Communicating Groundwater Science

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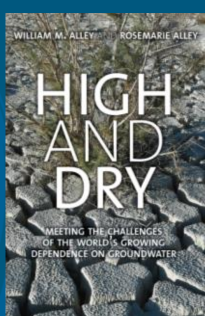
Outline

- Writing for the Public
- Class Exercise
- Ten GW Communication Challenges



"Imagine a book about groundwater that reads like a novel, and is overflowing with interesting and essential knowledge about a much-neglected topic. This is the book."

Bruce Babbitt, former US Secretary of the Interior

How Not To Do It!

Statement on suitability of a site for a nuclear power plant (cerca 1973):

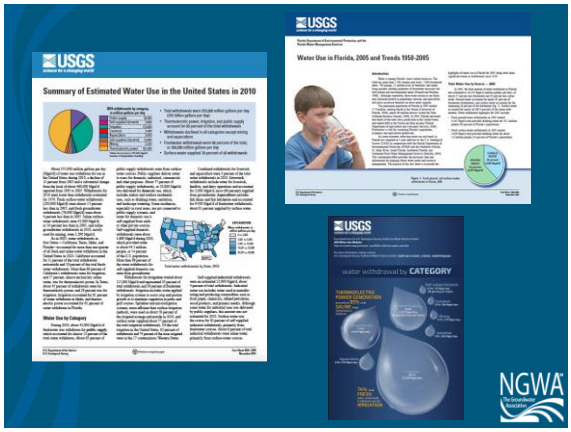
"Even given the most careful execution of the exploration program … there would remain certain areas of inadequate coverage and certain residual indeterminacies which would preclude final examination of the site with the degree of conservative assurance normally required for such application."

Questions

- Who is the target audience?
- What is the main idea?
- Who cares?
- What are the strengths and weaknesses?


USGS

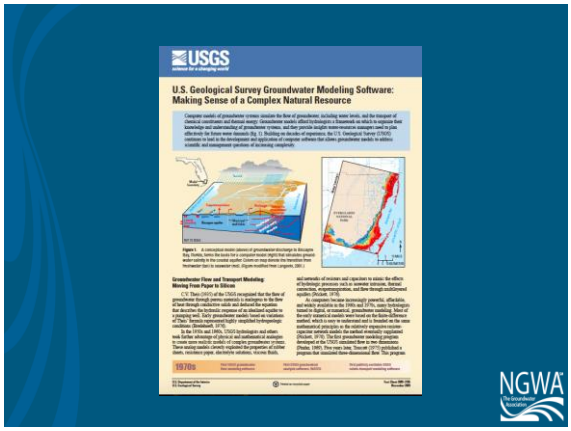
Tracing and Dating Young Ground Water


USGS
Summary of Estimated Water Use in the United States in 2010
USGS
Water Use in Florida, 2005 and Trends 1950-2005
USGS
water withdrawal by CATEGORY
NGWA


Managed Aquifer Recharge:
A Water Supply Management Tool
Introduction
Of all freshwater on Earth:
68.7% is icecaps and glaciers
30.0% is groundwater
0.3% is surface water
0.9% is other
NGWA INFORMATION BRIEF
NGWA


FEATURE
Growing Up... with
Managed Aquifer Recharge
Michael E. Campana
As a child growing up in the 1950s suburban wilds of Nassau County, Long Island, NY, I had the usual places to explore: woods, ponds, some streams and the ubiquitous building and sewer construction sites. The latter sites were often difficult to access as they were protected by fences, security guards, dogs or all of the above. Other parts of the county had wooded hills that towered a few hundred feet above sea level. I would later learn that these were glacial moraines, but no matter – I had no easy means of transportation to the county's North Shore and its high-end towns where these "mountains" were located. So in my neck of the woods – near the South Shore – there were few exotic places to capture my imagination.
Later on
NGWA

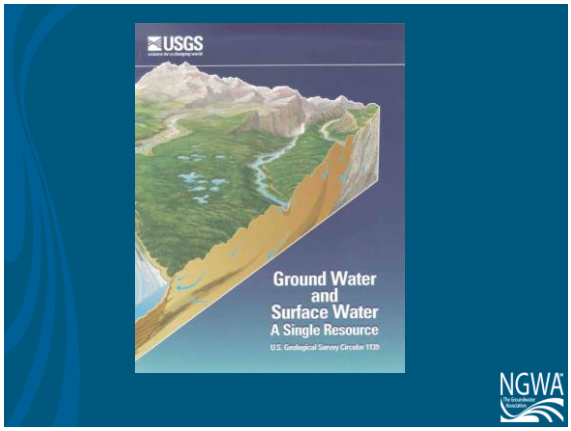

USGS
Nutrients in the Nation's Streams and Groundwater:
National Findings and Implications
Occurrence and Distribution of Nutrients in Streams and Groundwater
NGWA

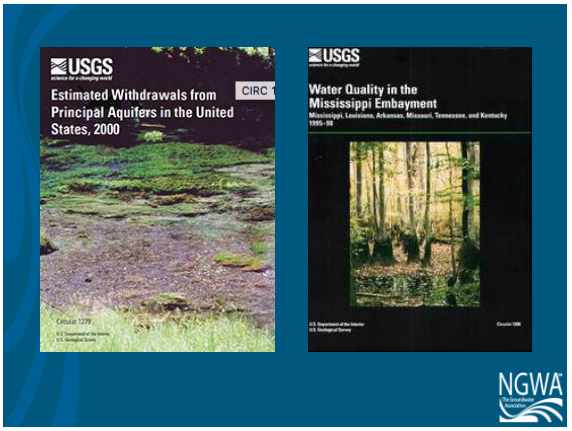

USGS
U.S. Geological Survey Groundwater Modeling Software:
Making Sense of a Complex Natural Resource
Groundwater Flow and Transport Modeling
Moving From Paper to Silicon
1970s
NGWA


USGS
Assessing the Vulnerability of Public-Supply Wells to Contamination
from Urban, Agricultural, and Natural Sources
A national priority, a scientific challenge
Contaminants assessed in this study
NGWA


USGS
California Groundwater Ambient Monitoring and Assessment (GAMA) Program
Priority Basin Project: Shallow Aquifer Assessment
What is the GAMA Priority Basin Project (GAMA-PBP)?
What Will Participants Gain from the GAMA PBP Shallow Aquifer Assessment?
NGWA


USGS
Groundwater Quality in the Borrego Valley, Central Desert, and Low-Use Basins of the Mojave and Sonoran Deserts, California
The Borrego Valley, Central Desert, and Low-Use Basins of the Mojave and Sonoran Deserts Study Unit
Overview of Water Quality
NGWA


USGS
Ground Water and Surface Water
A Single Resource
U.S. Geological Survey Circular 1139
NGWA

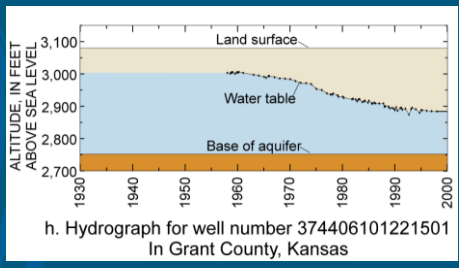

USGS
Estimated Withdrawals from Principal Aquifers in the United States, 2000
Circular 1279
USGS
Water Quality in the Mississippi Embayment
Mississippi, Louisiana, Arkansas, Missouri, Tennessee, and Kentucky
1995–98
NGWA


USGS
Do Created Wetlands Replace the Wetlands that are Destroyed?
Introduction
What are some of the issues surrounding wetland mitigation?
Why should we care about wetland loss?
What are the challenges associated with wetland mitigation?
What is wetland mitigation?
NGWA


USGS
The Value of Long-Term Monitoring in the Development of Ground-Water-Flow Models
Study Area and Modeling Objectives
Model Construction and Calibration
NGWA

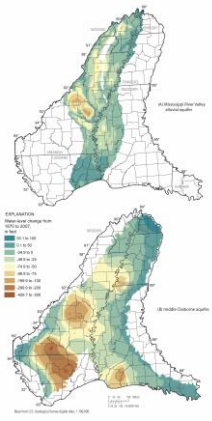
Ten GW Communication Challenges

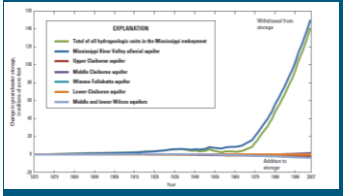
1. Not All Aquifers Are Created Equal



h. Hydrograph for well number 374406101221501 In Grant County, Kansas

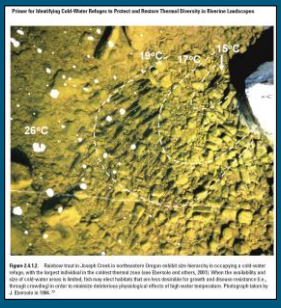
2. Confined vs Unconfined Aquifers





USGS Professional Paper 1785

3. Scales of Impact

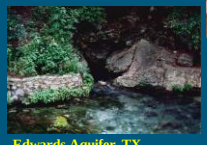


Torgersen, C.E., Ebersole, J.L., Keenan, D.M., 2012, *Primer for Identifying Cold-Water Refuges to Protect and Restore Thermal Diversity in Riverine Landscapes*: EPA 910-C-12-001

4. Depletion of a small part of the total volume of groundwater can have large effects on surface water, water quality, or subsidence which become limiting factors to development

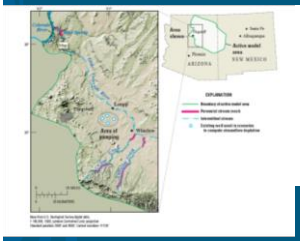
Houston, TX

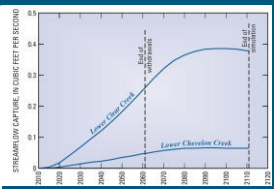
Republican River Basin, CO, KS, NE



Edwards Aquifer, TX

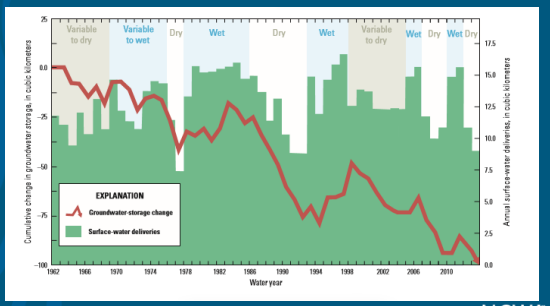
5. Streamflow Capture





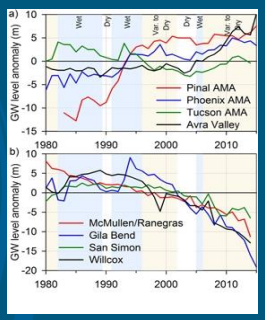
Leake, Hoffmann, and Dickinson, 2005

6. Resilience (or Not)



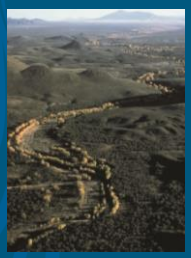
Source: USGS Fact Sheet 2015-3084

7. Managed Aquifer Recharge

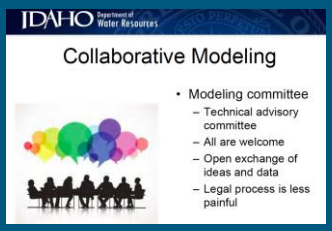


Scanlon et al. (2016) *Environ. Res. Lett.*

8. Collaborative Modeling



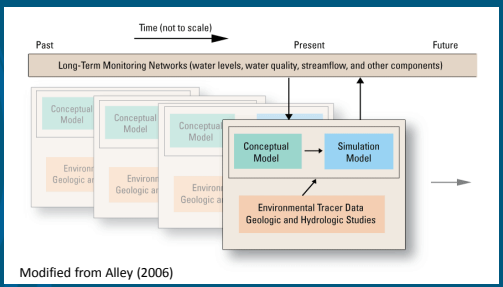
San Pedro River, AZ



A. Wylie, 2017 GW Foundation National Meeting

9. Permit-Exempt Wells

10. Integrated Monitoring and Modeling



Modified from Alley (2006)

Questions?