



***“Science as the Basis for
Water Policy” is the
AGWT’s Mission and the
Purpose of this Conference***



Andrew Stone
American Ground Water Trust

SPONSORS AND EXHIBITORS

Weld County Farm Bureau

Colorado Potato Administration

Colorado Onion Association

Regenesis Management Group, LLC

Northern CO Water Conservancy District

American Assn of Professional Geologists

Dynotek

Industry Professionals



Homeowners



Educators



Policy Makers

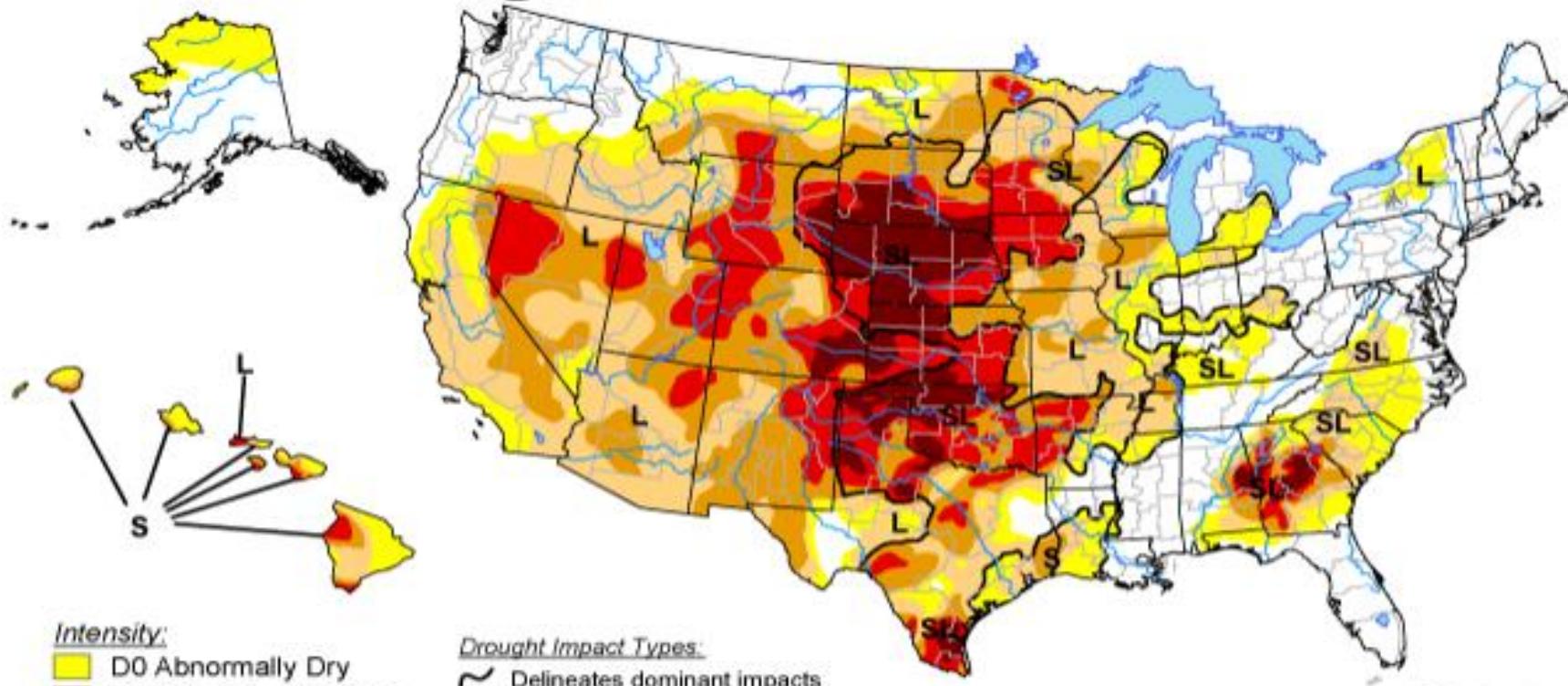
Water Demand



Water Resources

U.S. Drought Monitor

November 20, 2012
Valid 7 a.m. EST



Intensity:

- [Yellow square] D0 Abnormally Dry
- [Light Orange square] D1 Drought - Moderate
- [Medium Orange square] D2 Drought - Severe
- [Red square] D3 Drought - Extreme
- [Dark Red square] D4 Drought - Exceptional

Drought Impact Types:

- ~~~~~ Delineates dominant impacts
- S = Short-Term, typically <6 months
(e.g. agriculture, grasslands)
- L = Long-Term, typically >6 months
(e.g. hydrology, ecology)

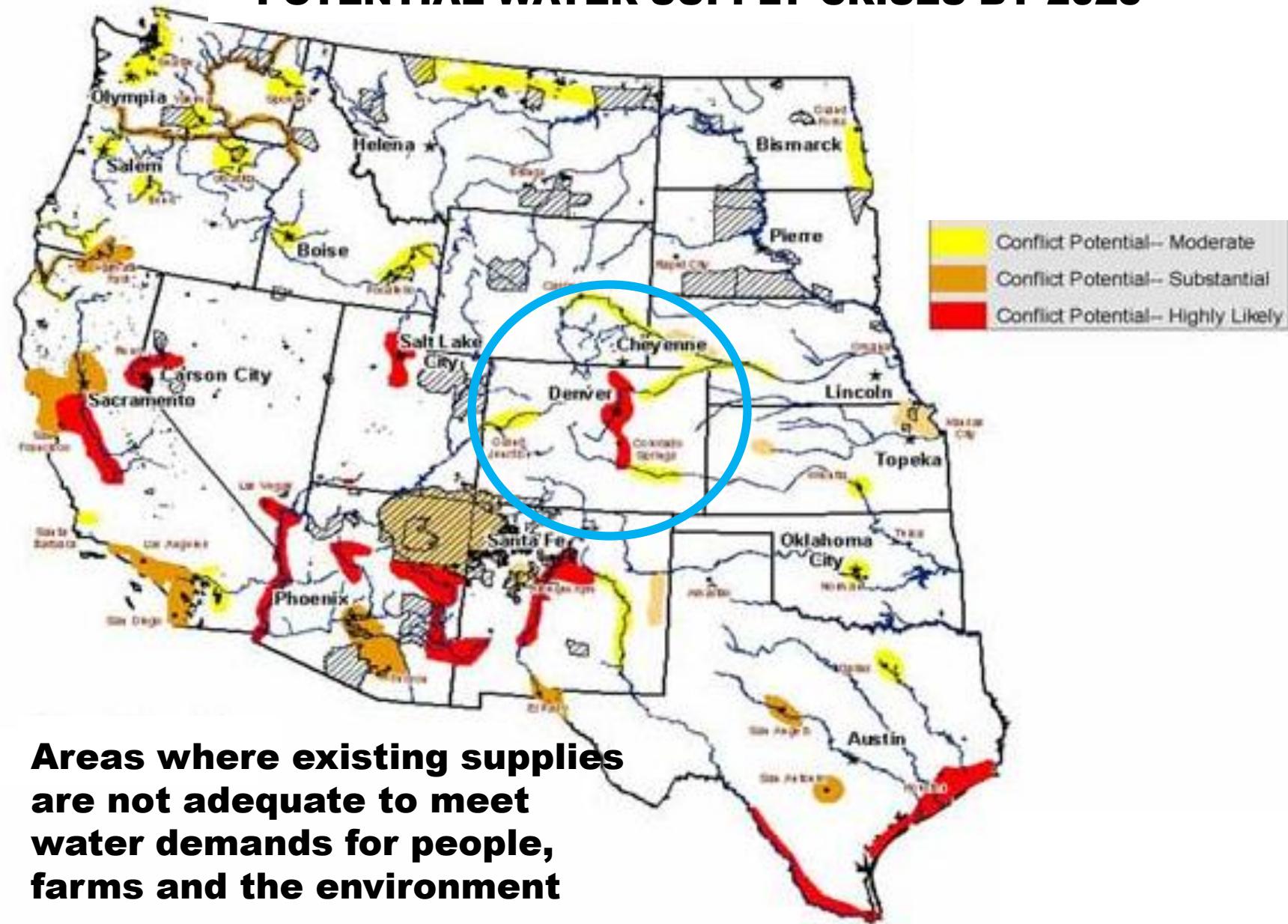
The Drought Monitor focuses on broad-scale conditions.
Local conditions may vary. See accompanying text summary
for forecast statements.

<http://droughtmonitor.unl.edu/>



Released Wednesday, November 21, 2012
Author: Eric Luebehusen, U.S. Department of Agriculture

Department of Interior map: POTENTIAL WATER SUPPLY CRISES BY 2025





**US
population
7,000 day
increase**

**MAXIMIZE BENEFICIAL
WATER USE
OPPORTUNITIES IN
COLORADO**



GOAL

**Elected
representatives**

**Gap in the bridge
between science
and policy?**

**Common sense
application of
sound science**

‘.... our current path will, lead us to a national freshwater crisis. This reality encompasses a wide array of challenges....that collectively amount to a tenuous trajectory for the future of the nation’s freshwater resources.’

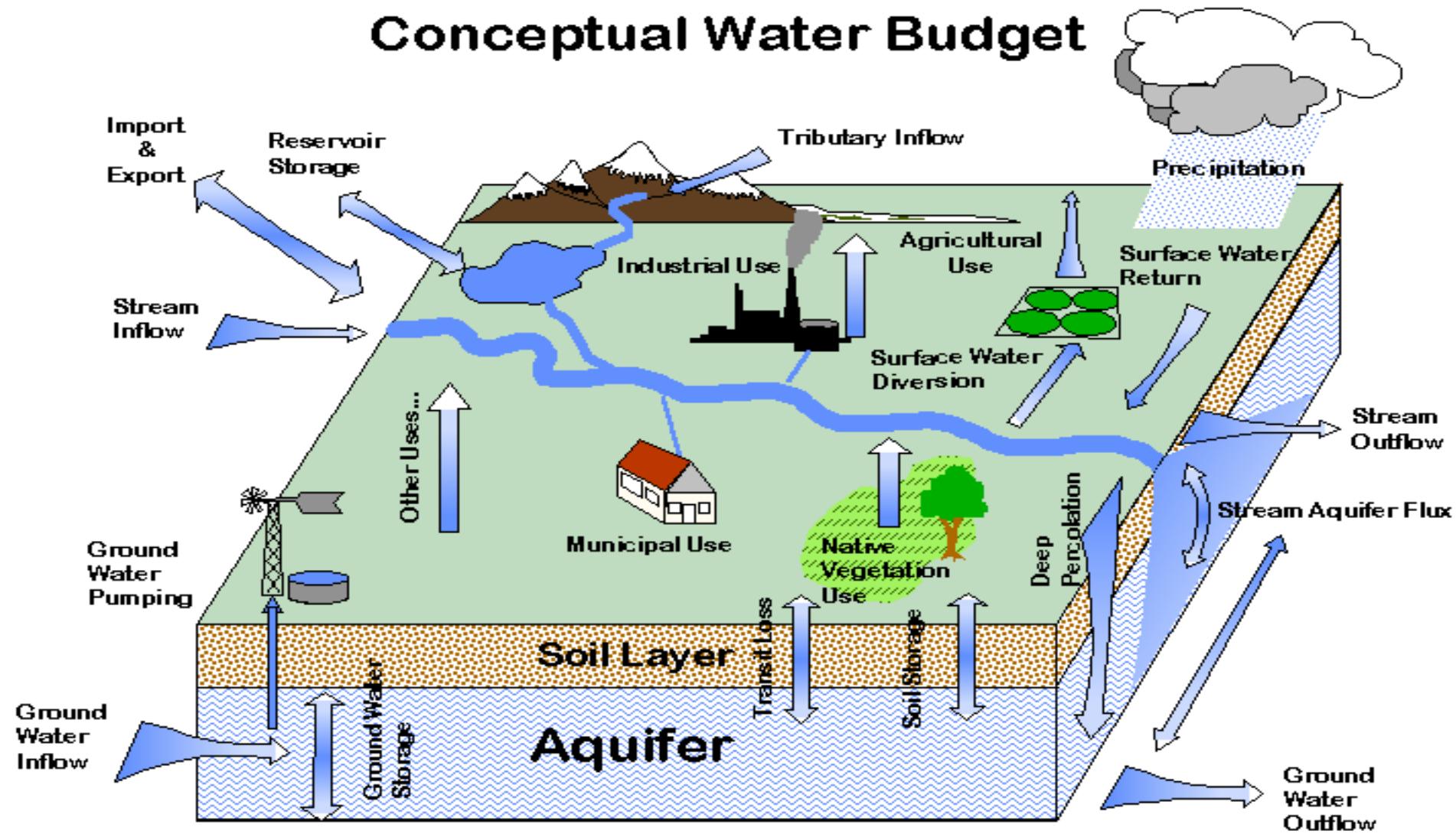


2010 Report - A Call to Action to Address US Freshwater Challenges

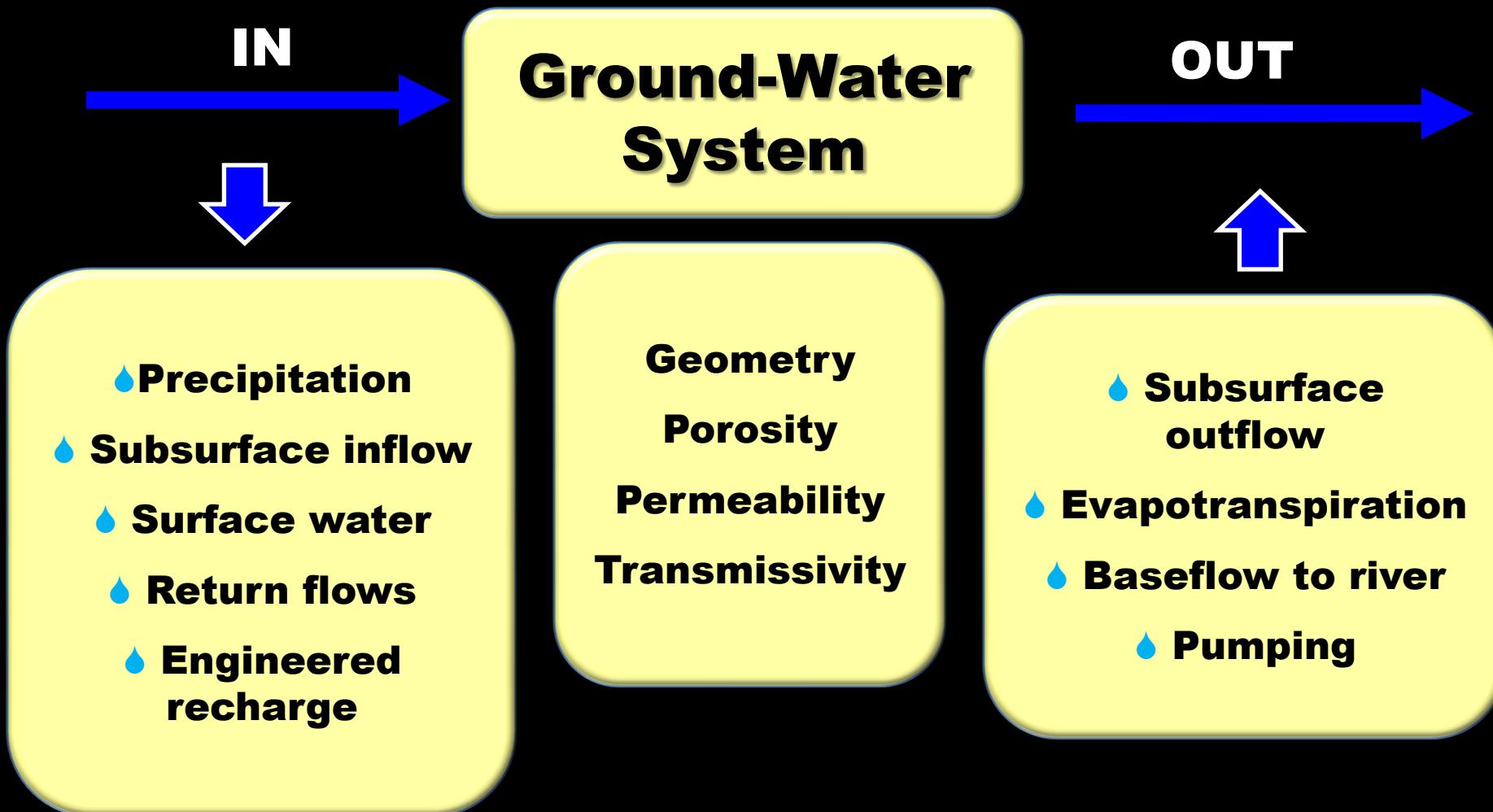


We must quantify vectors (science & engineering)

Conceptual Water Budget



$$\text{Budget} = \text{In} - \text{out} + \text{or} - \text{storage change}$$



Recharge: technical components

SOURCE WATER

- *Quality*
- *Quantity*
- *Duration*
- *Reliability*

END USE

- *Quality*
- *Quantity*
- *Duration*
- *Reliability*

RECHARGE

- *Land availability*
- *Aquifer Types*
- *Location*
- *Methods*

STORAGE

- *Duration*
- *Capacity*
- *Water quality changes*

RECOVERY

- *Rate*
- *Methods*
- *Efficiency*













**Intelligent use of aquifers is the
key to keeping water flowing for
agriculture**



www.farmwater.org

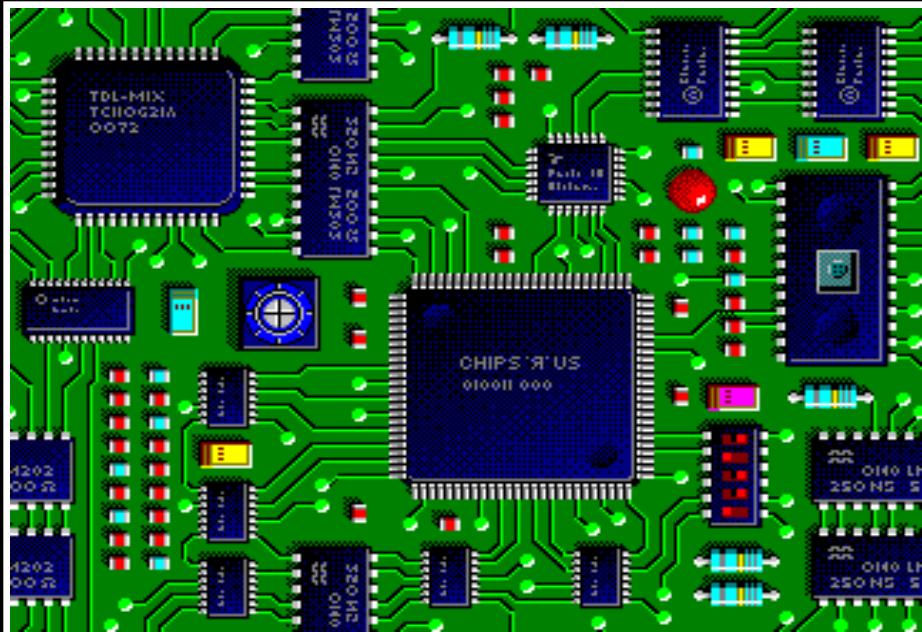
**Food Grows
Where Water Flows®**

California Farm Water Coalition
Central California Irrigation District

Introduction 4

ECONOMICS - WATER VALUE

\$100 alfalfa



**\$1,000,000
computer chips**







I don't want the government to come in and dictate 'This is all the water you can use on your own land,' ... we would resist that to our dying day

Mark Watte, farmer in Tulare, California

New York Times

California Constitution

Article X, Section 2

“It is hereby declared that because of the conditions prevailing in this State the general welfare requires that the water resources of the State be put to beneficial use to the fullest extent of which they are capable.....

Texas Supreme Court Decision

(2/24/2012)

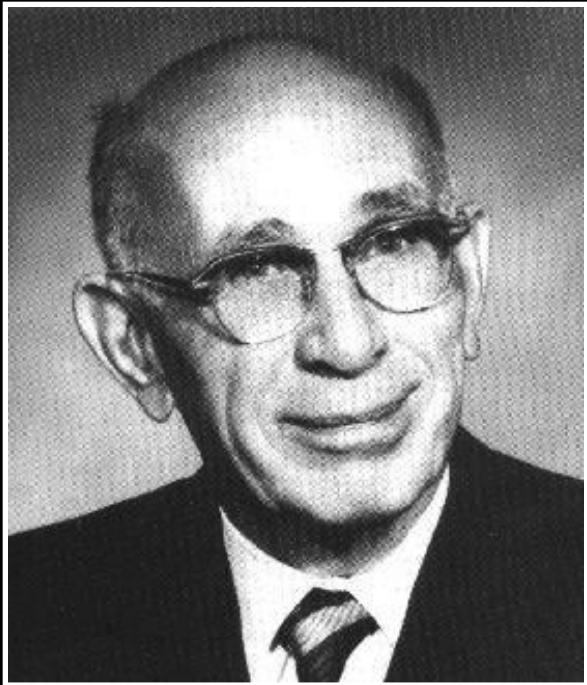
- The ruling recognized the passage of SB 332—Texas Farm Bureau's priority legislation on groundwater ownership a landowner's interest in groundwater in place cannot be taken for public use without adequate compensation



The first clear description of the effects of groundwater pumping on surface water was by USGS hydrologist C.V. Theis.

Paper published in 1940:

"The Source of Water Derived from Wells"



Under natural conditions Previous to development by wells, aquifers are in a state of approximate dynamic equilibrium. Discharge by wells is thus a new discharge superimposed upon a previously stable system, and it

must be balanced by an increase in the recharge of the aquifer, or by a decrease in the old natural discharge, or by loss of storage in the aquifer, or by a combination of these”

C.V. Theis 1940

The primary objective is to summarize scientific insights and to describe the various field methods and modeling approaches used to understand and manage streamflow depletion.

A secondary objective is to highlight misconceptions concerning streamflow depletion and to explain why these misconceptions are incorrect.

“Streamflow Depletion by Wells—Understanding and Managing the Effects of Groundwater Pumping on Streamflow”
Paul M. Barlow and Stanley A. Leake

USGS Press Release: 11/26/2012 9:51:04 AM

Quantifying Components of the Hydrologic Cycle in Virginia using Chemical Hydrograph Separation and Multiple Regression Analysis

By Ward E. Sanford, David L. Nelms, Jason P. Pope, and David L. Selnick SIR 2011-519

“Water & solute balance”

“Each component of the hydrologic budget that was measured or estimated from existing data is no more accurate than the assumptions that went into interpreting those measurements or data.”

*Achieving “maximum
beneficial use for all
citizens” seems to be at
odds with “protecting
vested water rights”*

**MAXIMIZE BENEFICIAL
WATER USE
OPPORTUNITIES IN
COLORADO**



GOAL

**Elected
representatives**

**Gap in the bridge
between science
and policy?**

**Common sense
application of
sound science**

Everything is working just fine – no need for any water management changes

*Have case-law decisions
unduly impacted
administrative processes in
managing the waters of the
State?*

*A few good storms and a
good winter snow-pack and
drought will soon be
forgotten*

*Are we accurately
computing accretions and
depletions? Is anybody
being injured?*

*Current well administration
is necessary to protect
downstream senior surface
rights*

*Irrigation well curtailment
and increased artificial
recharge cause damage
from high groundwater
levels*

***Colorado's best interest is
to let market forces
allocate water to the
highest value use***

***Real-time management of
both groundwater and
surface water resources
could maximize beneficial
use***

**MAXIMIZE BENEFICIAL
WATER USE
OPPORTUNITIES IN
COLORADO**



GOAL

**Elected
representatives**

**Gap in the bridge
between science
and policy?**

**Common sense
application of
sound science**