Community-based

Aquifer

Management

Partnerships

A DNR EWR Region 4 Pilot Effort

Wicked Problems

Connecting Water, Culture, Science and Community

DEPARTMENT OF NATURAL RESOURCES

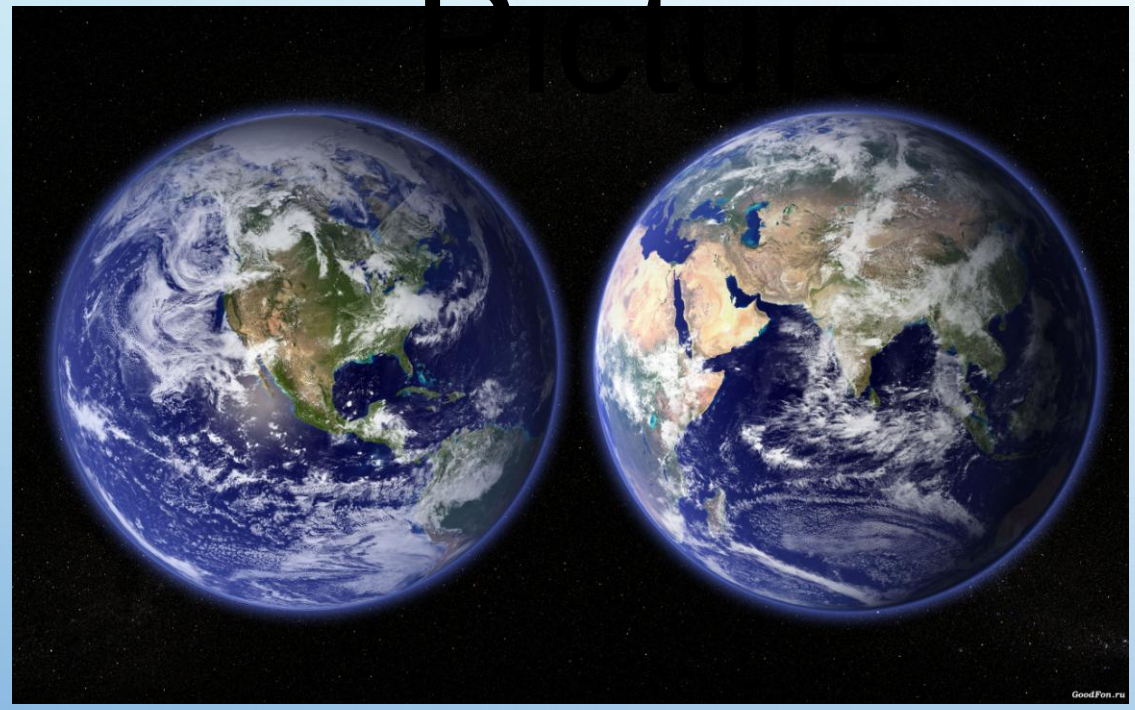
Groundwater is a Common Pool Resource

C.A.M.P. is an approach to co-manage this common pool resource

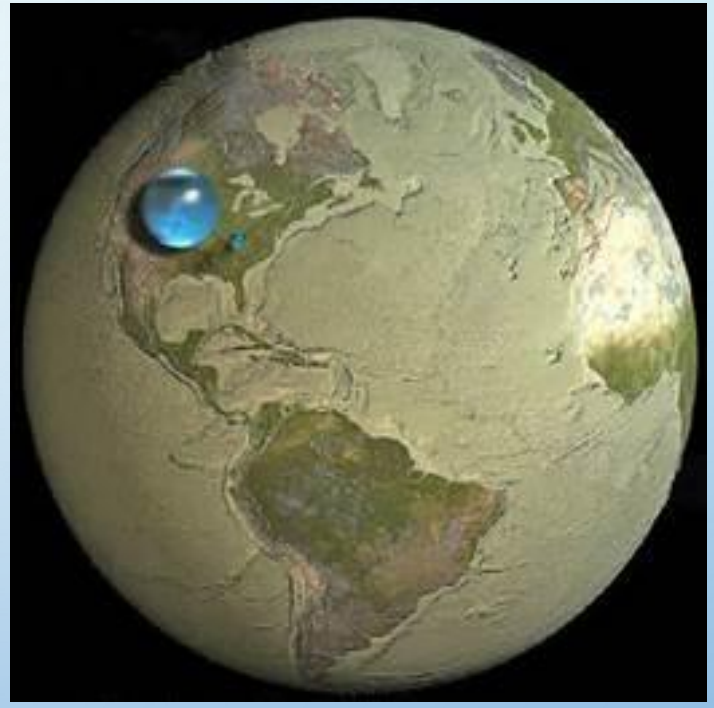
- ***Re-Connect**** people with use and management of the resource *[Slides ~3-9]*
- ***Re-Think**** how people contribute and use knowledge *[Slides ~10-16]*
- ***Re-Structure**** how organizations work together *[Slides ~17-23]*

* David Abson paper, “Leverage Points for Sustainability Transformation”

The Big Water Picture

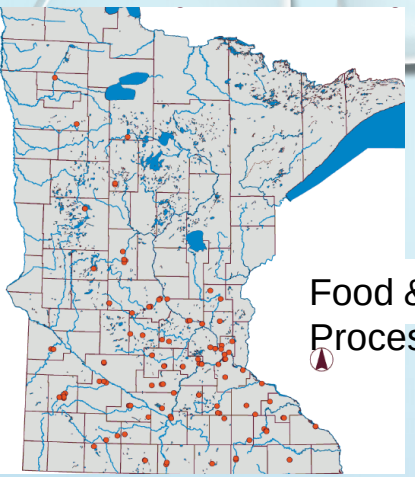


=

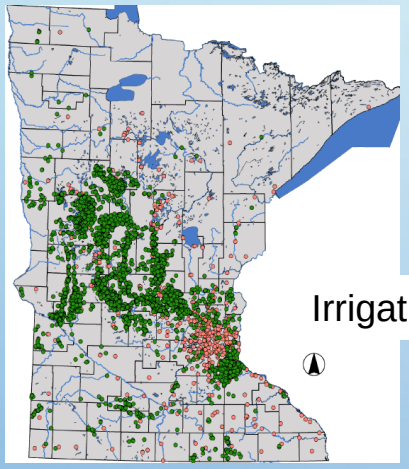


Photos Courtesy of USGS

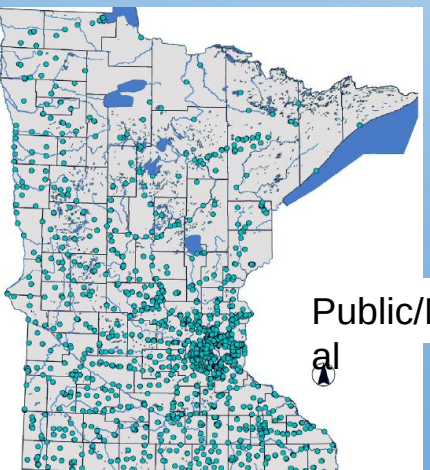
The State's Groundwater Picture



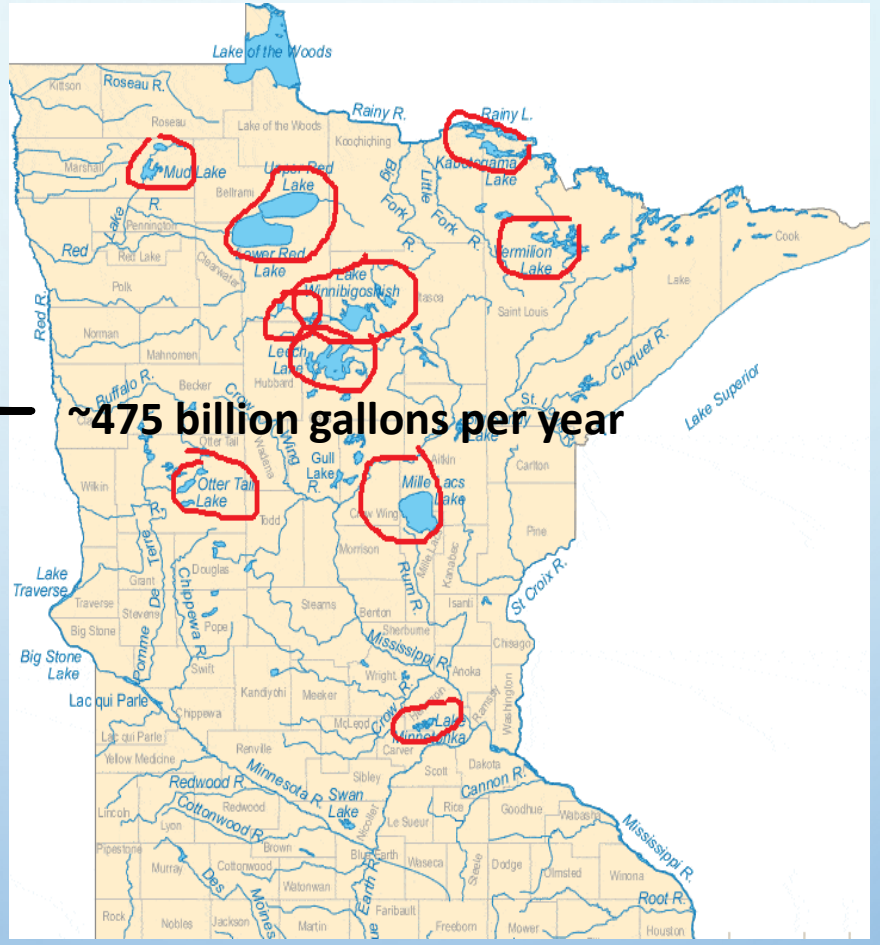
Food & Ag Processing



Irrigation



Public/Municipal



1. Red Lake
2. Mille Lacs
3. Leech Lake
4. Winnibigoshish
5. Vermillian Lake
6. Kabetogama
7. Mud Lake
8. Cass Lake
9. Lake Minnetonka
10. Otter Tail Lake

It's more than just a drop in the bucket!

Re-Connect

How many 500,000-Gallon “Water Towers” of Groundwater are used per year for these Land Uses?

 = 500,00 gallons

A Local Water Picture*

* Local Land Use Decisions *are* Local Water Use Decisions


10 Leaking Toilets


4,800 Finishing Hog Farm


500 Head of Steers

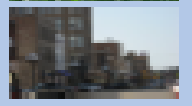

100 1/4-Acre Lawns


Town Pop. 500


2500 Cow Dairy Farm


18-hole Golf Course


160-Acre Corn Field


Town Pop. 2,000

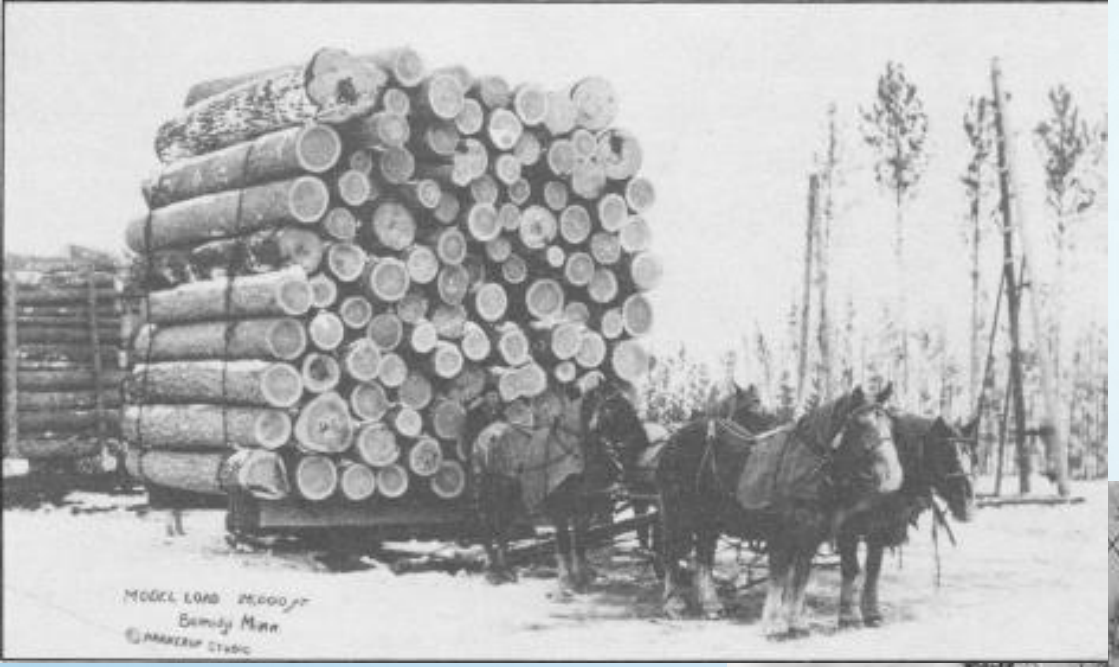

Food Processor =


Ethanol Plant-100mgy


Town Pop. 15000 =

Minnesotans have always been proudly industrious when it comes to the state's natural resources –

- It's our culture.



By 1890s, Minnesota hit peak lumber - with the technology and economic incentives to cut down every old growth white pine

Photos Courtesy of Mn Historical Socie

By the 1980s the technology and economic incentives existed to drain many wetlands to

Photos Courtesy of Ellinggson Drainage

Re-Connect

Photos Courtesy of Koosman Farms

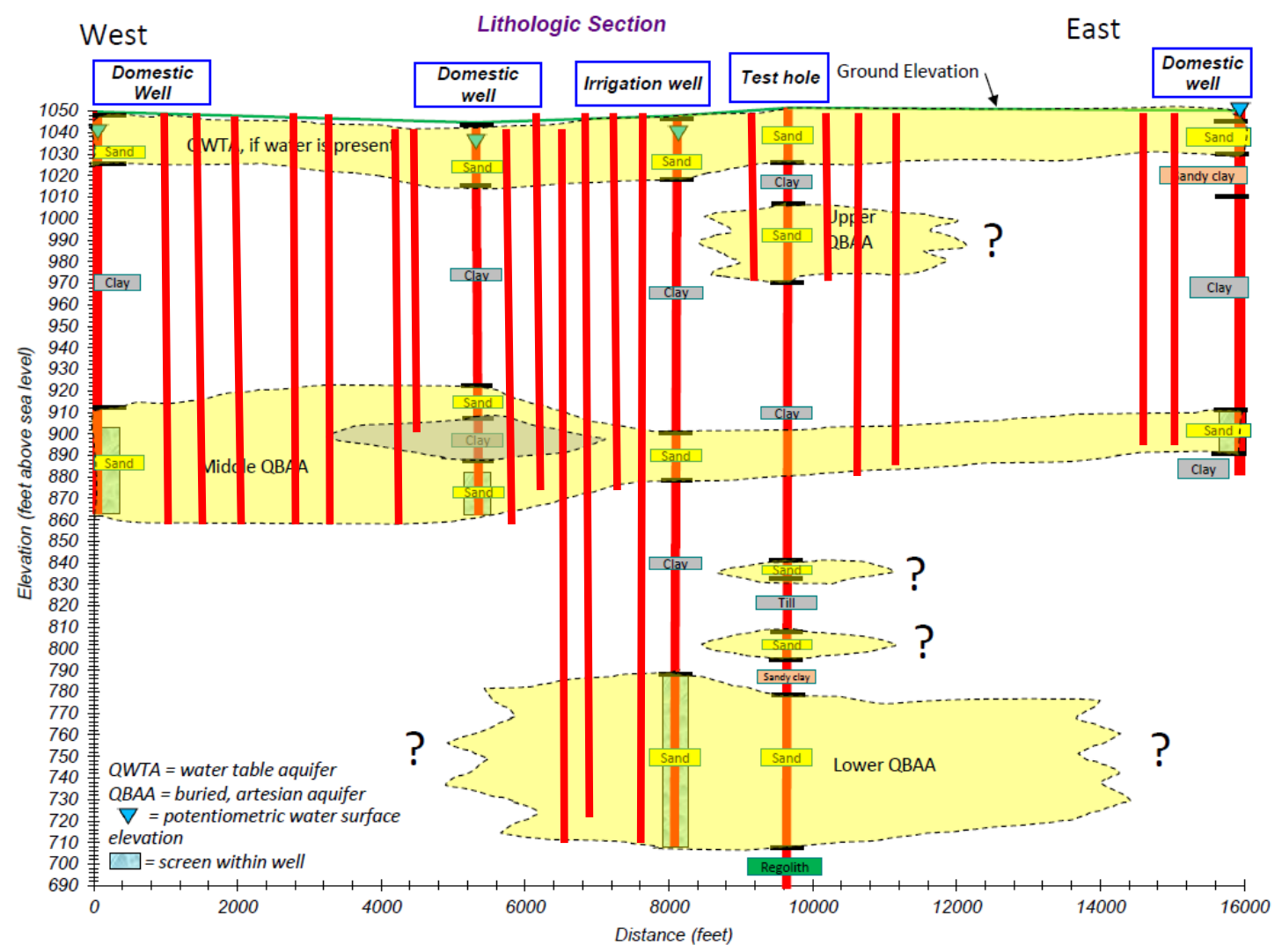
Photos by Kurt Grimm – NutraDrip Irrigation Systems

Photos by Riverview LLP

In the 2000s, Minnesotans now have the technology and economic incentives to over pump

Re-Connect

So why won't we?



How many "straws" is too many "straws"?

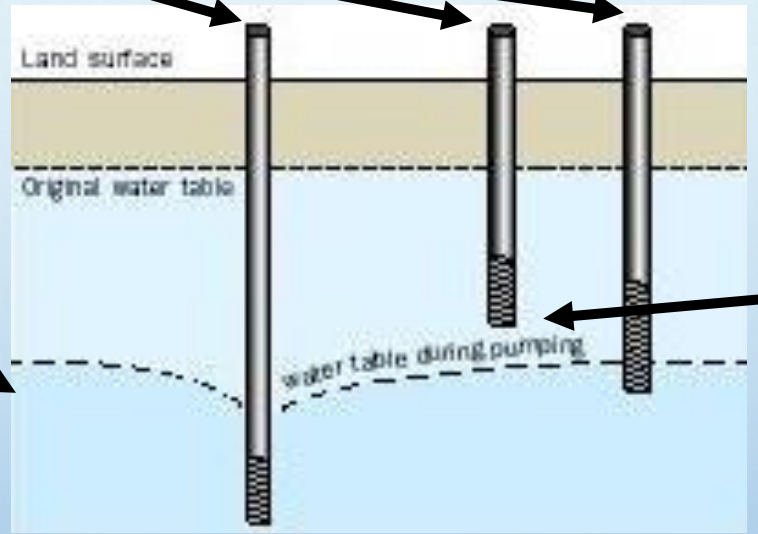
Who decides?

Re-Think

A Community's Aquifer as a Groundwater Checking Account

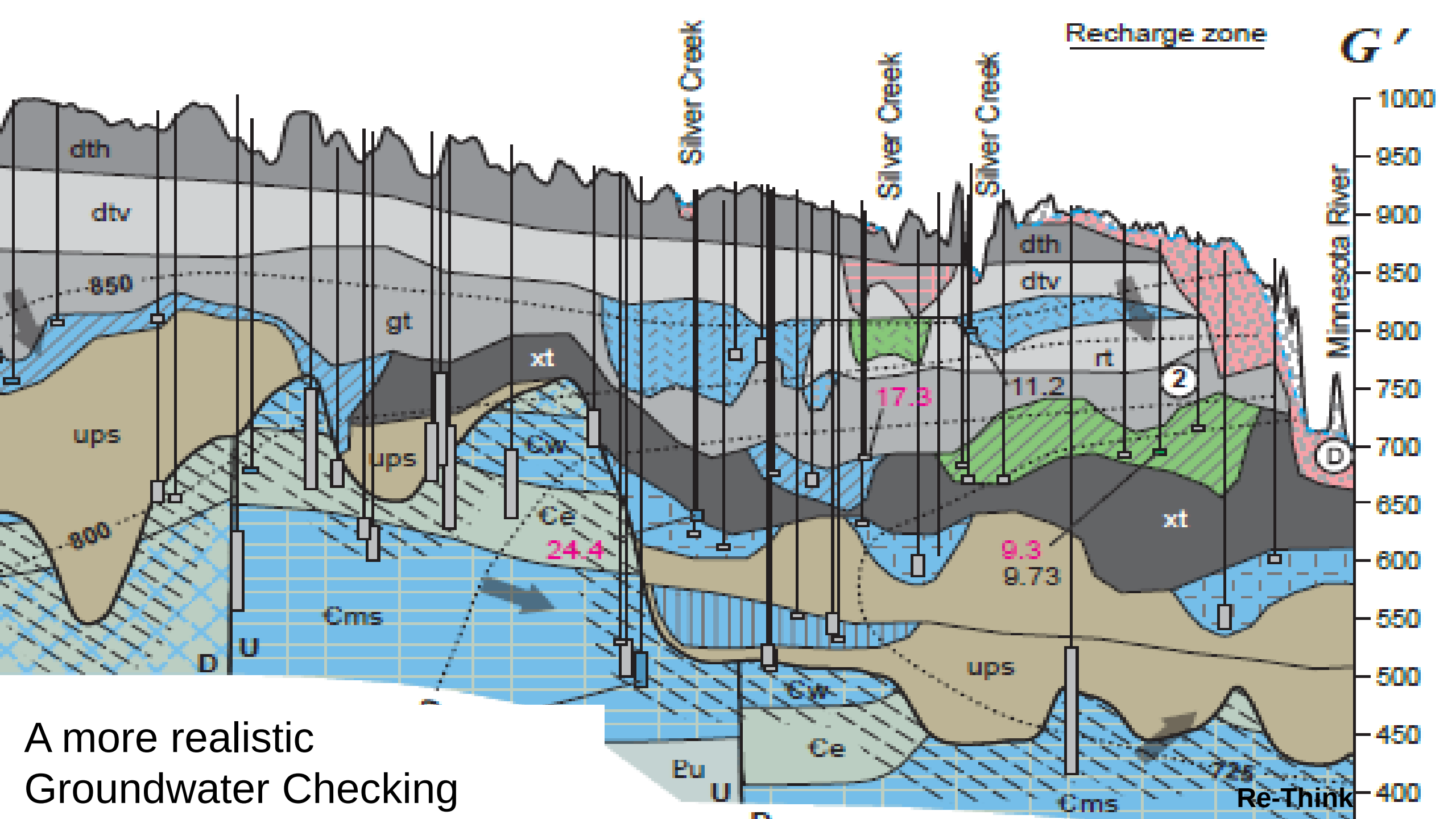
Withdrawals

Deposits



Overdrafts

But, of course, it is not this straightforward



A more realistic
Groundwater Checking

Groundwater: What Type of Issue is it?

Values / Knowledge	Consensus	Disagree
Consensus	Technical	
Disagree	Scientific	

** Rittel and Webber (1973)*

What Makes a Problem Wicked?

A system with inp… hat vary in… …

Technical and Scientific Data

…with system users and stakeh… ng different metho… inputs, output… outcomes of a system…

Social and Economic Values

…that are from organizations that have disp… *governance framewor…* me… methods for the varied inputs, outputs and outcomes of the system.

Organizational Structures and Processes

Why Wicked Problems Now?

Post-1980s

~~1980s~~

Never before have so many diverse organizations worked side-by-side to achieve common objectives

Re-Think

How do we often approach Wicked Problems?

Street Light Effect

Technical Solutions

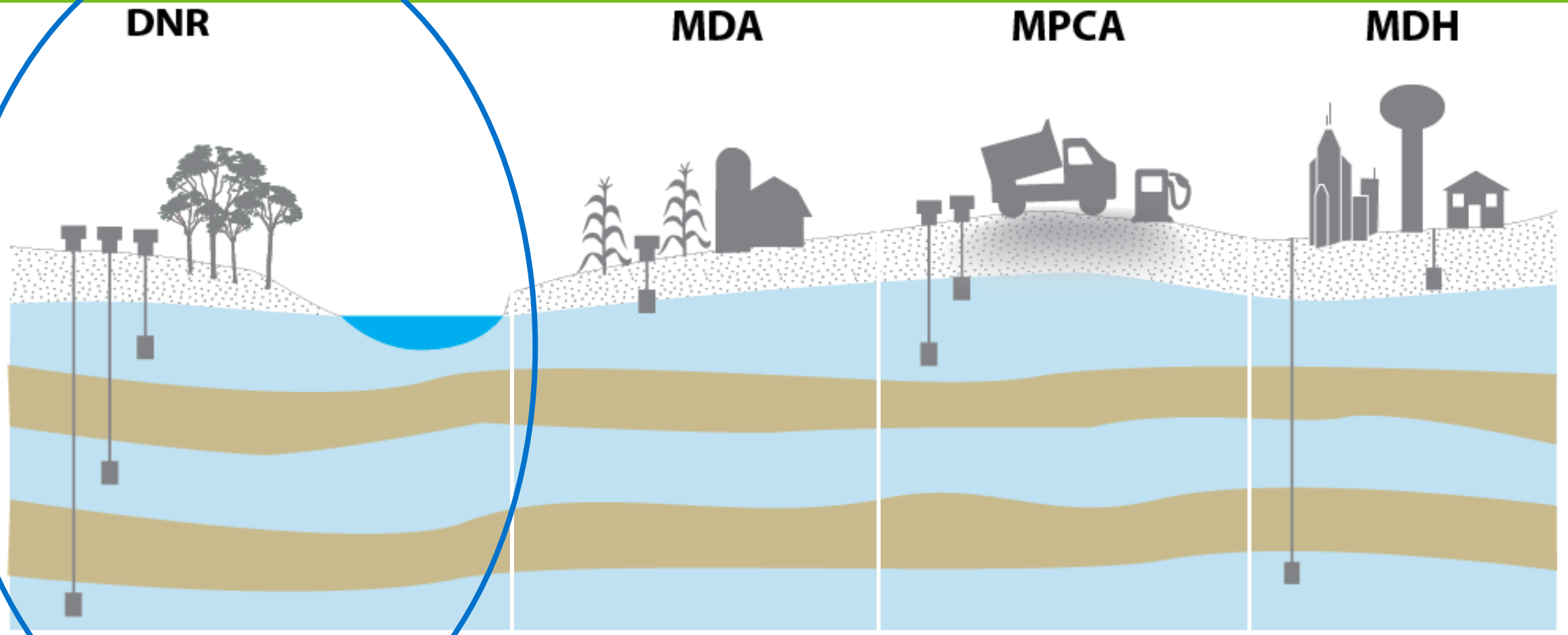
Scientific Solutions

Political Solutions

Social Solutions

Re-Think

How we approach a potential C.A.M.P. community



Groundwater
Quantity/Availability

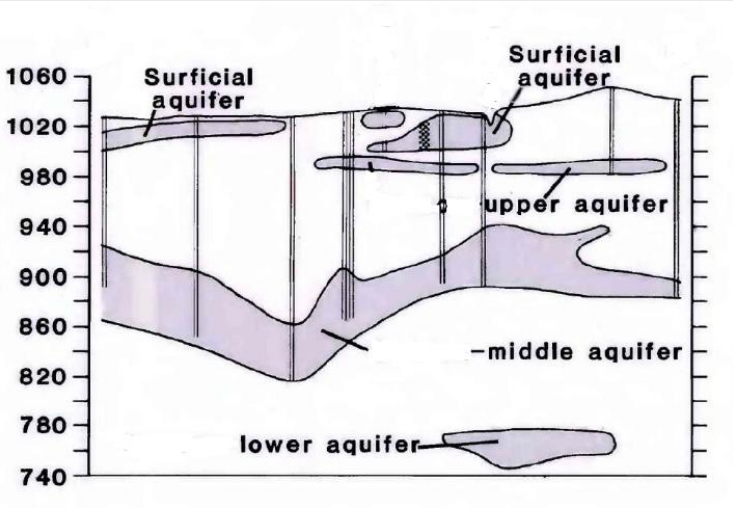
Agricultural
Contamination

Industrial
Contamination

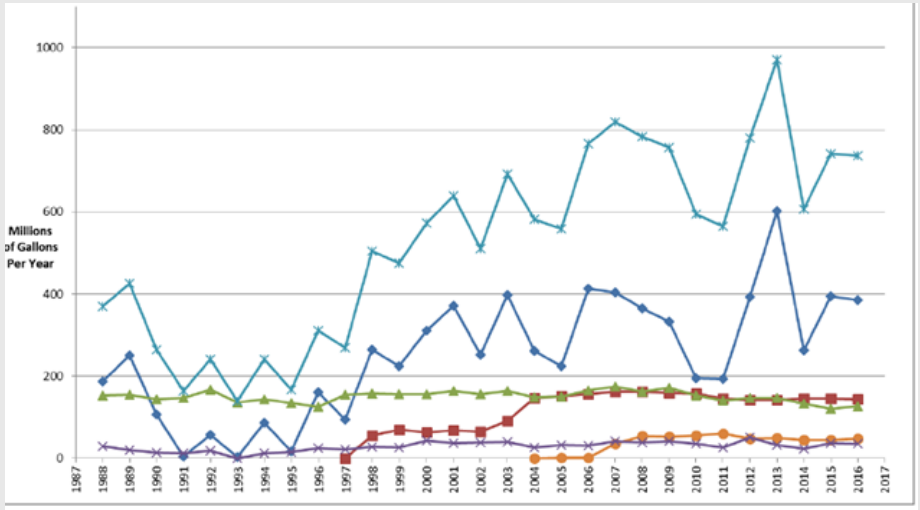
Safe Drinking Water Act
Well Construction

Present the C.A.M.P. story basics

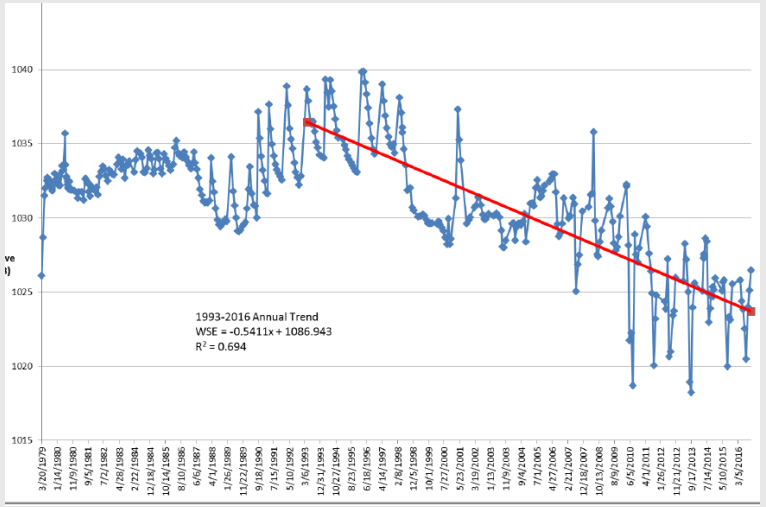
Aquifer Cross-sections



Groundwater Use Trends

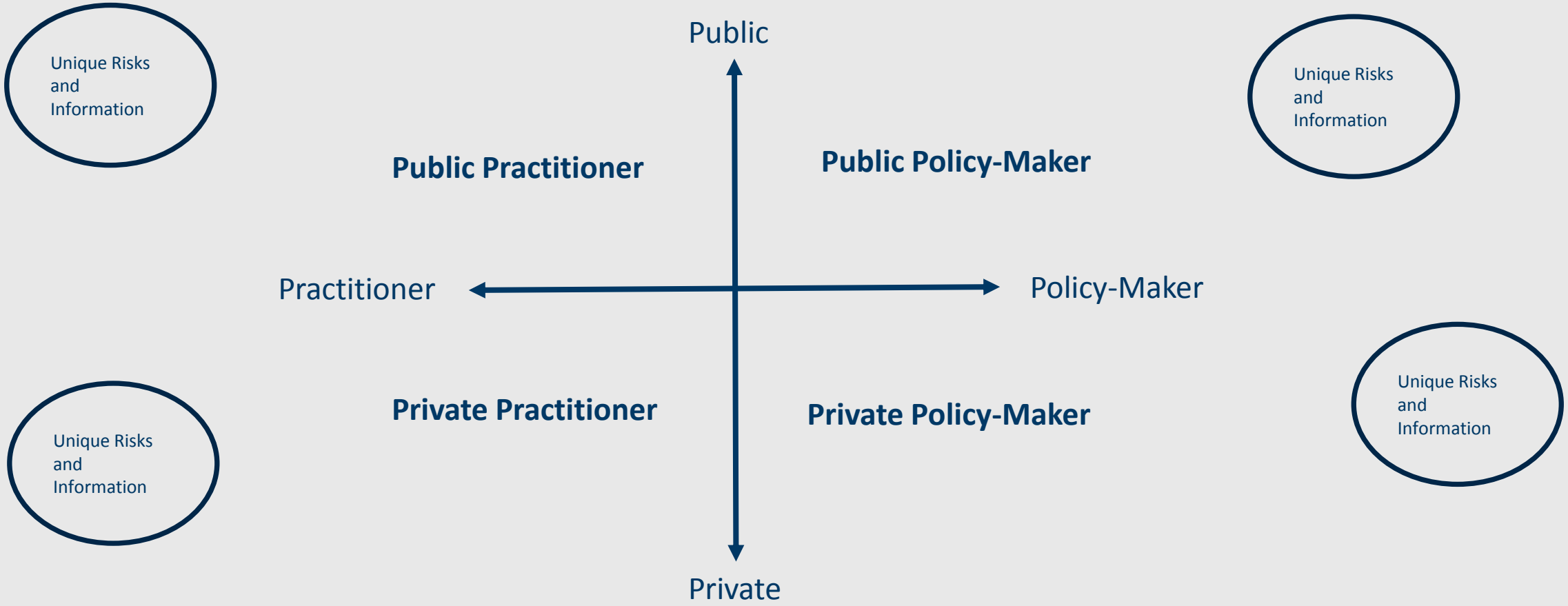


Observation Well data



It gives the community the opportunity to ask the next good question

C.A.M.P. “Community Actors”

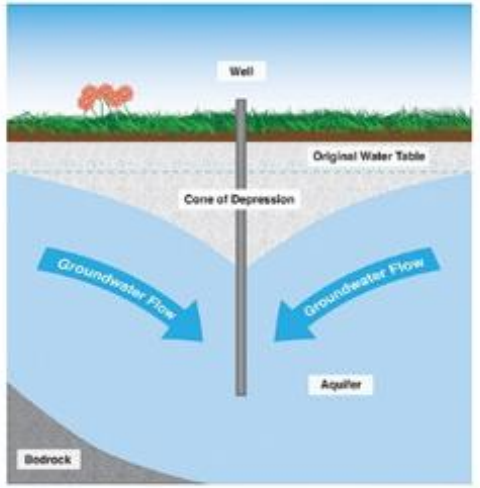


C.A.M.P. “Infrastructure”

“Management Units” of the Community’s Groundwater Story

Gray infrastructure refers to man-made structures used to convey, treat and store water. They include casings, pipes, towers, and treatment facilities.

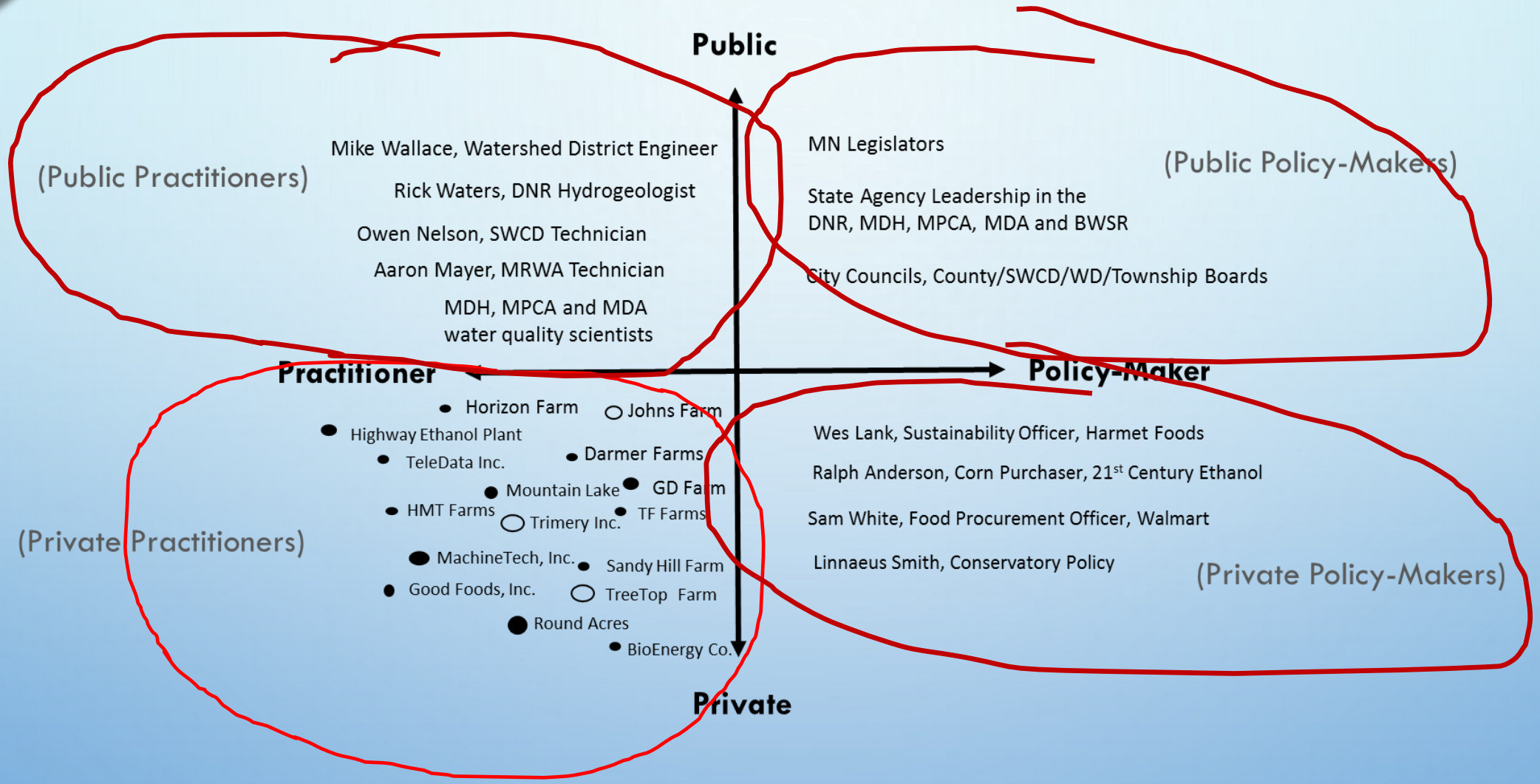
Blue infrastructure refers to the natural geology that collects, store, and transport water. They include aquifers, springs, rivers, lakes, and wetlands.



Green infrastructure refers to the soil and plants that cleanse the water prior to recharging the aquifer. These include grass buffers, wetlands, crop fields, prairies, parks, and forests.

Is it a sustainable “hydrological cycle”?

C.A.M.P. Story provides the context for "Community Actors" and their Roles



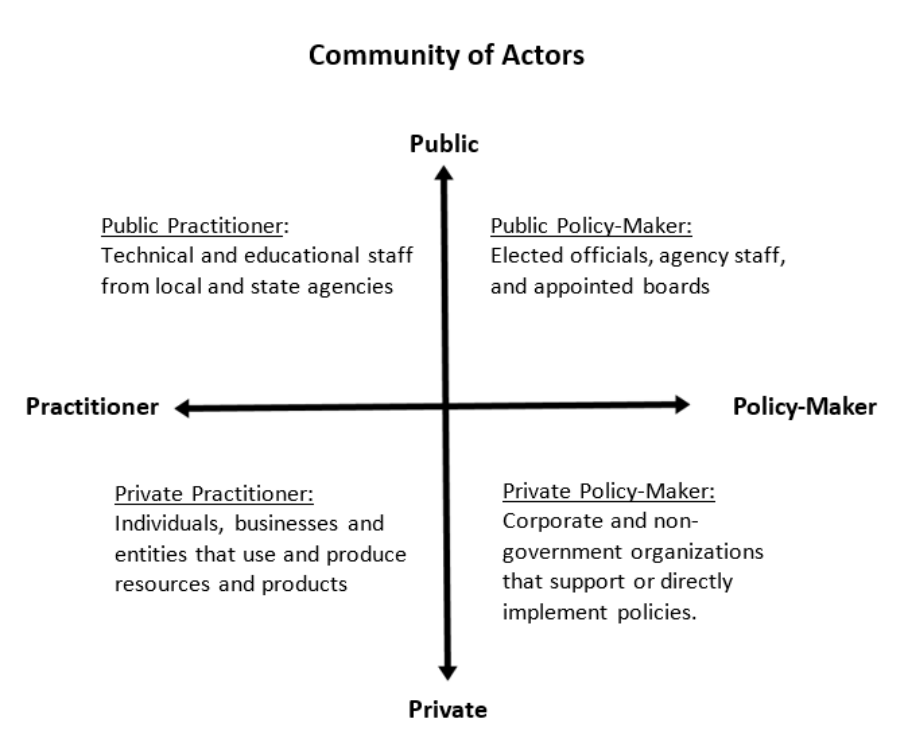
Re-

Why C.A.M.P. is a Good Option

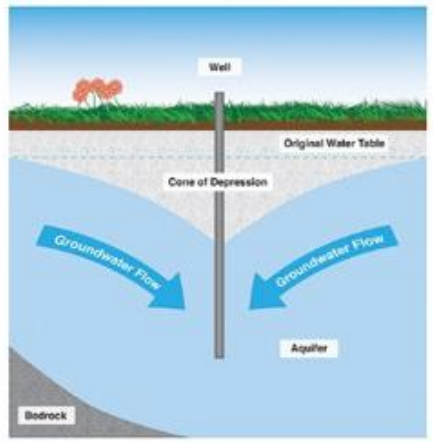
- Aquifers do not follow ***jurisdictional boundaries*** or industry sectors
- Aquifer users are ***interdependent*** on other aquifer users to be good stewards
- Local land use decisions are ***de facto*** groundwater use decisions
- It assists the community in understanding their unique ***groundwater story***
- It is supportive for co-managing and ***sustaining aquifers***

Community-based Aquifer Management Partnership

Connects Community & Culture ……. Science & Technology



Blue infrastructure refers to the natural geology that collects, store, and transport water. They include aquifers, springs, rivers, lakes, and wetlands.



Gray infrastructure refers to man-made structures used to convey, treat and store water. They include casings, pipes, towers, and treatment facilities.

Green infrastructure refers to the soil and plants that cleanse the water prior to recharging the aquifer. These include grass buffers, wetlands, crop fields, prairies, parks, and forests.

DEPARTMENT OF NATURAL RESOURCES

Tim Gieseke, DNR Region 4 EWR Groundwater Planner – New Ulm
tim.gieseke@state.mn.us