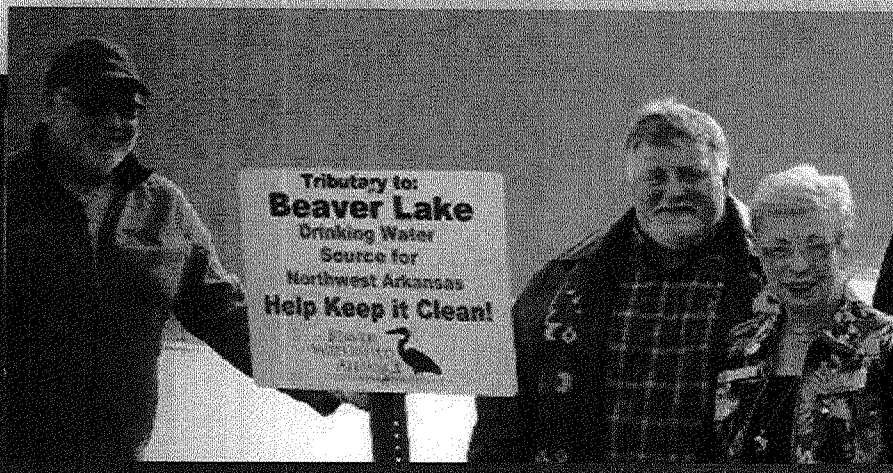


Source Water Protection in Arkansas: Connecting the Public to the Science

Darcia Routh, M.S., P.G./ADH
AWW&WEA 2016

Hot Springs Convention Center 5/1/16



The challenge

- ▶ Distilling highly technical information for non-experts
- ▶ Role of interpreter
- ▶ A couple of examples of how we do this

▶ ***SHAMELESS PROMOTION ALERT:***
Infomercial for Source Water Protection especially wellhead protection



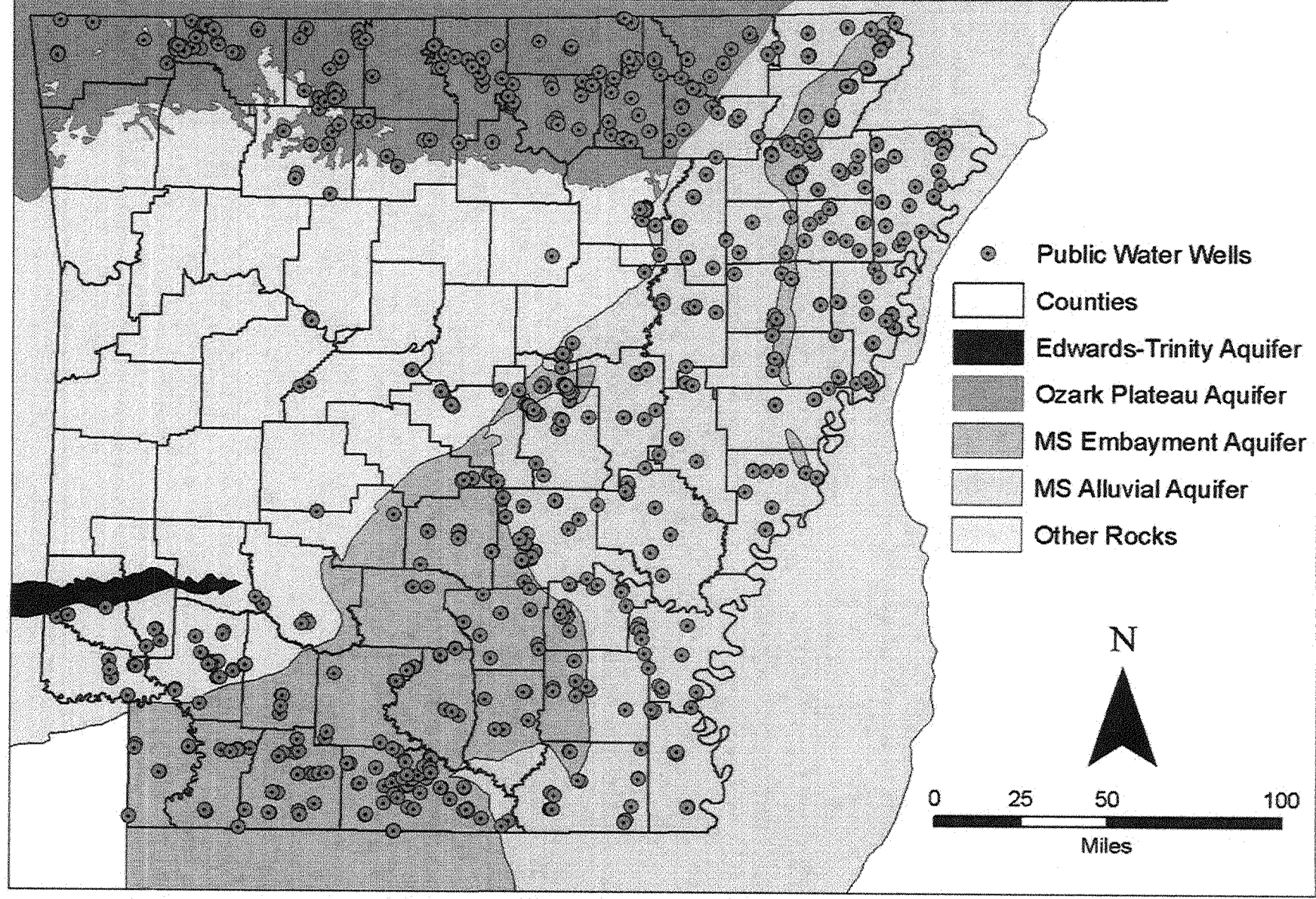
My Interpretive Context

- ▶ Source Water Protection
- ▶ Safe Drinking Water Act
- ▶ Non-regulatory program
- ▶ Technical Support Team of 5:
Geologist Supervisor, Geologist, GIS Analyst, GIS Specialist & Source Specialist

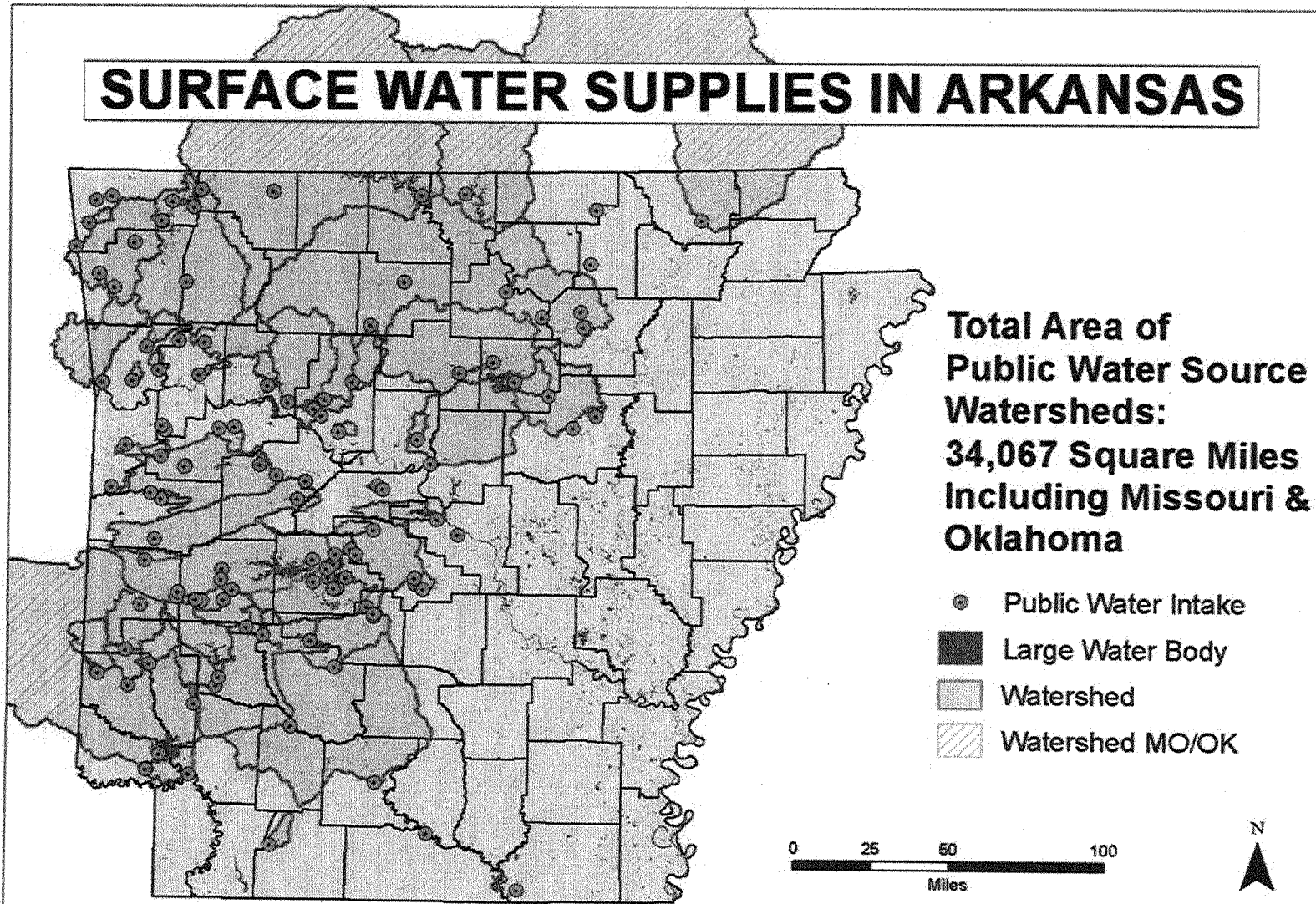
CORE: Designate an area to be protected around each drinking water source (emphasis wells)



GROUNDWATER SUPPLIES IN ARKANSAS

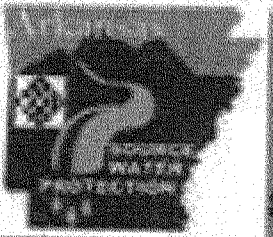


SURFACE WATER SUPPLIES IN ARKANSAS



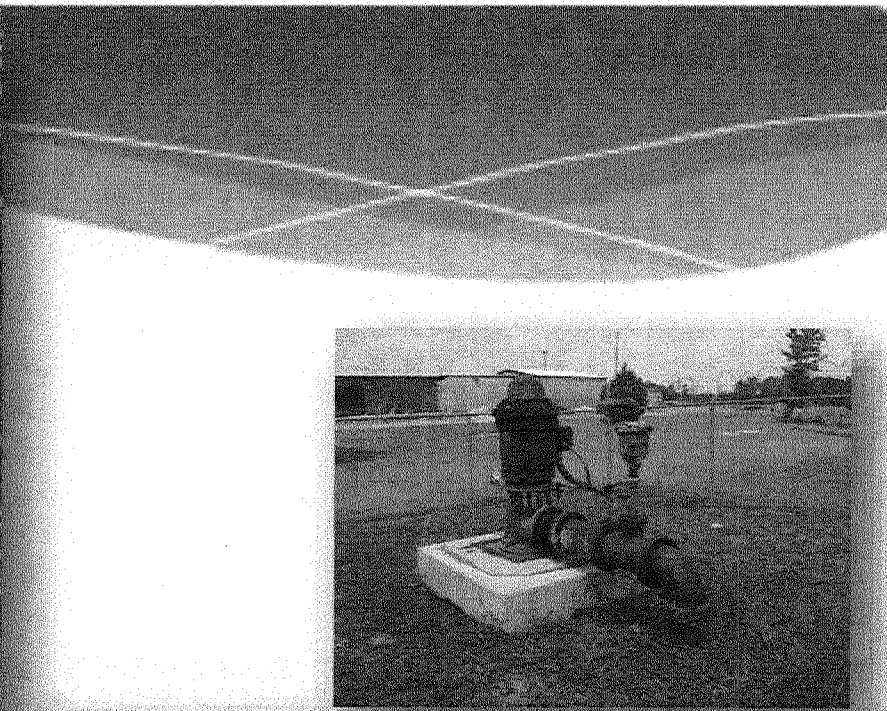


Two Arkansas

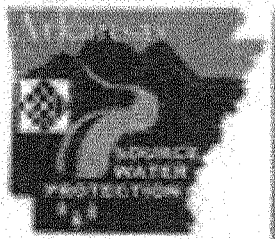


Source: JimWark@AirPhotoNA.com

Interior Highlands: Surface Water Country



Gulf Coastal Plain: Groundwater Country



Source: JimWarb@AirPhotoNA.com

Drinking Water NW ½ AR

Abundant high quality surface water available in Interior Highlands

Groundwater of good quality and decent quantity restricted to N AR

Springfield and Salem plateau carbonates are karst aquifers

Boston Mtns, River Valley, and Ouachitas: groundwater restricted to modern alluvial deposits along major rivers

Low yield questionable quality GW suitable for domestic wells



Drinking Water SE ½ AR

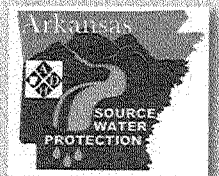
Abundant high quality groundwater available in Gulf Coastal Plain

Surface water of good quality and decent quantity only in small areas.

MERAS aquifer system: MS Embayment Regional Aquifer System

Modern alluvial deposits along major rivers

Gulf Coastal marine and non-marine sediments of the Tertiary



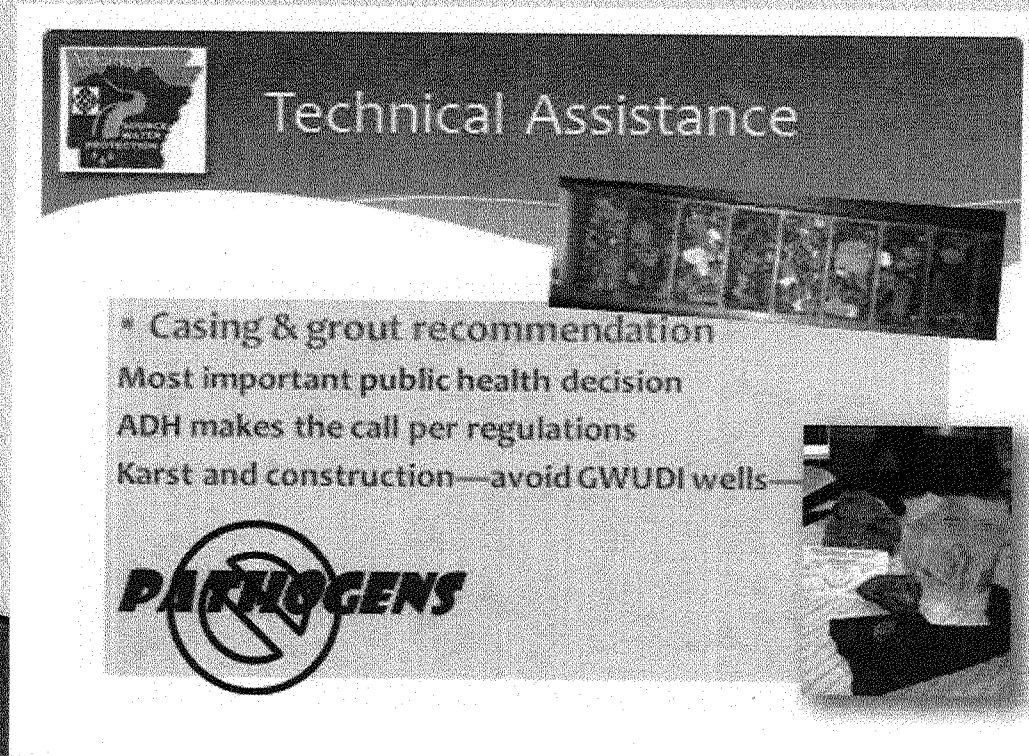
How can we help you?

- ▶ *Groundwater sources & protection*
- ▶ *Surface Intake/watershed sources & protection*



Designate Protection Areas

- ▶ Locate sources (GPS) each public supply
- ▶ Determine an area to be protected for each
 - *Differs for wells, springs, GWUDI wells, rivers, reservoirs*




Technical Assistance

- Casing & grout recommendation

Most important public health decision
ADH makes the call per regulations
Karst and construction—avoid GWUDI wells—

PATHOGENS



Initial Well Recommendation

- ▶ A description of the location
- ▶ The best aquifer/s to tap & how deep it is expected to be,
- ▶ The site-specific stratigraphy
- ▶ Typical yield of the aquifer in the vicinity of the well
- ▶ The estimated depth of casing and grout to install.



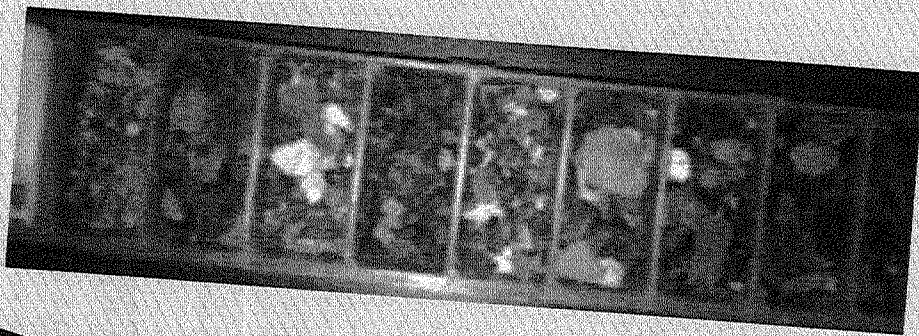
Initial Well Recommendation

- ▶ Precautions for drilling complications based on conditions encountered in surrounding wells
- ▶ Details regarding how to make the required submittal of cuttings and driller's notes and logs.
- ▶ CASING & GROUT ADH geologist
- ▶ make the determination



Cuttings Review/Grout Casing Rec

- ▶ AGS and ADH geologists examine the drill cuttings under a high-powered binocular microscope
- ▶ Identify rocks and sediments penetrated and
- ▶ Look for signs of surface water influence (oxidation).



Casing & Grout Determination

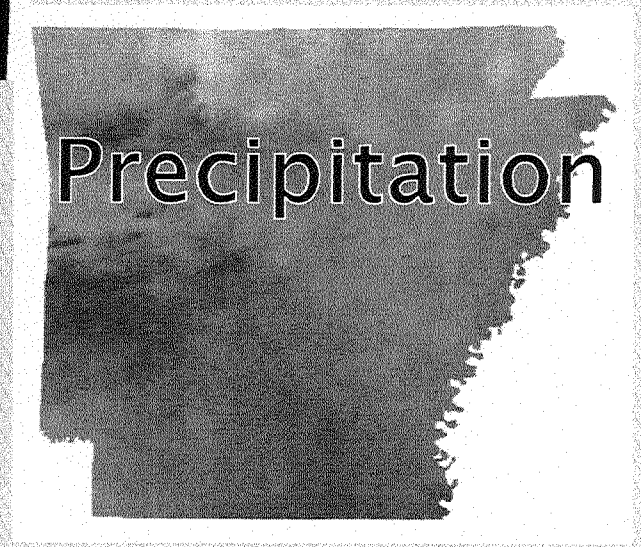
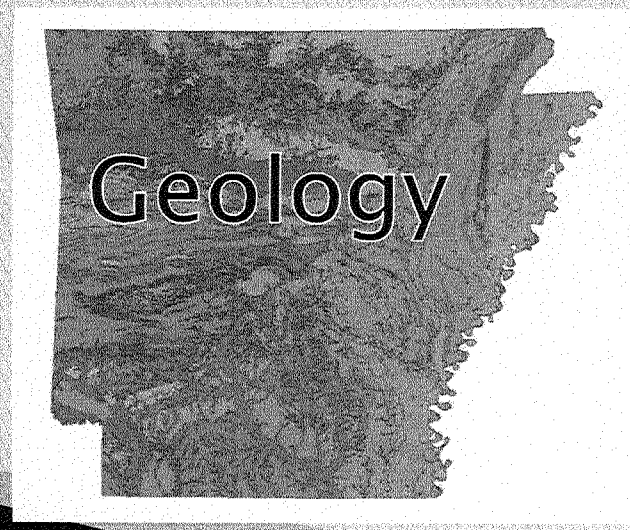
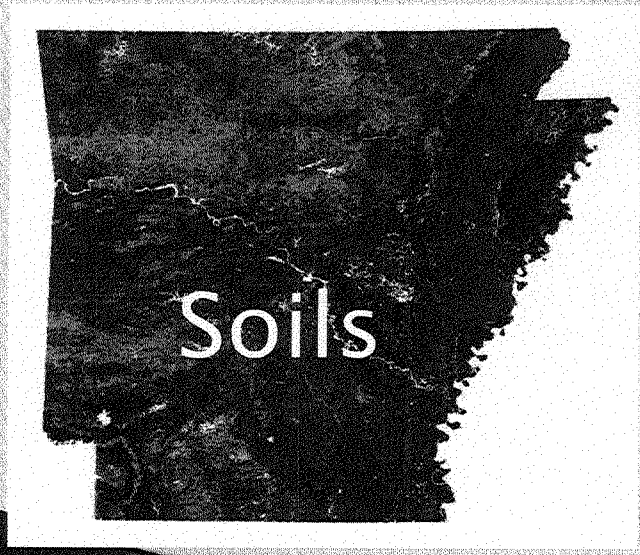
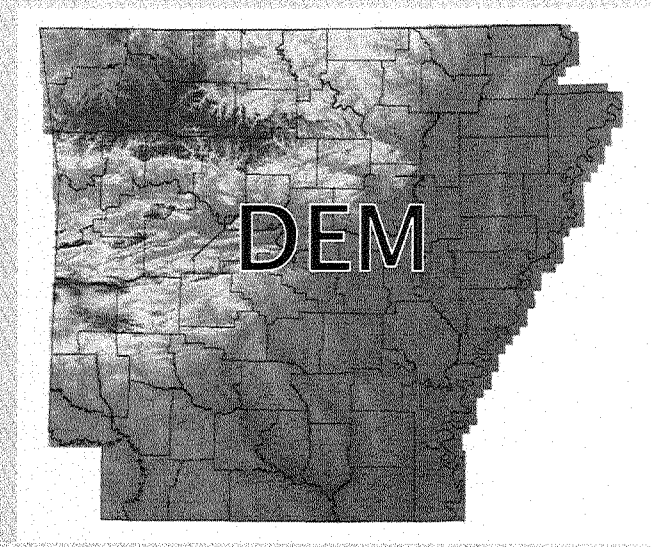
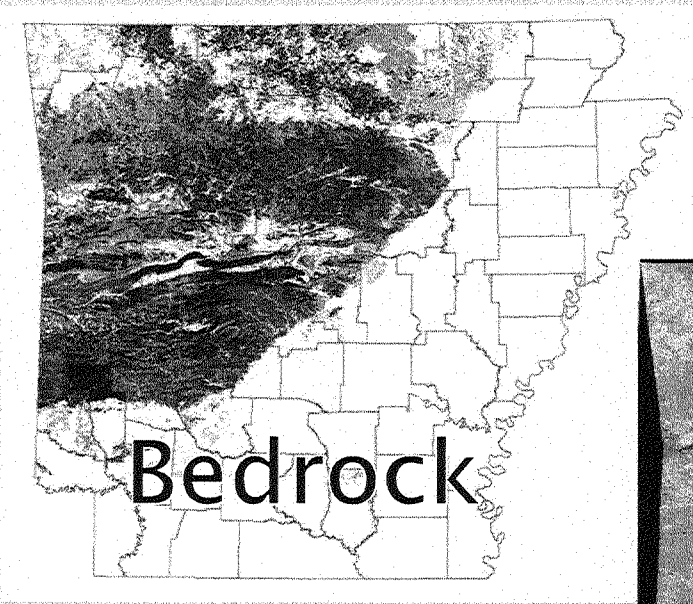
- ▶ PUBLIC HEALTH DECISION
- ▶ *ARKANSAS STATE BOARD OF HEALTH Rules and Regulations Pertaining to Public Water Systems require that “the required depth of the grout seal will be determined by the Arkansas Department of Health after a review of the geological formation” (VII. GROUND WATER SUPPLIES B. Well Construction 1.Casing, p. 12).*



SWAP Model



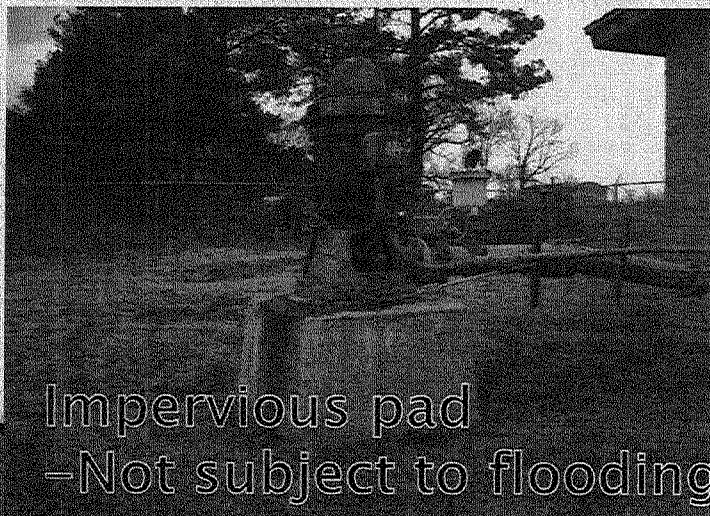
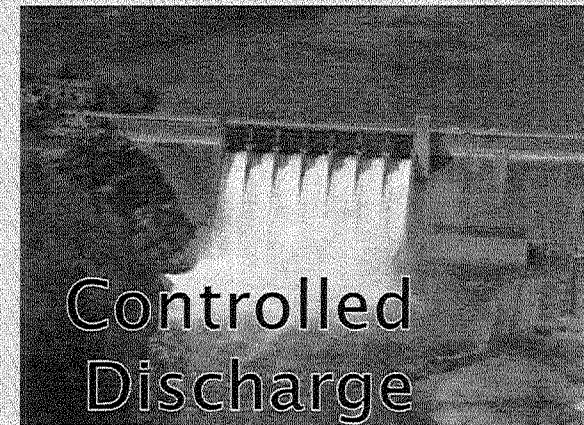
- * Source Water Assessment Plan
- * GIS model developed to assess a source's vulnerability to contamination; "Vulnerability Assessment."
- * Automated report and map generation; "SWAP Reports."



NON GEOSPATIAL DATA



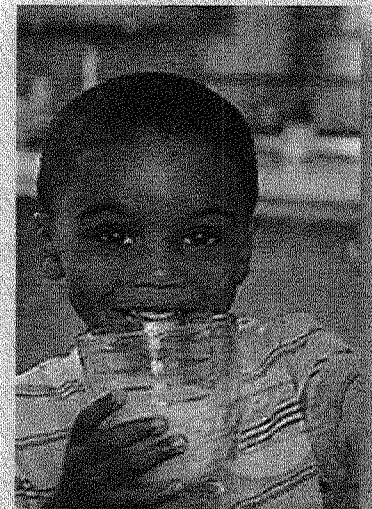
- ▶ Well construction
- ▶ Reservoir volume
- ▶ PWS pumping rates
- ▶ Containment/Regulating structure
- ▶ Controlled discharge (reservoirs).



New & Improved SWAP

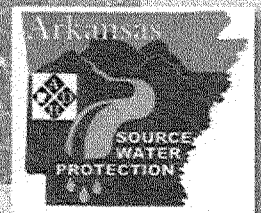
- ▶ SWPP Staff in data clean up phase of project
- ▶ Need to accurately locate all wells
- ▶ Need to look for wellhead construction faults

The Dreaded Wellhead Deficiency Survey



Wellhead Deficiency Surveys

- ▶ Coming soon to a well field near you!
- ▶ Needed for the new improved SWAP Model
- ▶ Summer interns, samplers, WHPP & District staff
- ▶ Looking for construction faults that can serve as pathways for contamination of your aquifer
- ▶ Non-regulatory



Wellhead Deficiency Surveys

- ▶ ADH staff will review:
- ▶ Pump type (vertical turbine vs submersible)
- ▶ Flood potential
- ▶ Whether adequate impervious pad present
- ▶ *2 feet in every direction from outside of casing?*
- ▶ *How high above natural grade?*
- ▶ Are vents present? Screened?
- ▶ Properly sealed?
- ▶ Discharge below grade? Proper pitless adapter?
- ▶ Review of well construction documents



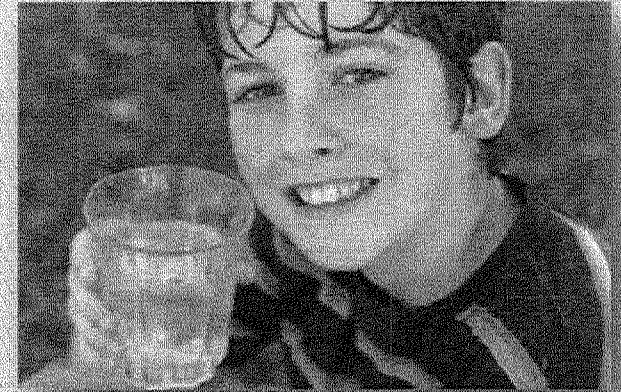
Wellhead Deficiency Surveys

- ▶ What you'll need to do:
 - ▶ Make someone knowledgeable available to assist with access and questions
 - ▶ We need to visit both active and inactive wells
 - ▶ & evaluate the construction

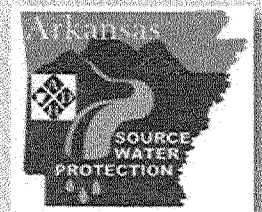
(If your well looks like this one, please plug & abandon it now before we visit)



An E Ozark Example



- ▶ Lower Ozark Aquifer
 - ▶ PWS concerned about “muddy water”
 - ▶ Site visit & review ensues
 - ▶ Records review revealed always had this issue
 - ▶ Not a GWUDI well
 - ▶ (Share from notes)
-
- ▶ Reduce the pumping rates again, see what happens. They are using the well again.

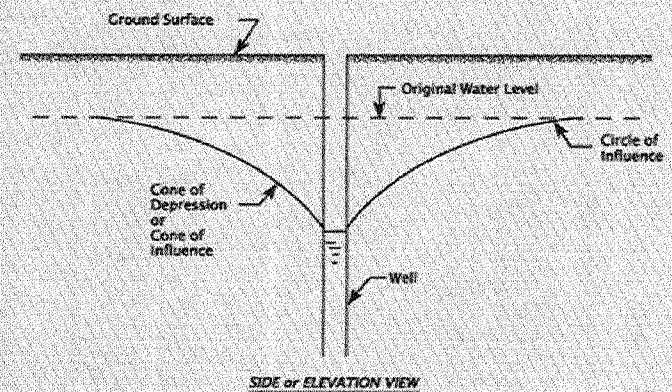
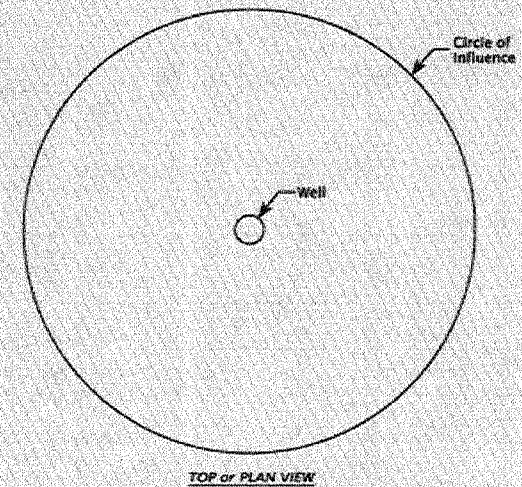


Calculating WHPAs (Phase I)

Assigning a wellhead protection area

Use the characteristics of the
Aquifer & the maximum
pumping rate of a well

The more data, the better

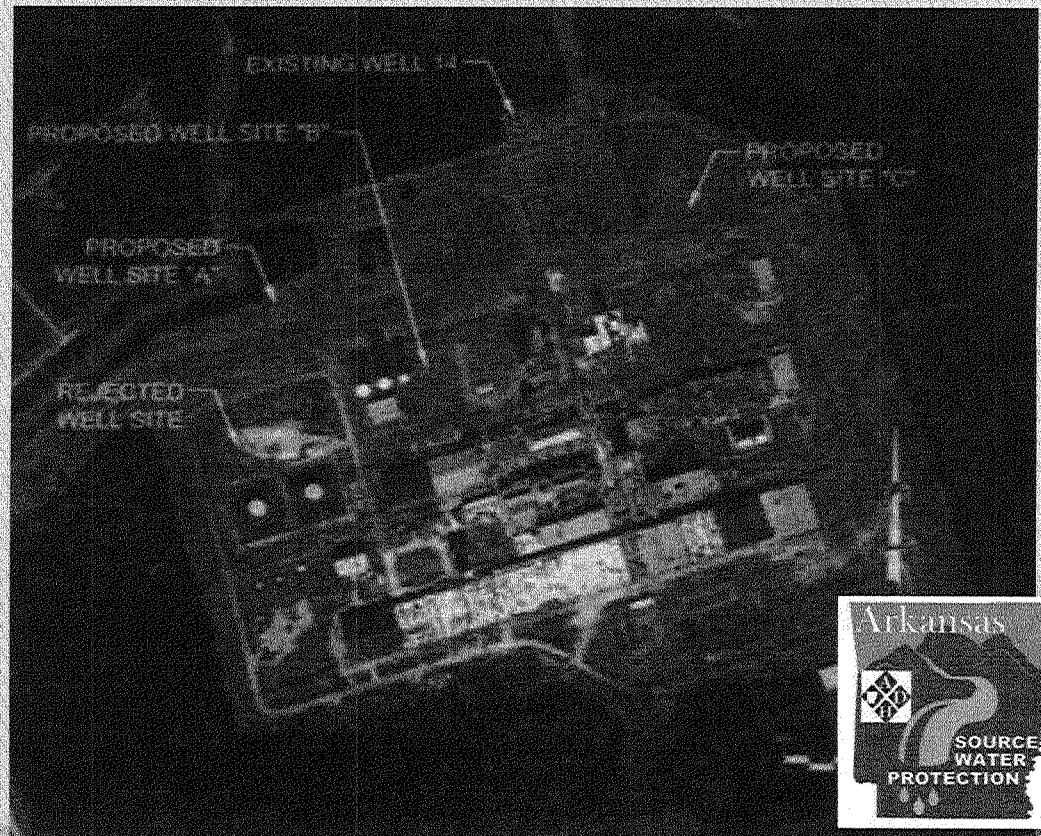
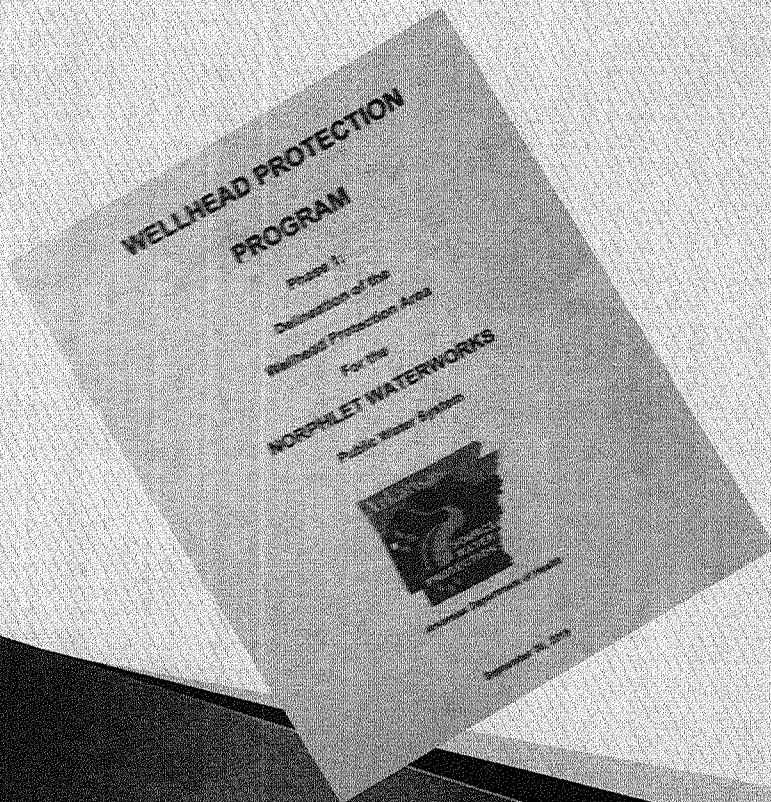


Circle of influence and cone of depression/cone of influence

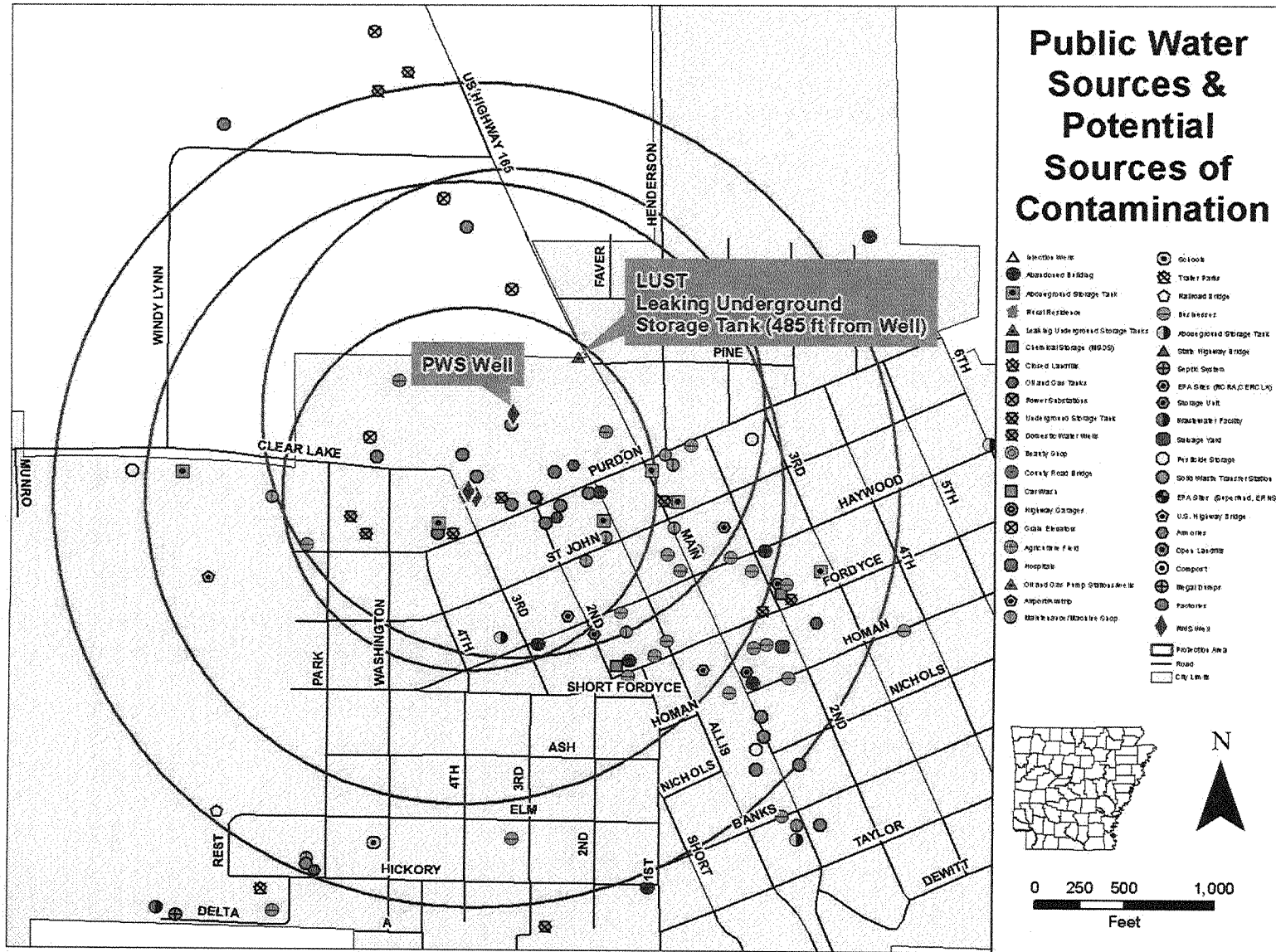


Potential Sources of Contamination

- ▶ Compile comprehensive state-wide database of PSOCs
- ▶ Field GPS component (Contractor and staff)



Core Document: Phase 2



Last ID#: 43-8865

Date Notified: 8/16/2011

Received By: Shazonta Brown

Entry Date: 8/23/2011 4:08:02 PM

Entry Clerk: BROWNS

Update Date: 6/21/2012 2:18:18 PM

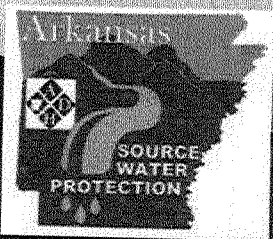
Update Clerk: GLD



Comments: 8/16/2011- Product was found in a groundwater monitoring well on August 2, 2011. [BROWNS 8/23/2011 4:08:02 PM]. 8/31/2011- SITE ASSESSMENT CONDUCTED BY DAVID MCKAMIE. TWO BORING SAMPLES WERE PULLED. /SRB [BROWNS 9/2/2011 8:37:21 AM]. 9/13/2011- RECEIVED IRR AND SITE CHECK REPORT. LEVELS WERE ABOVE CLEAN UP GUIDELINES. /SRB [BROWNS 9/13/2011 2:01:45 PM]. 09-19-11- FACILITY REFERRED TO TECHNICAL BRANCH ON 9-19-11 FOR FURTHER REVIEW. [SMCDUFFIE 9/19/2011 9:15:54 AM]. 11-16-11- Trust Fund Eligibility Denied; [PAES 12/12/2011 11:23:15 AM]. (STATUS CHANGE SEE 05/03/12 ENTRY) 11-29-11 - Site Inspection and receptor survey performed by Gerald Delavan, P.G., Case manager and Jarrod Zweifel. RST Geologist. 12-3-11 - Preliminary Assessment completed; need additional site assessment to determine if NAPL is present. 12-07-11 - Letter Request for SAWP & CE sent out. 01-26-12 - ATC submits SAWP & CE; revisions to WP requested; 05-03-12 - Release is deemed TRUST FUNDE ELIGIBLE (AFTER REVIEW). LETTER DATED 05/03/12. [PAES 5/3/2012 1:27:13 PM]. 06-06-12 - Revised SAW & CE received from [redacted] 6-19-12 - Letter Approving SAWP & CE sent out; [GLD 6/21/2012 2:18:18 PM]

W Coastal Plain LUST Case

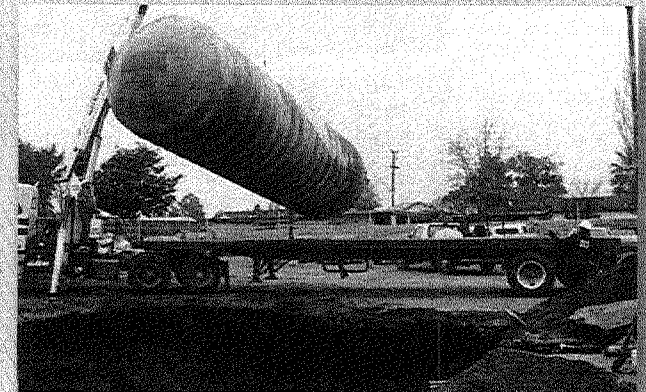
- ▶ Free product petroleum site
- ▶ Found new LUST during PSOC Inventory
- ▶ Coordinate with RST Technical Branch
- ▶ Track progress SoCo and ADEQ
- ▶ Joint notification to the PWS



W Coastal Plain LUST Case

- ▶ Terrified the PWS (site visit with her)
- ▶ City was using QAA well as their back up supply (peak season only)
- ▶ 3 other functional (deeper) Sparta wells
- ▶ QAA was not the nearest PWS well
- ▶ ADH discrete sampling of town wells for VOCs monthly
- ▶ Strongly encourage the P&A

- ▶ INTERPRET for and inform PWS



Petroleum Free Product Site

- ▶ RST site investigations found deep free product in the QAA
- ▶ Significant accumulation
- ▶ Tanks were removed
- ▶ Clean up underway



Examples: Weighing Risks to Aquifers & Watersheds

- ▶ Reviewed over 1400 permits or projects FFY15

Does this activity potentially pose environmental risks to public water supplies?

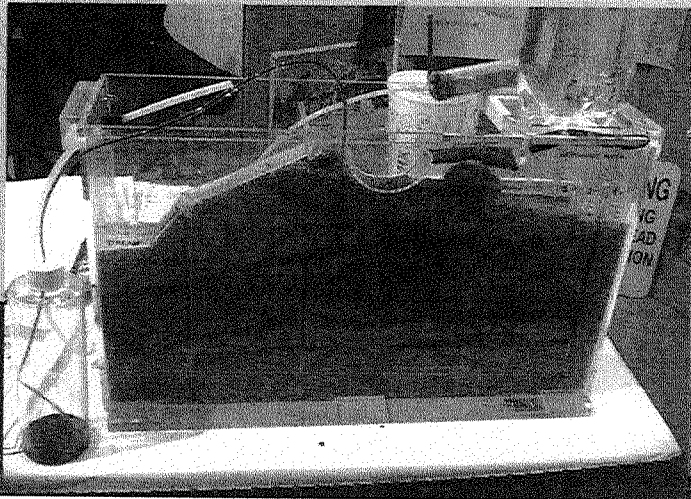


Weighing Risks to aquifers & watersheds – *we write letters*

- ▶ Reviewed over 1400 permits or projects FFY15

Does this activity potentially pose environmental risks to public water supplies?

EXAMPLE: State-wide review for Plains All-American (Valero) Diamond Pipeline

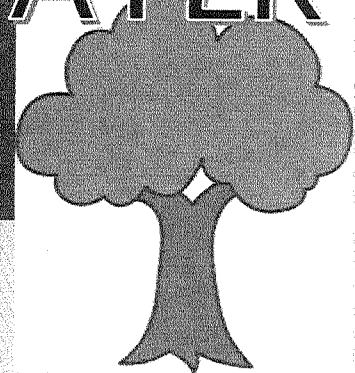


EX: Inter-agency Coordination

First AR Forestry and Drinking Water Forum
Last May

- ▶ Very successful, broad participation, both sectors, few smaller systems took part
- ▶ Talk to Stephanie Burchfield to be included in future forums

Healthy Forests = CLEAN WATER



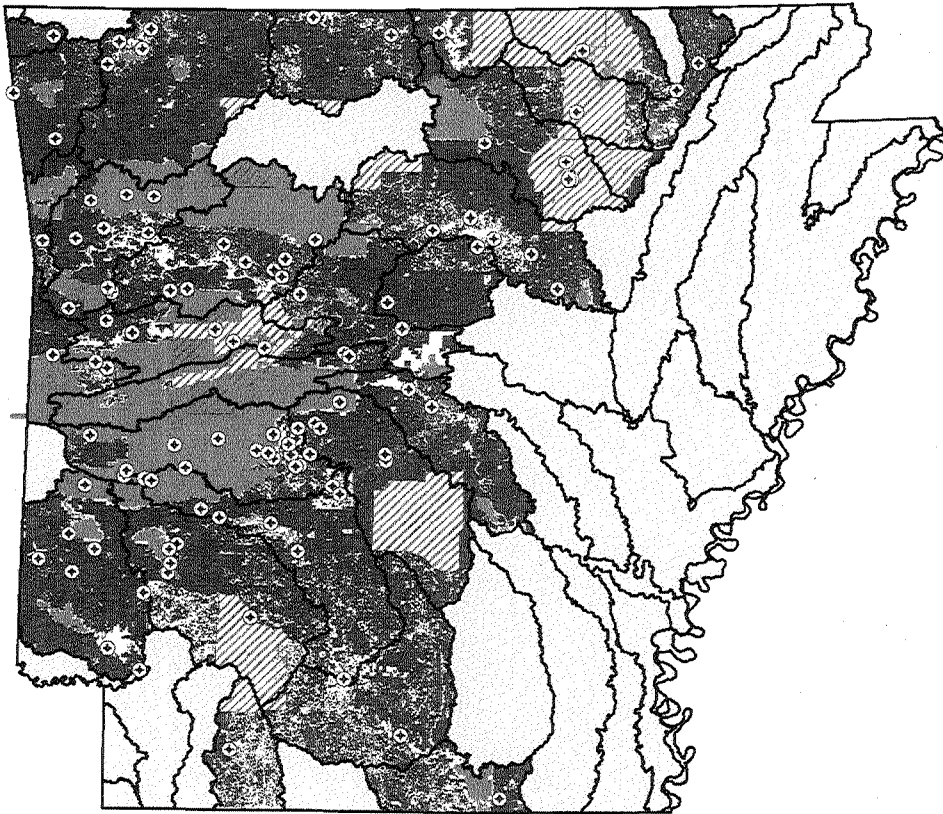
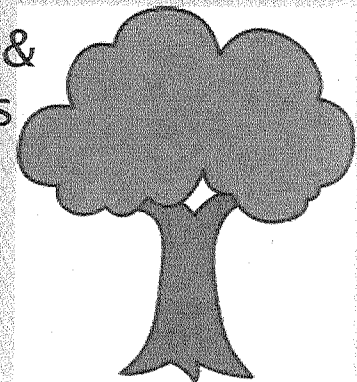
Next Steps

Land Use & Parcel Data

Phase II will pinpoint forested areas analysis of the LULC (land use-land coverage) raster data:

- Deciduous
- Evergreen
- Mixed forest
- Woody wetlands

Future workshops & Watershed projects



Data Summary

The data contained in this map was compiled for the purpose of analyzing forested lands found on private (or more specifically, non-tax exempt) properties that are not in National Forest (public lands), but are within basins (HUC 8) that have at least one surface water intake.

The darker green represents private parcels; lighter green is the National Forest.

The hatched areas are counties lacking parcel data. The yellow basins are devoid of surface water intakes.

- ⊕ Surface water intake
- Private parcels near intakes
- Public lands
- ▨ Counties with no parcel data
- HUC 8- No surface water intakes

NOTE: WPA data is exempt from release under the Arkansas Freedom of Information Act per the provisions of Ark. Code Ann. § 25-19-105(b)(18)(A). Do not share this map.

0 25 50 100 Miles



Arkansas Forests & Surface Water Intakes within Non-Tax Exempt Parcels

Scale 1:1,749,801
North American Datum 1983
Universal Transverse Mercator Zone 15 N



This map was created by the Arkansas Department of Agriculture, 20 June 2010.

EX: Inter-agency Coordination

Source Water Collaborative

<http://sourcewatercollaborative.org/>

Harmful “Algal” Blooms workgroup

- AR Water Resources Center
- Annual Watershed Research Conference
 - Focuses on HABs Fayetteville July 26-27
- Coming soon: Sam will identify cyanobacteria

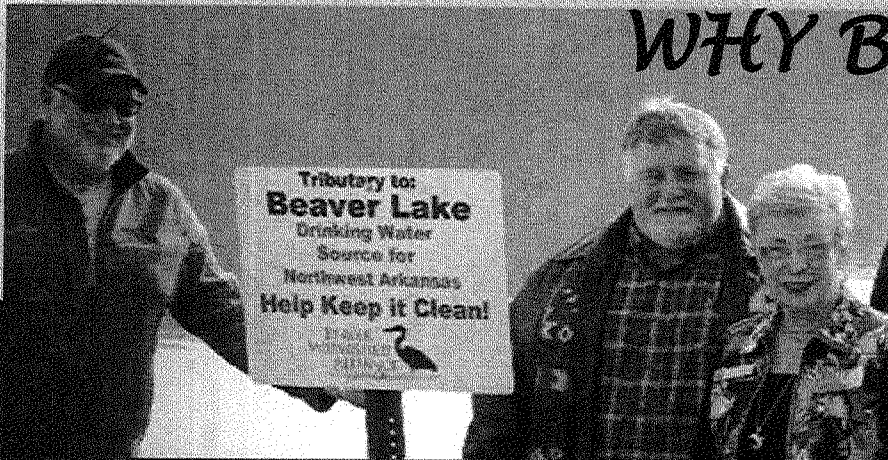


Reminder

- ✓ Do good science
- ✓ Know your audience
- ✓ Craft an understandable message
- ✓ Avoid jargon
- ✓ *SHOW EYES*
- ✓ Help the public value the shared resource
- ✓ *INTERPRET* the science

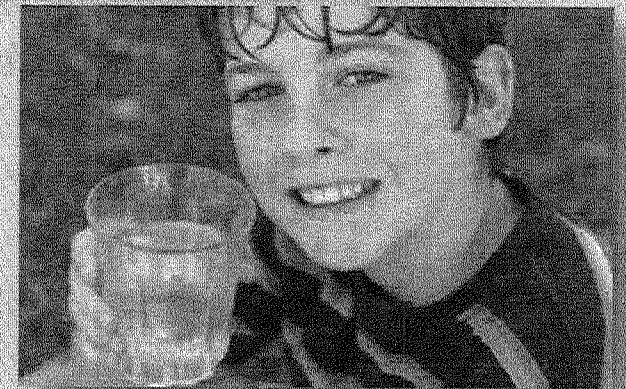
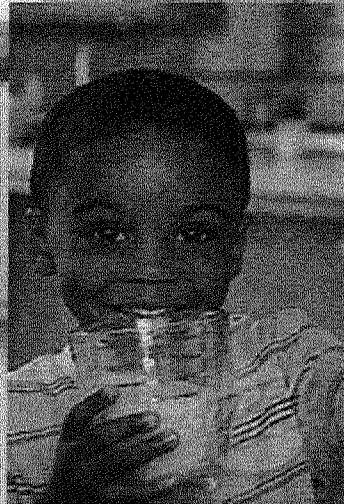


WHY BOTHER?



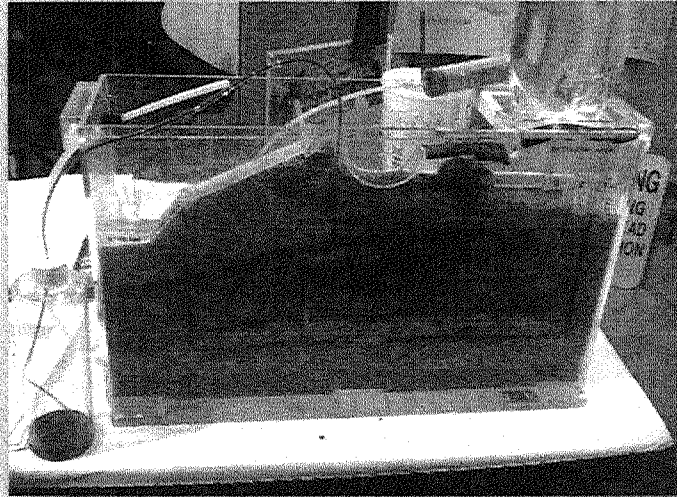
Water Words that Work

► Do it for them!



► <http://www.waterwordsthatwork.com/>

Questions?



Water: Arkansas' most important natural resource



R. Hutto

Darcia Routh, P.G.
“dar-sha ruth”
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Manager, Source Water
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