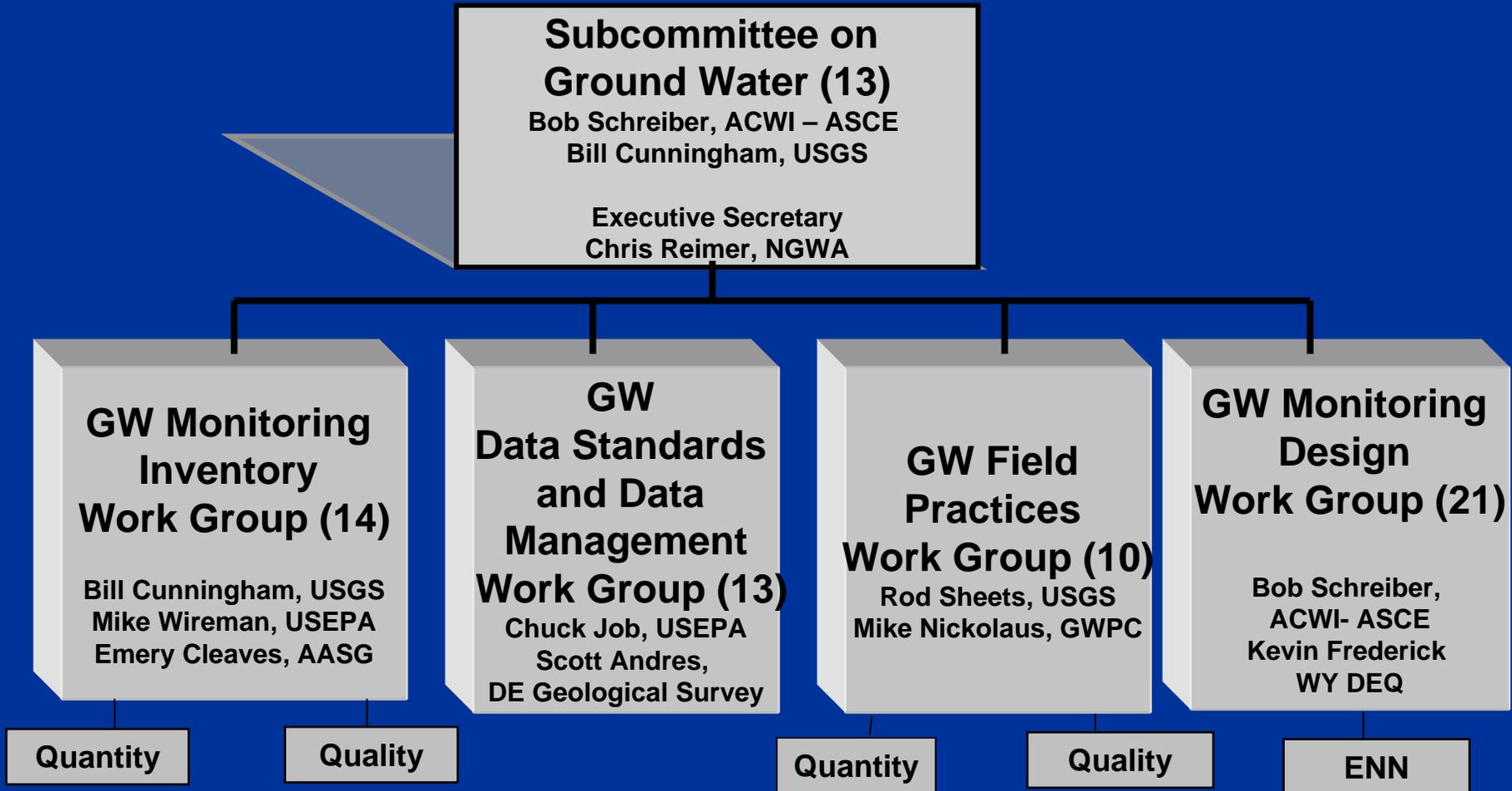
Kevin Frederick
Design WG Co-Chair



Overview of Presentation

- **Network Design Features**
- **Monitoring Network Goals and Objectives**
- **National Questions and Issues**
- **Monitoring Sub-networks and Categories**
- **Design Criteria**

Work Groups



Work Group Terms of Reference

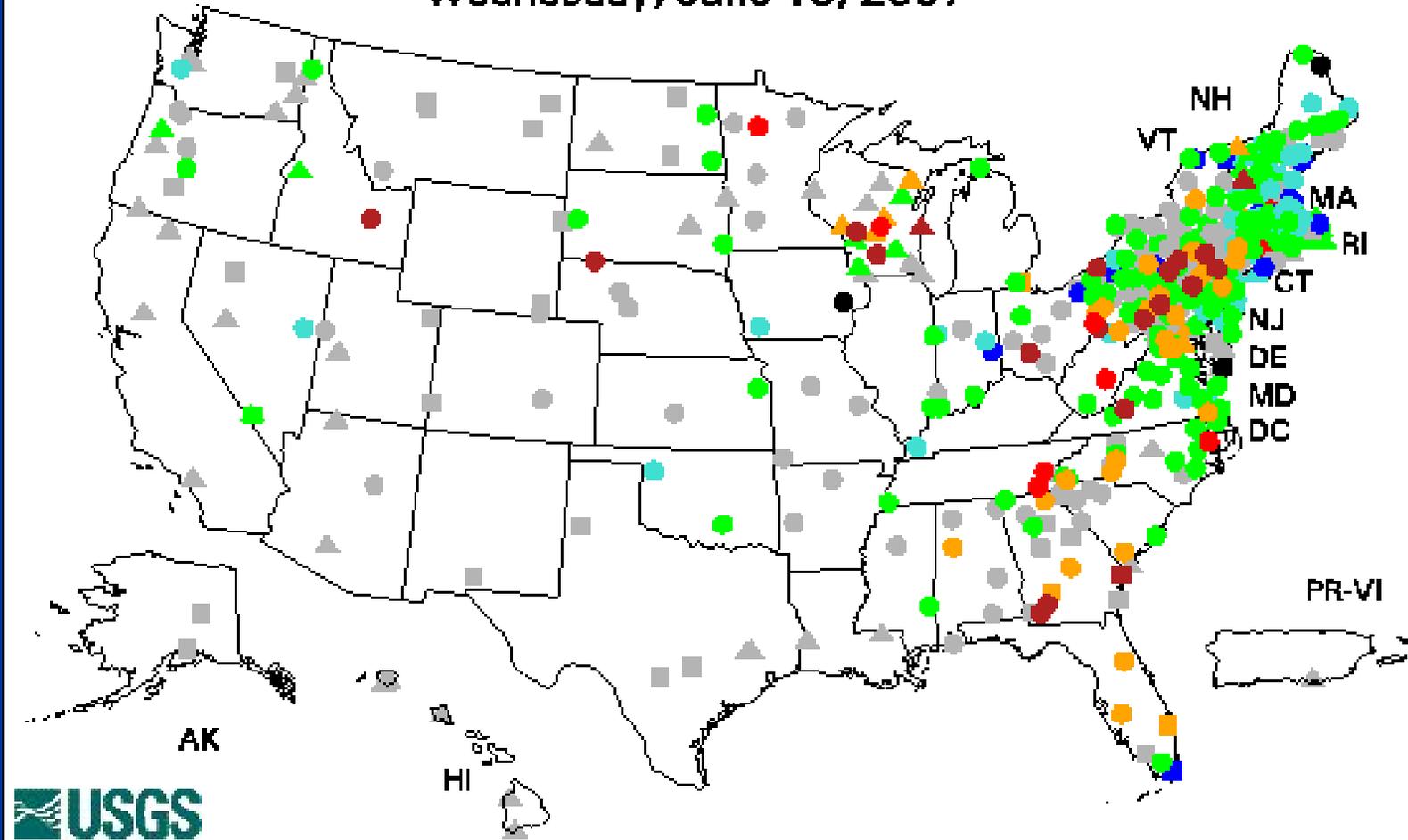
- **Develop a draft national framework for ground-water monitoring and collaboration that will assist in assessments of the quantity of U.S. ground-water reserves, as constrained by ground water quality**
- **Additionally, the work group will develop recommendations for a monitoring design that can provide a status of the Nation's ground-water resource, how it has changed over time, and how it may change in the future.**

Network Design Features

- **“Network-of-Networks”**
 - Incorporates wells in existing federal, regional, state, and local monitoring programs.
 - National ‘Network’ or ‘Framework’
 - Is not intended to replace existing regional, state, and local monitoring systems, nor is it intended to address localized issues such as contaminated industrial sites.

USGS Climate Response Network

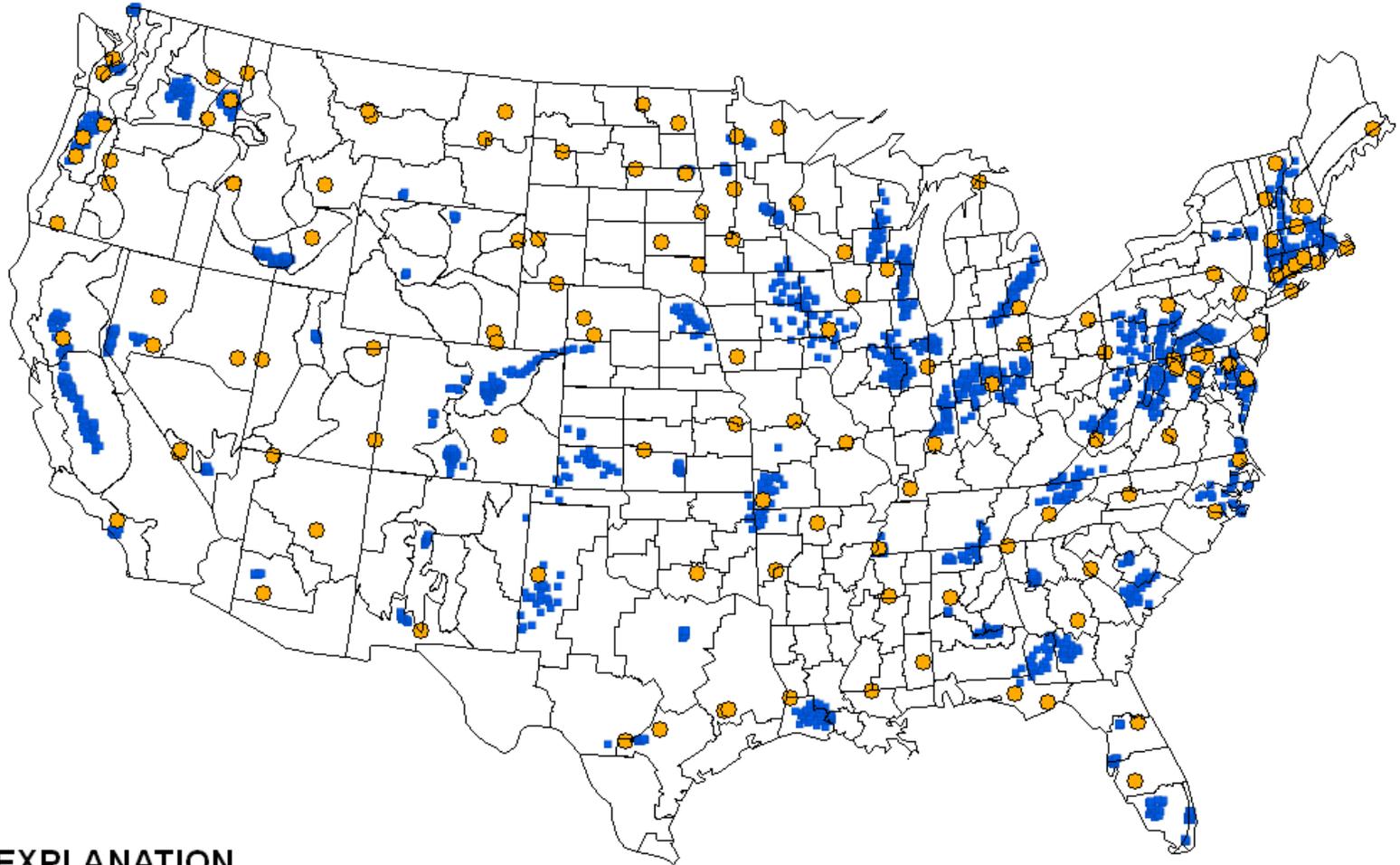
Wednesday, June 13, 2007



Explanation - Percentile classes

								Real Time
New Low	<10	10-24	25-75	76-90	>90	New High	Insufficient Data	Continuous
Low	Much Below Normal	Below Normal	Normal	Above Normal	Much Above Normal			Periodic Measurements

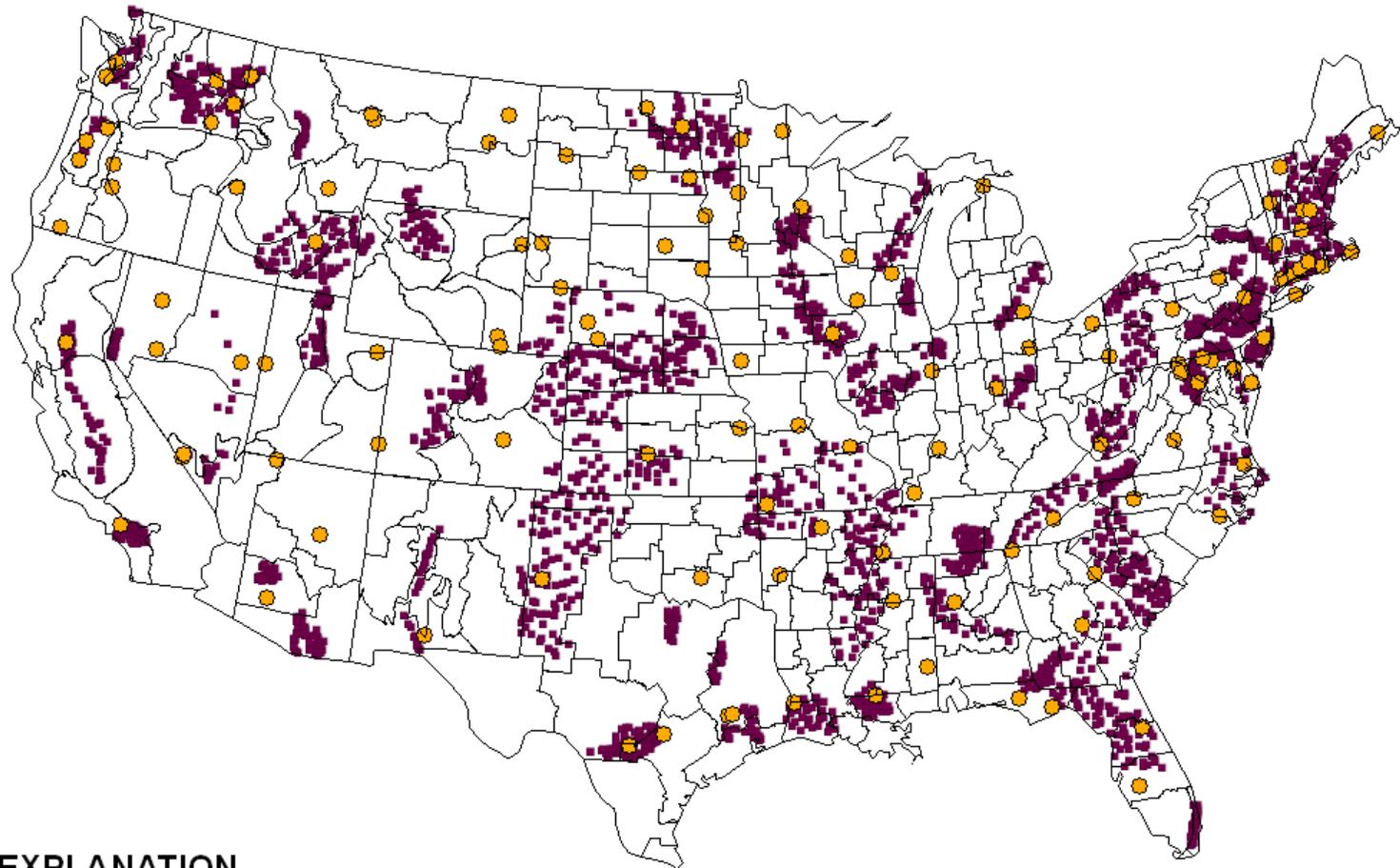
Climate Response Network and NAWQA Shallow Monitoring Wells



EXPLANATION

- NOAA climate divisions
- CRN network FY07
- NAWQA shallow GW monitoring sites (lus network)

USGS Climate Response Network and NAWQA Major Aquifer Wells



EXPLANATION

- NOAA climate divisions
- CRN network FY07
- NAWQA primary drinking water sites (sus network)

Regional Monitoring Network

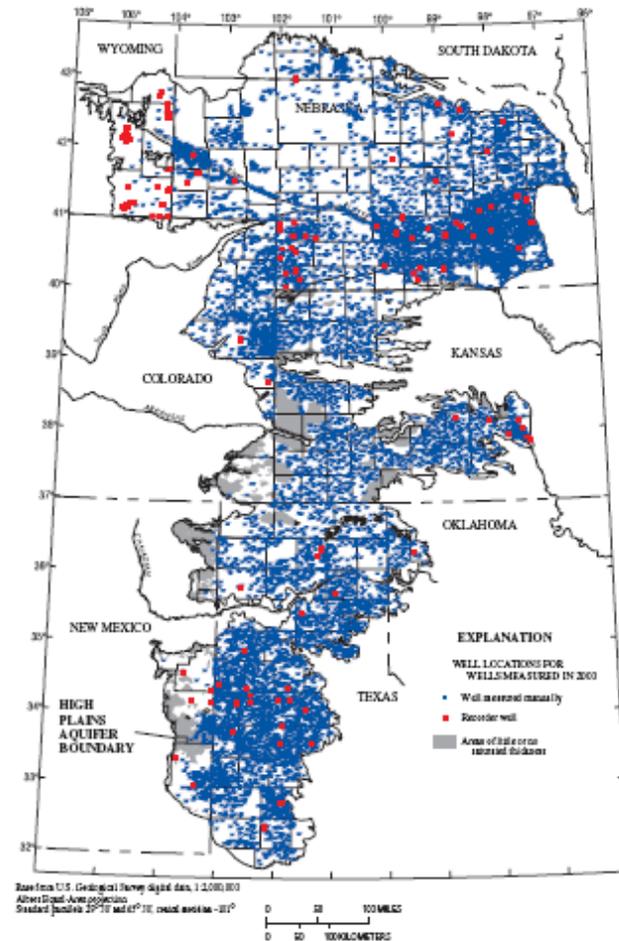
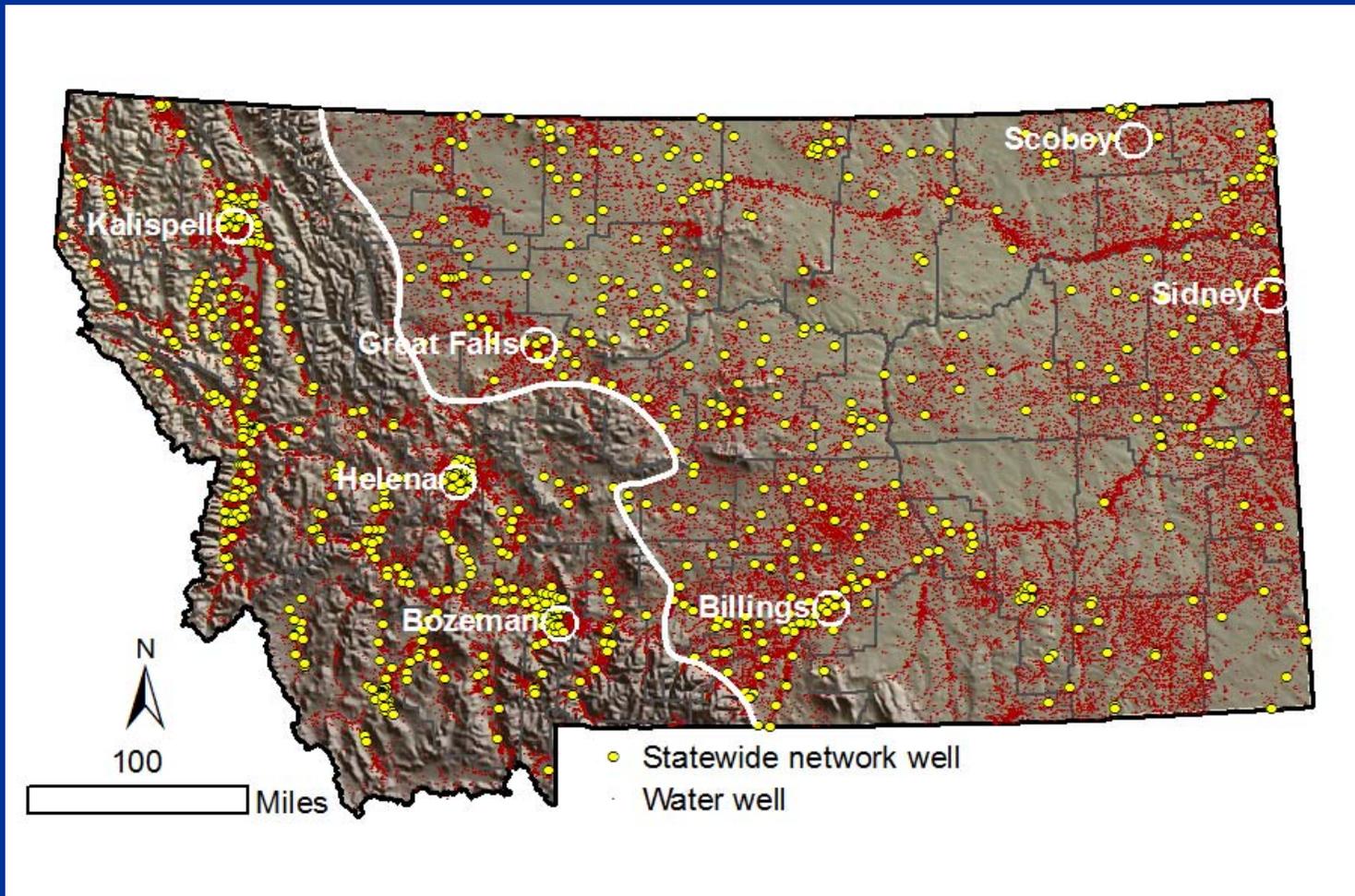


Figure 11. Well locations for wells screened in the High Plains aquifer and measured in the year 2000.

Montana's Monitoring Network



Network Design Features

- What do we monitor?
 - “Principal Aquifers of the US” (USGS)
 - Additional ‘significant’ aquifers identified in *USGS Ground-Water Atlases*
 - Other ‘significant’ aquifers identified by states

Network Goals and Objectives

- Provide data that is on a national scale
- Define the status and trends
- Identify potential problem areas
- Answer resource questions of local, regional, or national importance...

Questions Addressed

- **Level I: Required (Primary)**
 - Answered by NGWMN data, only
 - Regional and national scales
- **Level II – Encouraged (Secondary)**
 - Require ancillary data to answer
 - Local, State, Regional and National scales

Example Level I Questions

- **What are baseline water level and quality conditions?**
- **How are conditions (levels and quality) changing over time?**
- **What % of GW is suitable for human consumption without treatment?**

Example of Level II Questions

- **What are the impacts of climate variability on GW resources?**
- **What are the impacts to GW and SW due to excessive pumping?**
- **Can states sustain their GW needs into the future?**
- **What are the contributions of GW to surface water?**

Network Design Features

- “Sub-Networks”
 - ‘Unstressed’
 - ‘Targeted’
- Monitoring “Categories”
 - ‘Baseline’
 - ‘Surveillance’
 - ‘Trend’
 - ‘Special Studies’

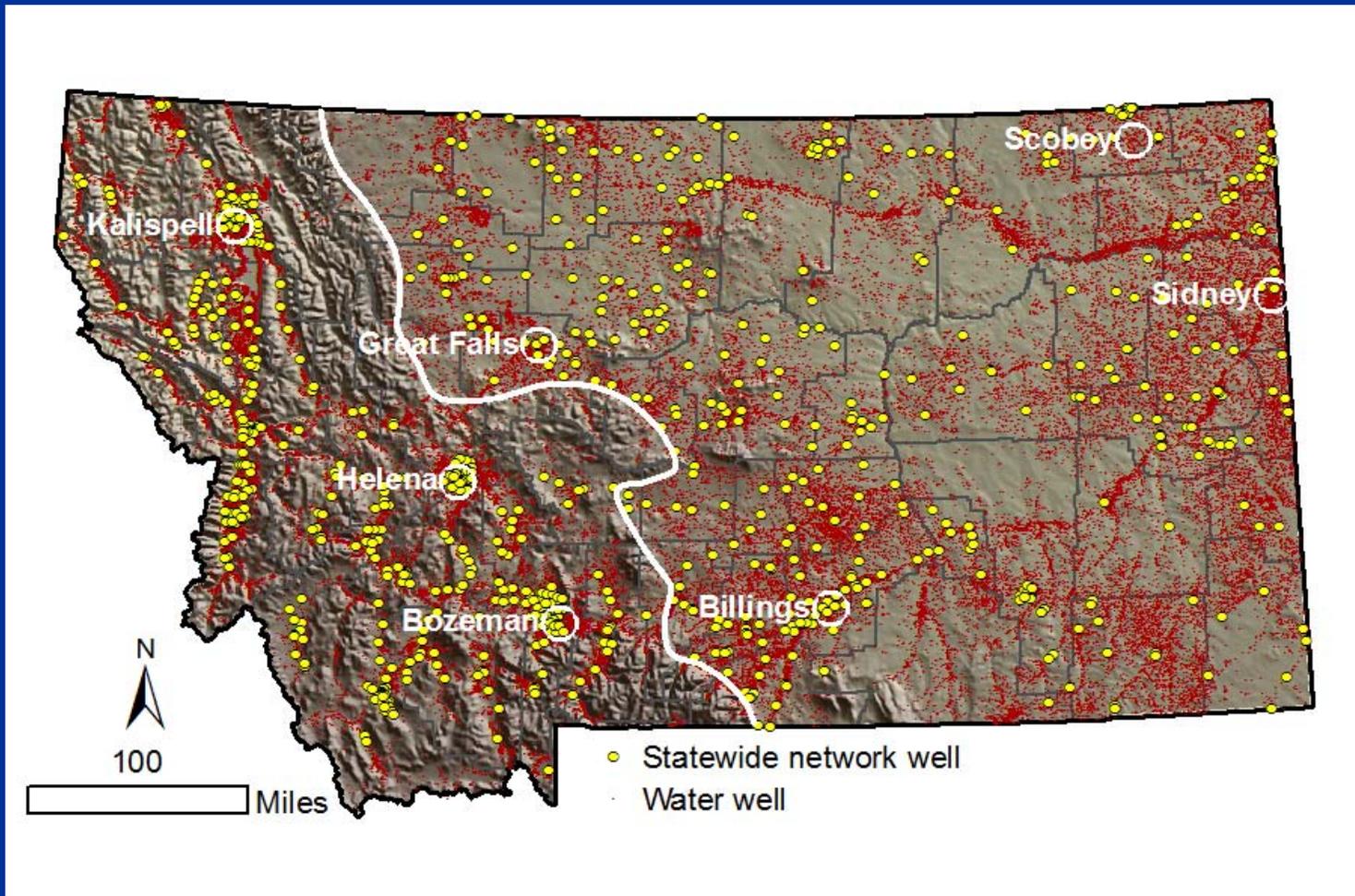
Network Design Features

- **“Unstressed”**
 - **Water-level data or water-quality results represent non-pumping and non-contaminated areas.**
 - **Unstressed areas are those that either have no stress or those that have only been minimally impacted by human activities.**

Network Design Features

- **“Targeted”**
 - **Comprised of wells that represent areas currently or anticipated to be influenced by anthropogenic or other (e.g. climatic) stresses.**
 - **Pumping stress**
 - **Impaired ground water quality**

'Unstressed' and 'Targeted' Sub-Networks



Network Design Features

- **Monitoring “Categories”**
 - ‘Baseline’
 - Initial Event
 - ‘Surveillance’
 - Periodic re-sampling; long-term trends quantity/quality.
 - ‘Trend’
 - Periodic, but increased frequency; short-term trends and seasonal variability.
 - ‘Special Studies’: Variable

Network Design Features

- **What is the frequency of monitoring?**
 - **Dependent upon...**
 - **Monitoring Category (Surveillance, Trend, etc.)**
 - **Aquifer Flow Type (Porous, fracture, karst)**
 - **Degree of Confinement**

Network Design Features

- What field parameters and analytes do we analyze for?
 - Comprehensive suite
 - Defined for 'Baseline' and 'Surveillance' monitoring
 - Variable for 'Trend' and 'Special Studies'
 - Can begin to establish overall 'use suitability' (Domestic, Irrigation, Livestock, Industrial)

Network Design Features

- **Minimum Criteria for Well Acceptance**
 - Long-term accessibility
 - Acceptable construction
 - Others
- **Well Density**
 - Minimum number: Approx 30/unit (2,010)
 - Prescribed density: 1 per 100 km² (115,670)

Questions?

