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A National Water Census

* Part of the 

Initiative

U.S. Department of the Interior
U.S. Geological Survey

Our objective for the Water Census:

To place technical information and tools in the hands of stakeholders, allowing them to answer two primary questions about water availability:

Does the Nation have enough freshwater to meet both human and ecological needs?

Will this water be present to meet future needs?

How do the National Water Census and WaterSMART Interrelate?

is a Department of the Interior initiative on water conservation. It includes activities in:
- Bureau of Reclamation
- U.S. Geological Survey
- Office of the Ass't. Sec. for Water and Sci.

The National Water Census

is an integral part of the U.S. Geological Survey's Science Strategy to conduct an ongoing assessment of the Nation's water resources

The Water Availability and Use Assessment proposed in the 2011 budget is part of WaterSMART and the National Water Census

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P.L. 111-11 Subtitle F
(SECURE Water Act as signed by the President March 30, 2009)

Section 9501: Findings

Section 9502: Definitions

Section 9503: Reclamation Climate Change and Water Program

Section 9504: Water Management Improvement

Section 9505: Hydroelectric Power Assessment

Section 9506: Climate Change and Water Intergovernmental Panel

Section 9507: Water Data Enhancement by United States Geological Survey

*Full **National Streamflow Information Program**.*
*Creates a **National Groundwater Resources Monitoring Program** and a **Brackish Groundwater Assessment.***

Section 9508: Water Availability Assessments

*Creates a **national program to study water quality and quantity**.*
Requires first report in 2012 and every 5 years thereafter.
***Grants** are available to assist state agencies in **developing and integrating state water use data**.*

Section 9509: Research Agreement Authority

Section 9510: Effect

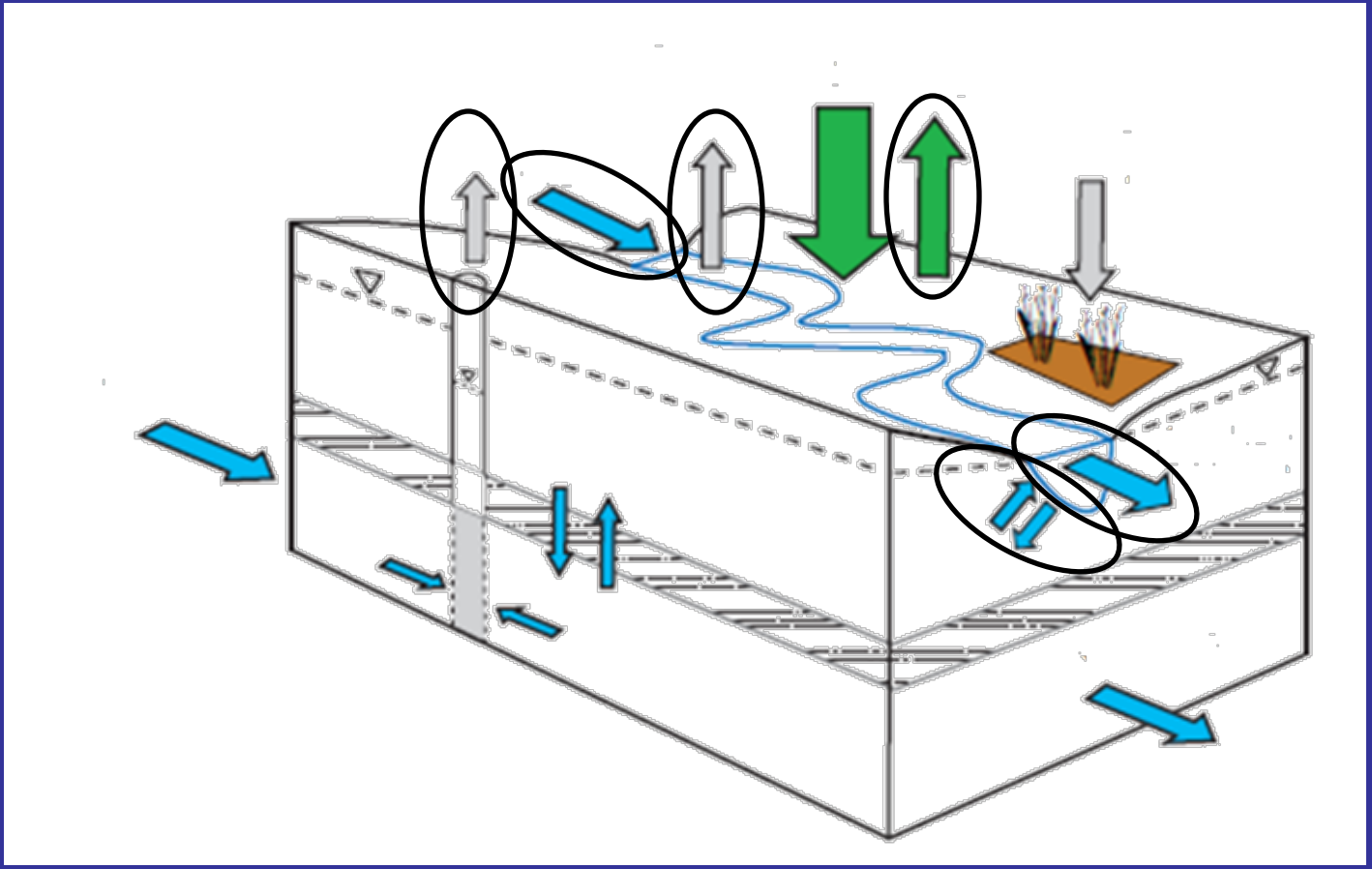
Stakeholders on ad hoc committee

Organization	Acronym
Association of American State Geologists	AASG
Association of Fish and Wildlife Agencies	AFWA
Association of Metropolitan Water Agencies	AMWA
Association of State Drinking Water Administrators	ASDWA
American Water Resources Association	AWRA
American Water Works Association	AWWA
Interstate Council on Water Policy	ICWP
National Ground Water Association	NGWA
National Tribal Water Council	NTWC
The Nature Conservancy	TNC
Water Systems Council	WSC
Western States Water Council	WSWC
Bureau of Reclamation	BOR
National Aeronautics and Space Administration	NASA
US Fish and Wildlife Service	USFWS
US Dept. of Energy - Energy Information Administration	DOE - EIA
NOAA National Weather Service	NOAA-NWS
US Army Corps of Engineers	USACE
US Dept. of Agriculture - Economic Research Service	USDA - ERS
US Dept. of Agriculture – Forest Service	USDA - FS
US Dept. of Agriculture - NASS	USDA - NASS
US Dept. of Agriculture - NRCS	USDA - NRCS
US Environmental Protection Agency	USEPA

How will we apply the 2011 funds?

Nationwide Analysis System	$1.05 M
Water Use	$1.30 M
Ecological Flow	$0.90 M
Ground Water	$0.50 M
Focus Area Studies	$0.25 M
Total	$4.0 M

Account for water with a “budget”



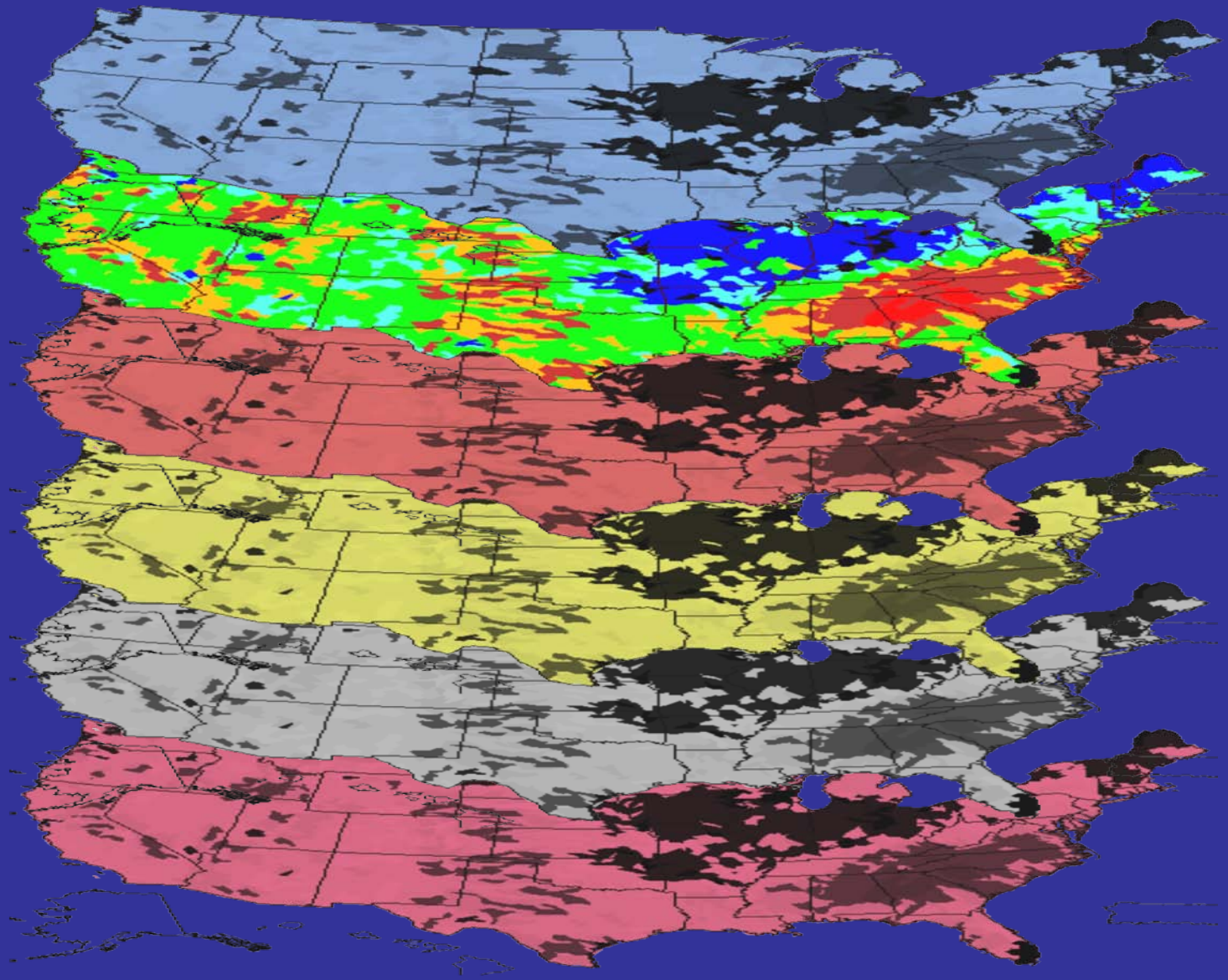
$$P + Qin = ET + \Delta S + Qout$$

$$P + Qswin + Qgwin = ETsw + ETgw + ETuz + \Delta Ssw + \Delta Ssnow + \Delta Suz + \Delta Sgw + Qgwout + RO + Qbf$$

A Nationwide System to deliver water accounting information addressing

- Precipitation
- Evapotranspiration
- Storage in Reservoirs, Lakes, Snow and Ice
- Surface Water
- Groundwater
  - Recharge rates
  - Water level in aquifers
- Ecological Needs
- Water Withdrawals
- Return Flows
- Consumptive Uses
- Run-of-the-River Uses

And if you could get that info for all accounting components



Precipitation

Runoff

Baseflow

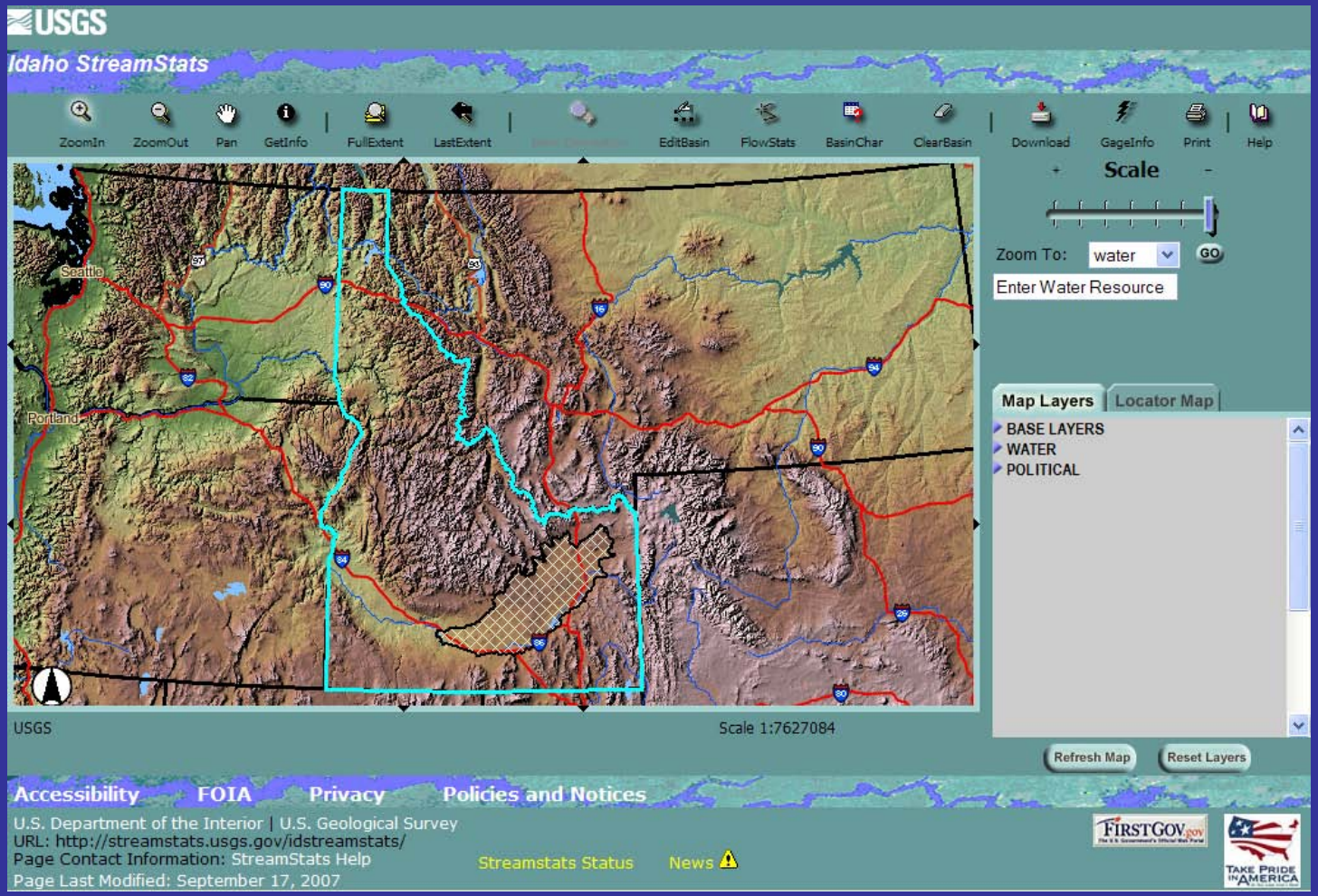
ET

Recharge

Surface Storage

Information Delivery

A web application for delivering water availability information at scales that are relevant to the user



Select the area of interest.

Generate information on water accounting components

Work with the online tool to construct your water budget

Access trend information

Estimating Flows at Ungaged Areas – Selection of models

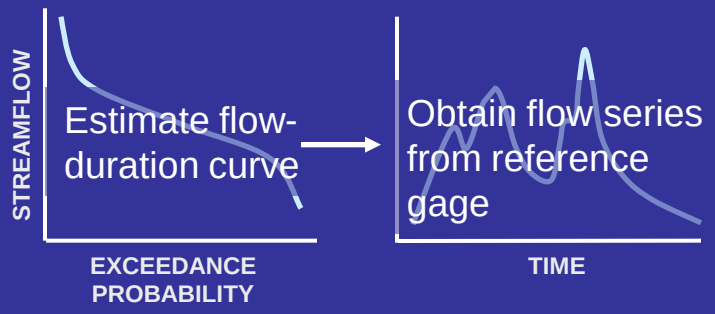
Drainage-area ratio

$$Qu_t = \frac{Au}{Ag} Qg_t$$

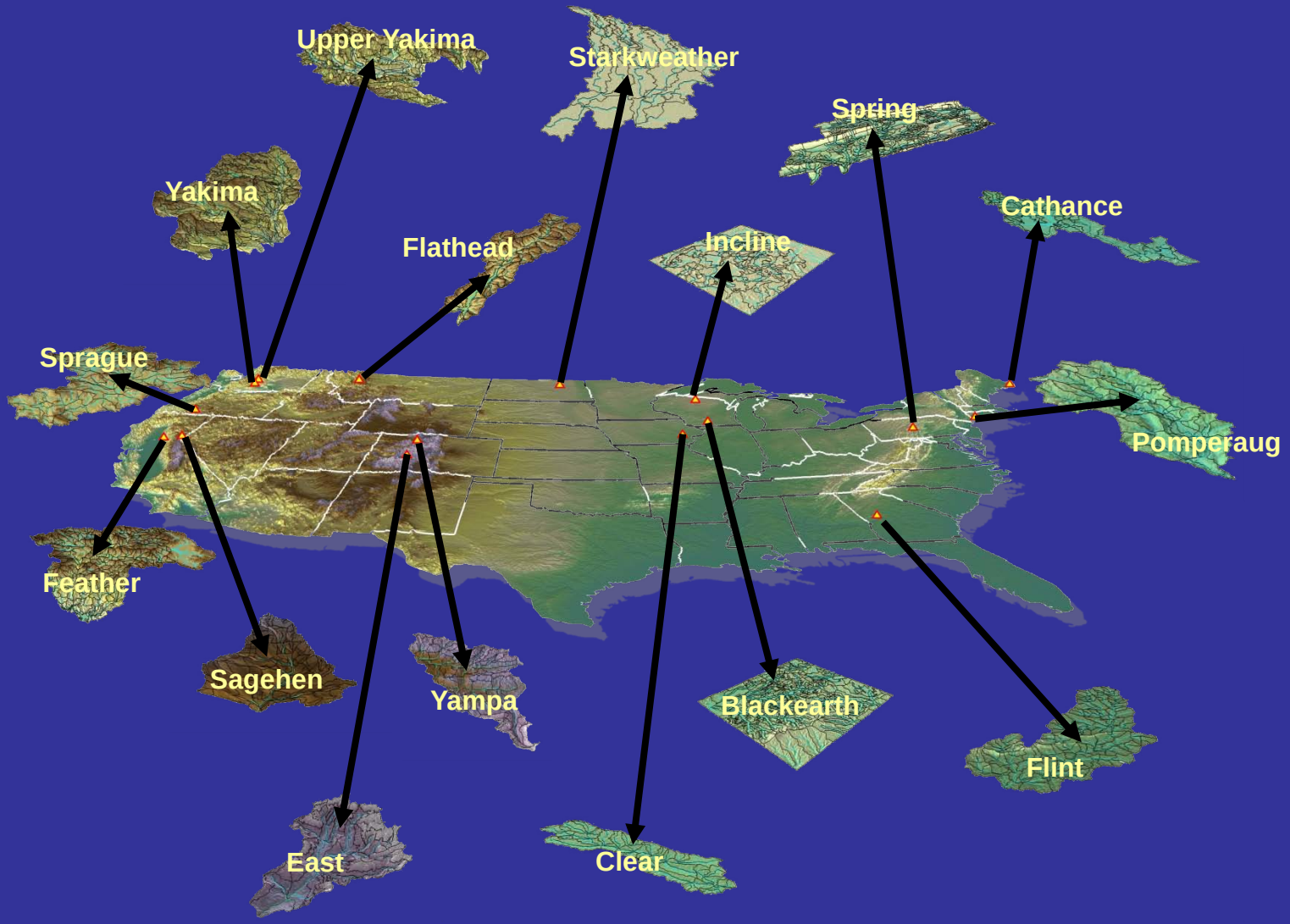
Scaling by the at-site mean and variance
(Hirsch, 1979)

$$Qu_t = \hat{\mu}_u + \hat{\sigma}_u \left(\frac{Qg_t - \hat{\mu}_g}{\hat{\sigma}_g} \right)$$

Non-linear spatial interpolation
(Fennessey, 1994; Smakhtin, 1999; Smakhtin et al. 1997, Mohamoud, 2008; Archfield and others, 2010)



Conduct Tests in Locations Representing Varying Conditions



819 Hydrologic Cataloging Units (HUC8) with Active Streamgage Near Outlet

(Total 2102 HUC 8's in Lower 48 States)

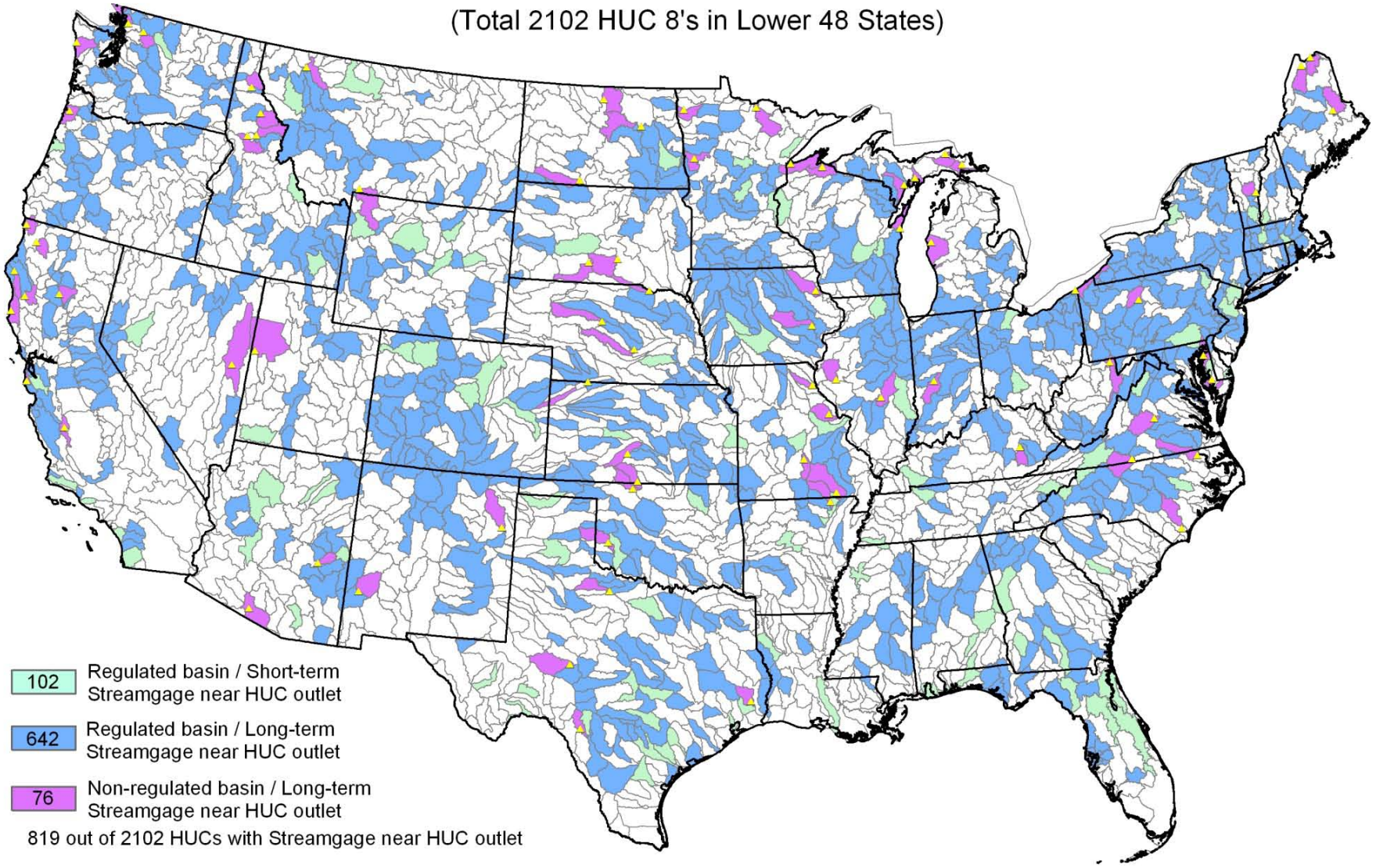
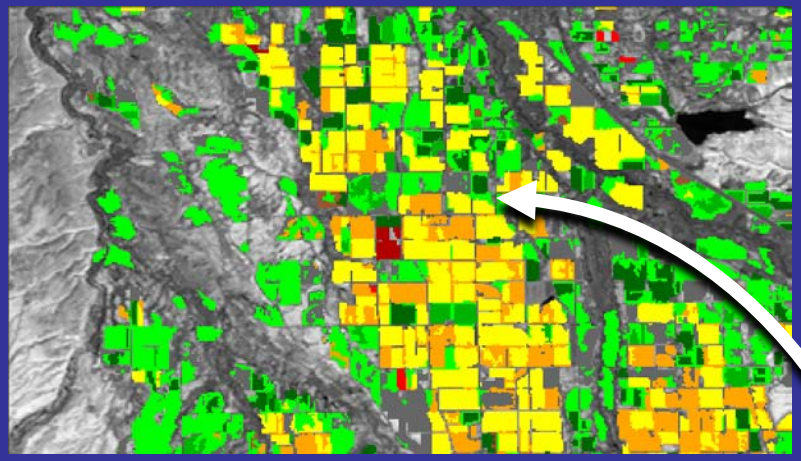
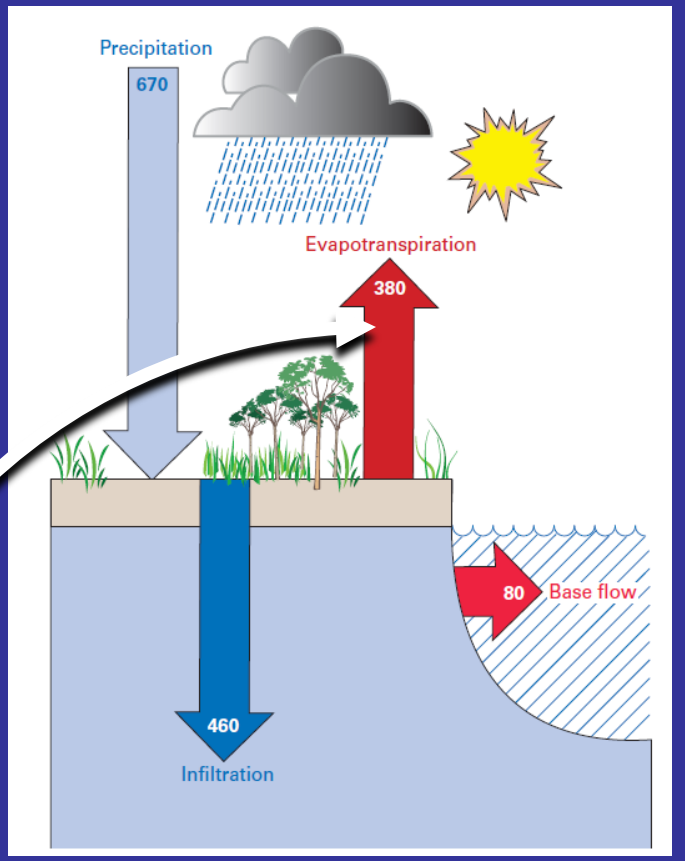


Fig. 5



ET

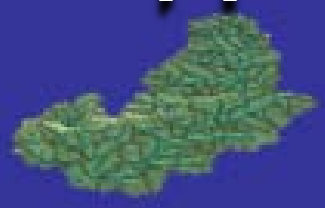


Water Use Effort:

For irrigation water use to estimate consumptive use.

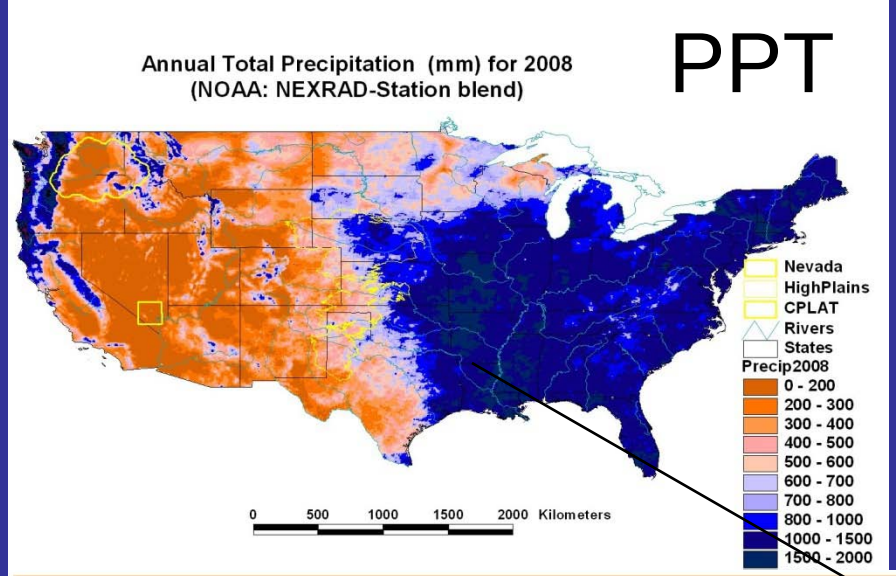
Water Budget Effort:

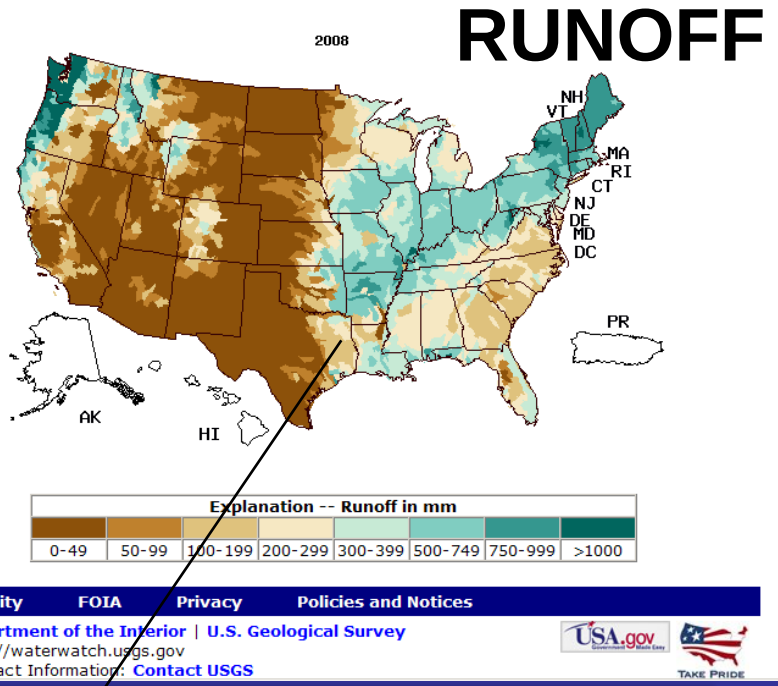
Total ET as a component of the water budget.

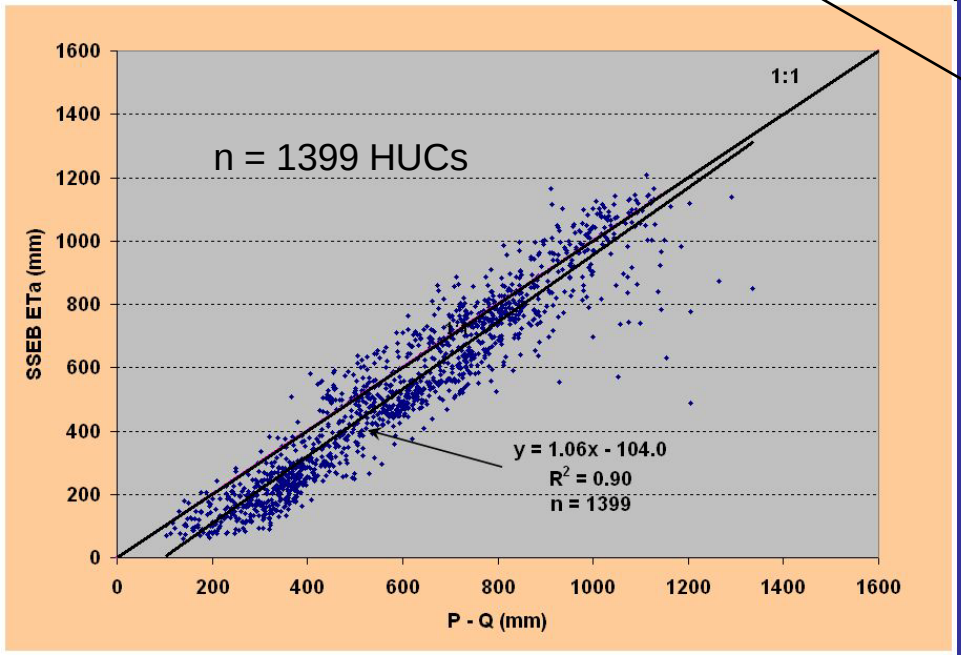


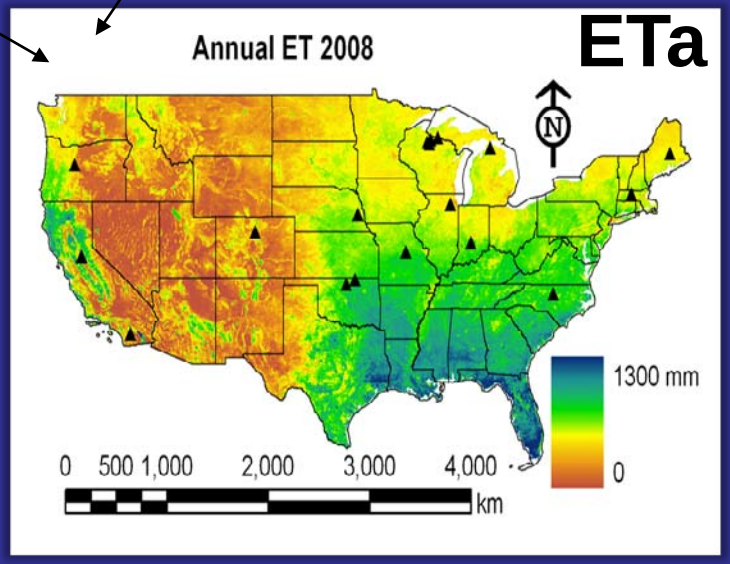
12 digit HUC Watershed

Temporal Scale: Monthly, weekly, daily ?? Trends for how many years back ??


Annual Total Precipitation (mm) for 2008
(NOAA: NEXRAD-Station blend)
PPT
Nevada
HighPlains
CPLAT
Rivers
States
Precip2008
0 - 200
200 - 300
300 - 400
400 - 500
500 - 600
600 - 700
700 - 800
800 - 1000
1000 - 1500
1500 - 2000
0 500 1000 1500 2000 Kilometers


2008
RUNOFF
NH
VT
MA
RI
CT
NJ
DE
MD
DC
PR
AK
HI
Explanation -- Runoff in mm
0-49
50-99
100-199
200-299
300-399
500-749
750-999
>1000
Accessibility
FOIA
Privacy
Policies and Notices
U.S. Department of the Interior | U.S. Geological Survey
URL: http://waterwatch.usgs.gov
Page Contact Information: Contact USGS
USA.gov
TAKE PRIDE

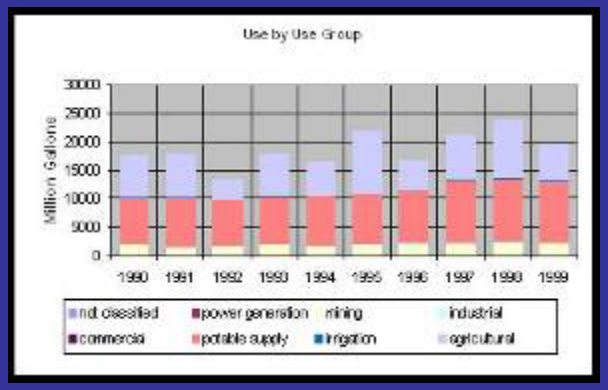

n = 1399 HUCs
1:1
y = 1.06x - 104.0
R2 = 0.90
n = 1399
SSEB ETa (mm)
P - Q (mm)
0
200
400
600
800
1000
1200
1400
1600


Annual ET 2008
ETa
N
1300 mm
0
0 500 1,000 2,000 3,000 4,000
km

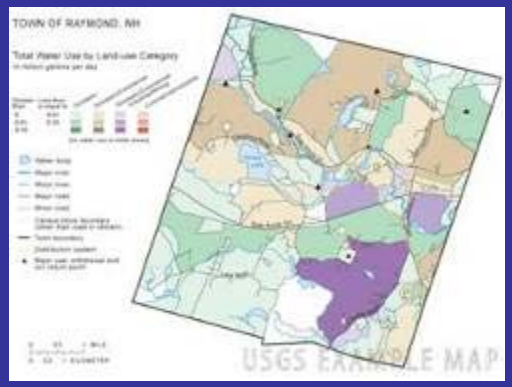
Enhancing the Nation's Water Use Information

Use New Methods to Estimate Water Use

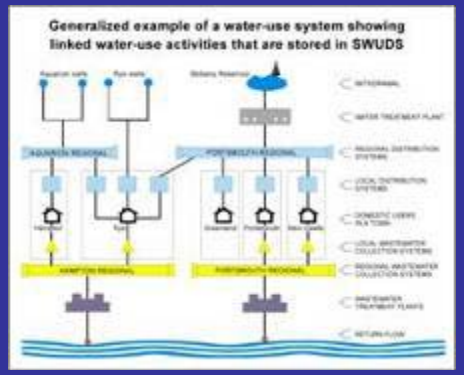
- Stratified Random Sampling
- Regression Models



Develop models of water use based on land use



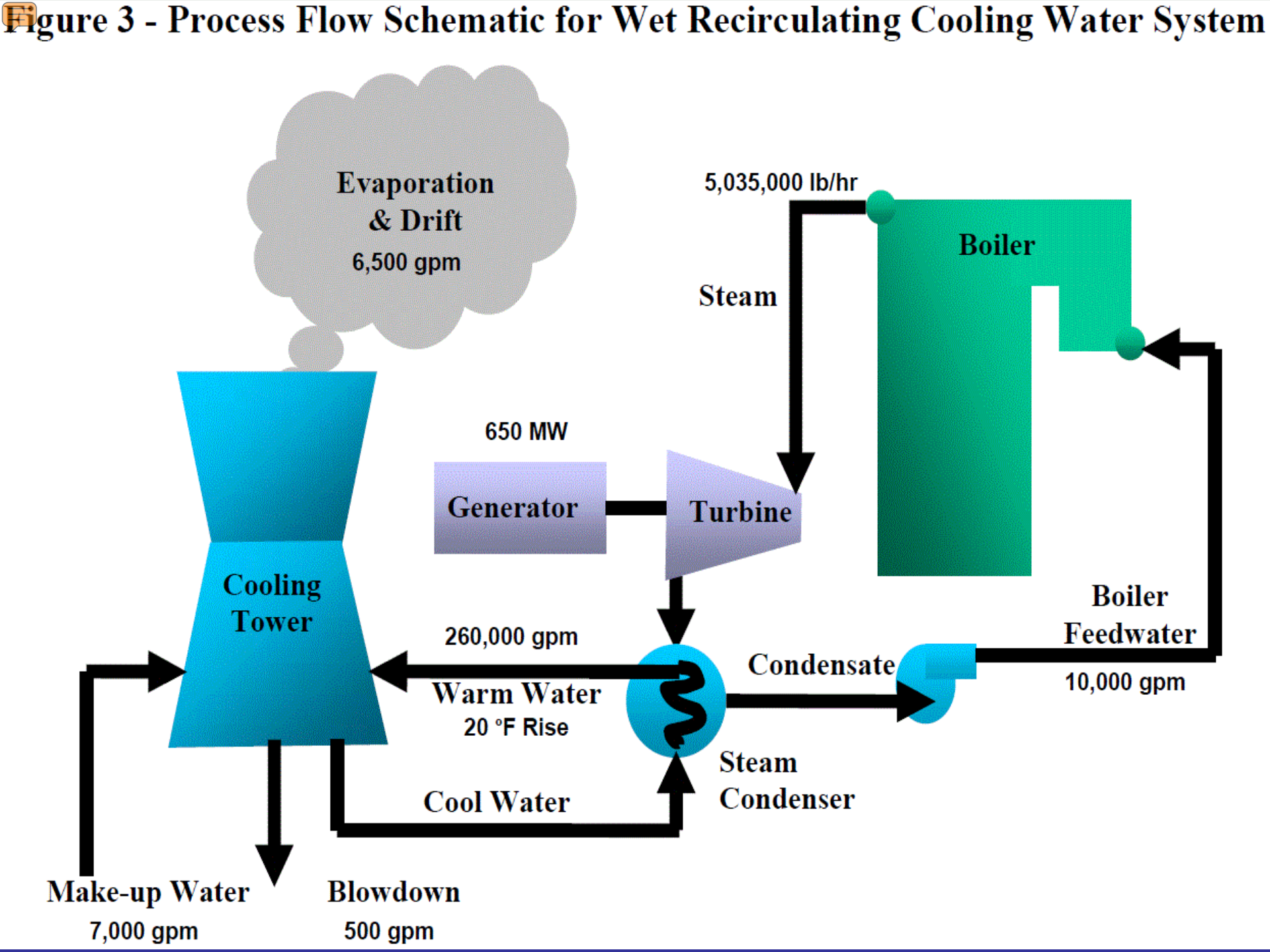
Ability to track water from point of withdrawal thru to return of flow.



Thermoelectric Withdrawals

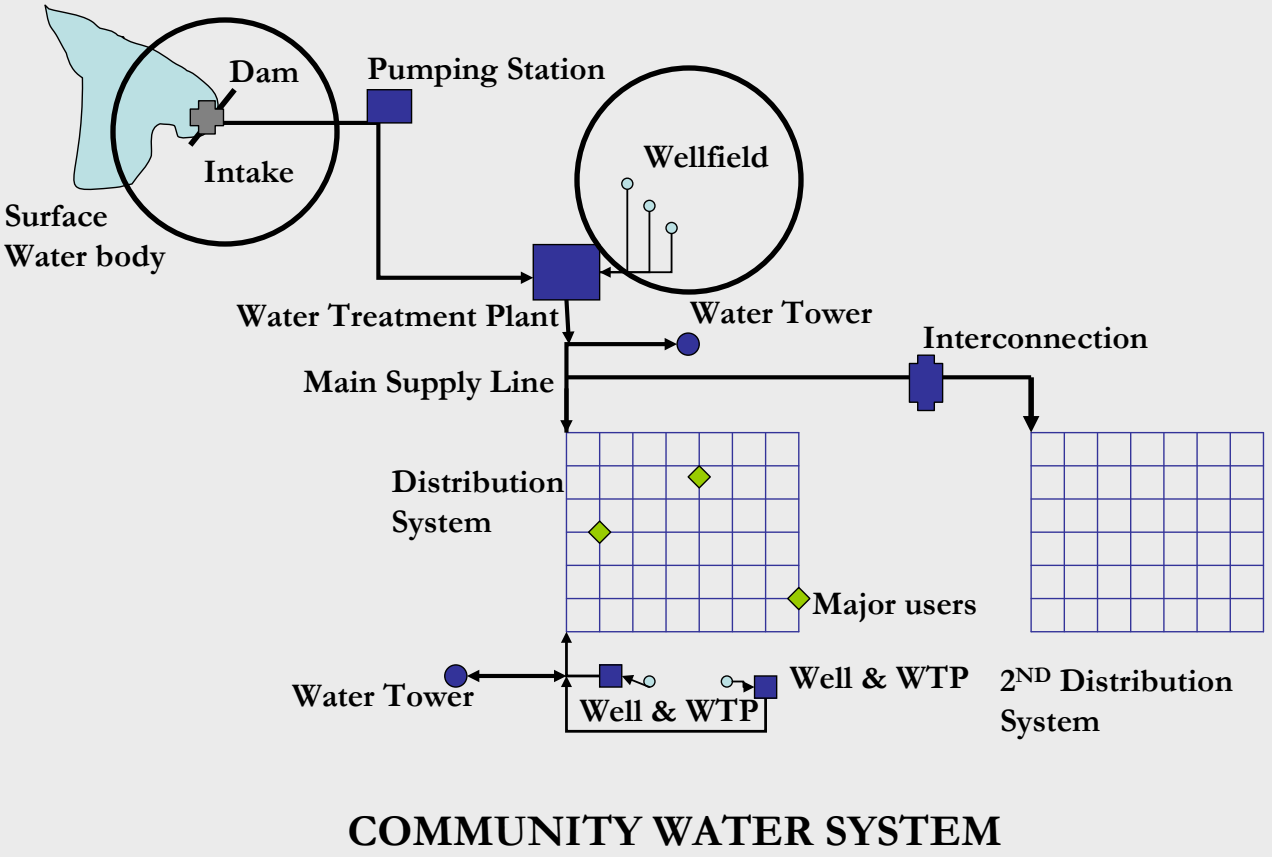

The new frontier -
CONSUMPTION

Figure 3 - Process Flow Schematic for Wet Recirculating Cooling Water System



Major Public Supply Effort

- Geospatially locating intakes and wells,
- Linked to the systems and population served
- Linked to withdrawal volumes



2005 Water withdrawals by category

Livestock

Less than 1 percent

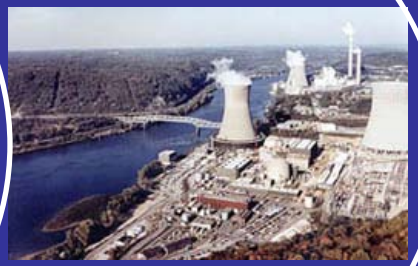
Self-Supplied Domestic

1 percent

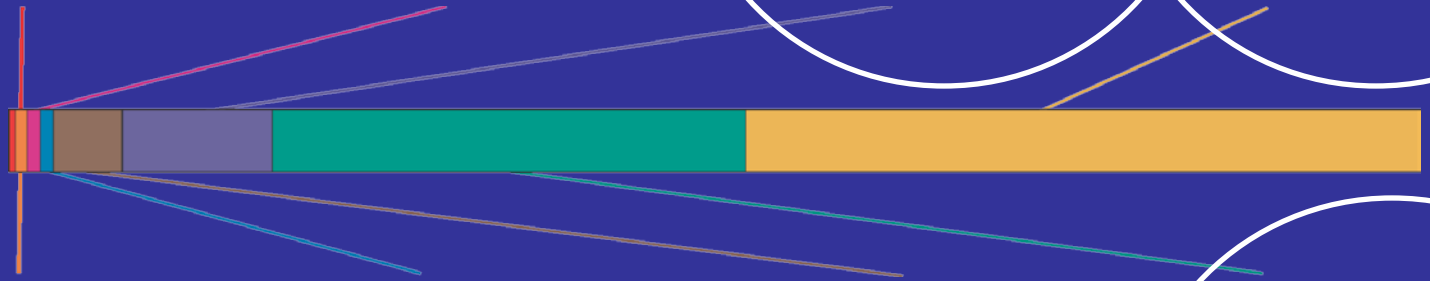
Public Supply

11 percent

Thermoelectric Power



49 percent



1 percent

Mining

2 percent

Aquaculture

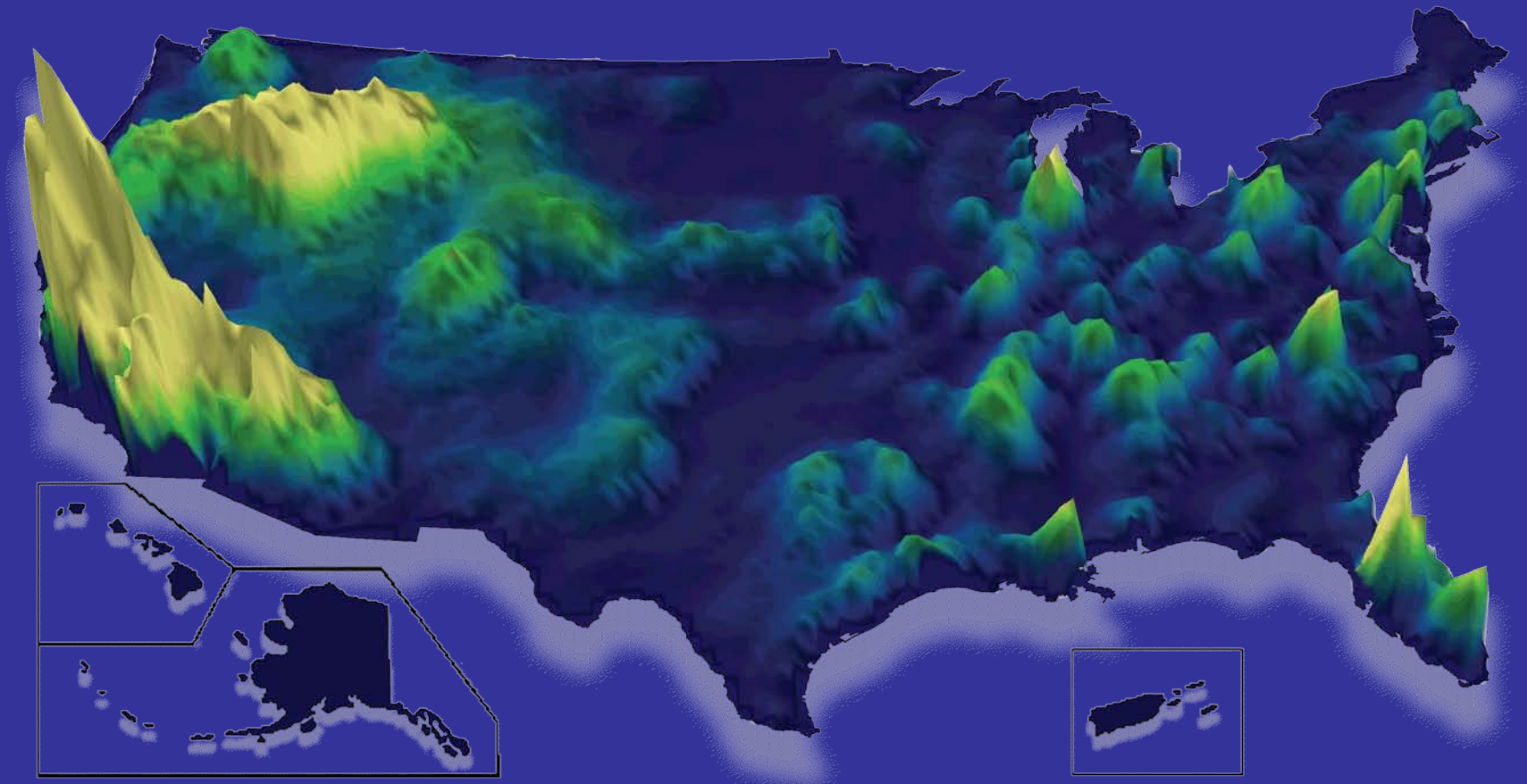
4 percent

Self-Supplied Industrial

31 percent

Irrigation

New Authority: Water Use Grants to States



Flows Needs for Wildlife and Habitat

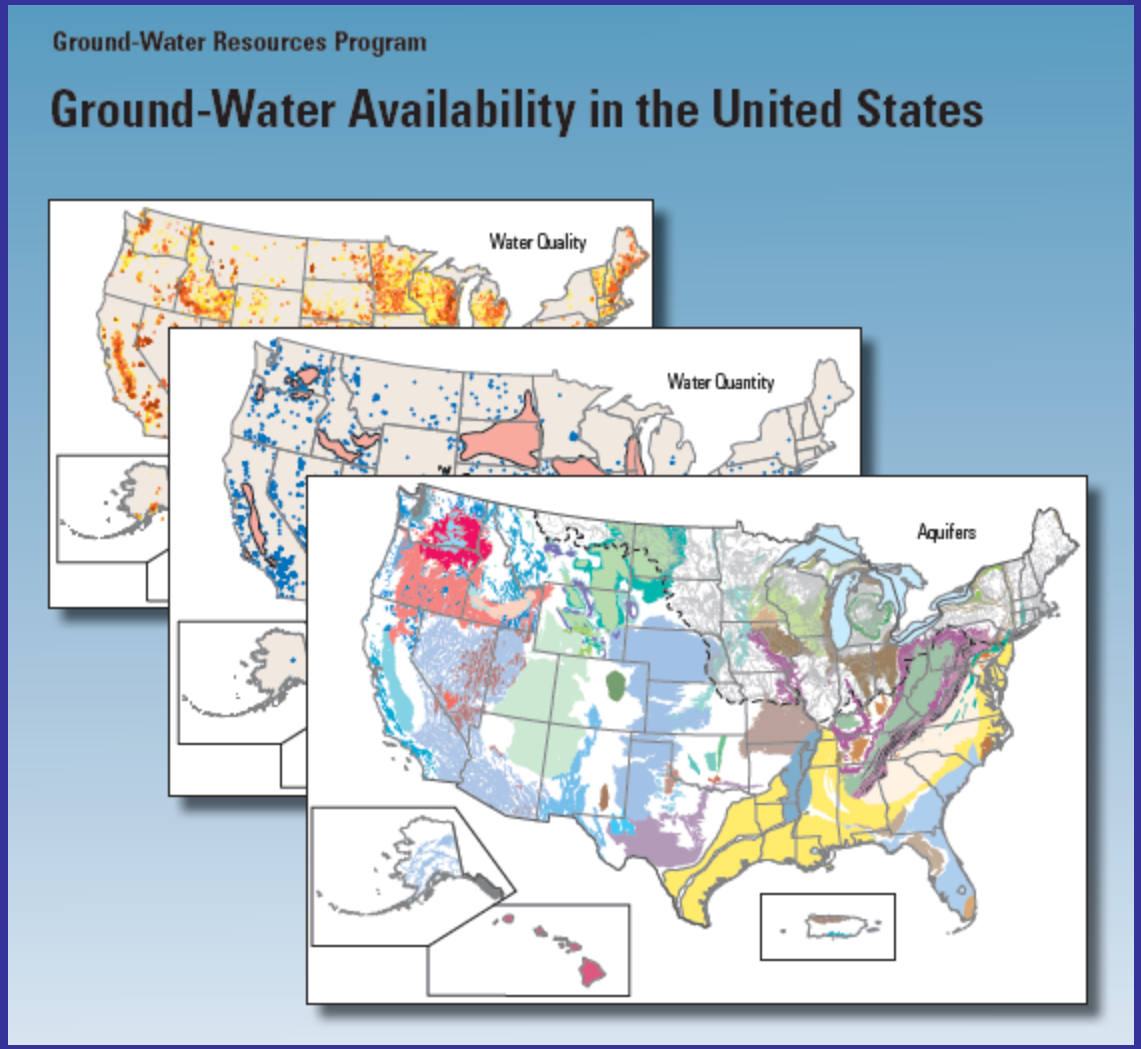
- Assist classifying water bodies for their hydro-ecological type
- Provide tools and data to systematically assess the ecological affects of hydrologic alteration
- Assist users to develop flow or water level alteration – ecological response relationships by type of water body

Assess Groundwater's role in Water Availability

Use the strength of and enhance the resources within this program to provide the information on:

- Recharge
- GW yields
- Changes in storage.
- Saltwater Intrusion
- Trends in GW Indices
- Artificial Recharge
- GW/SW Interactions

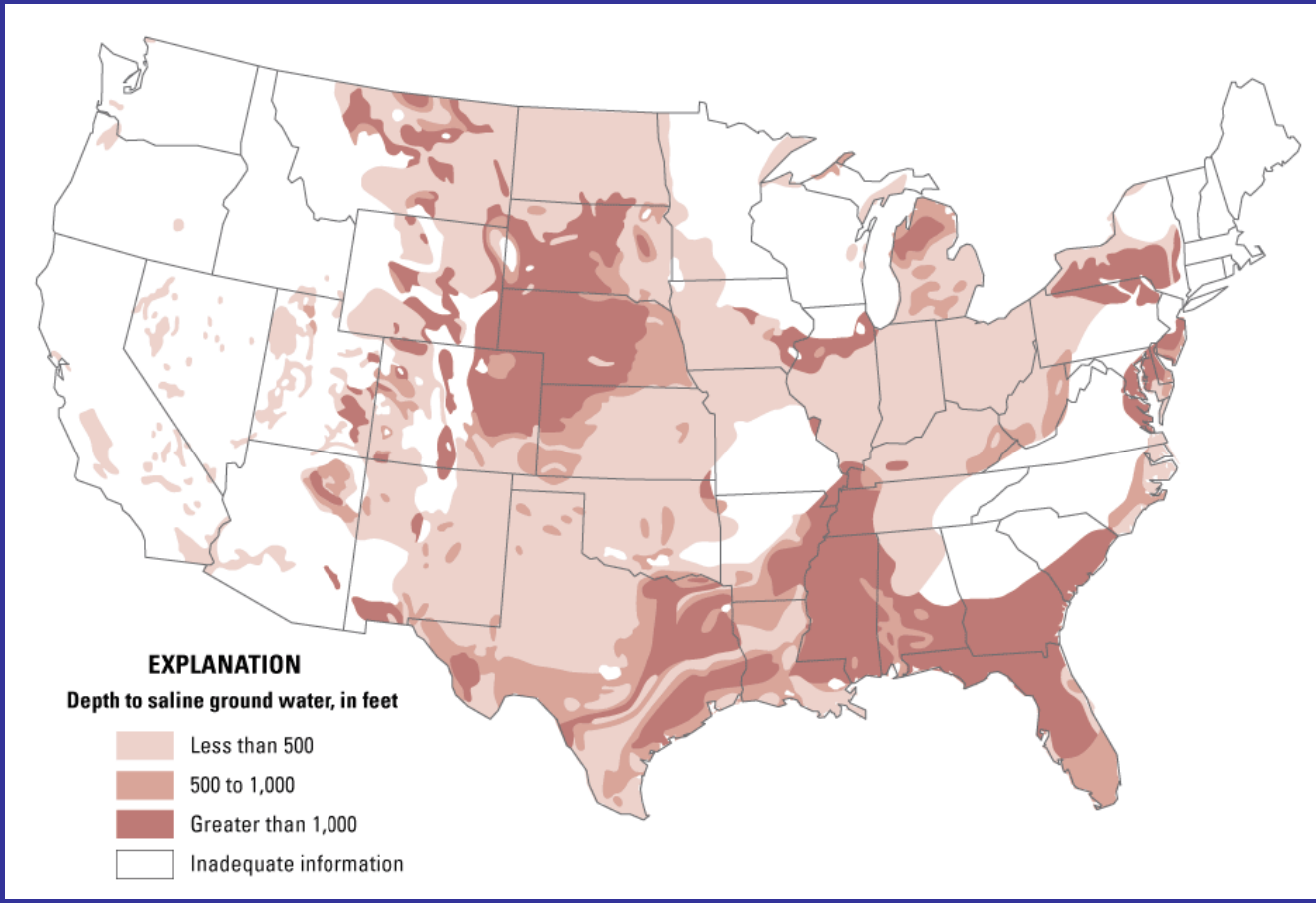
- Developing a regional approach for estimating GW/SW interactions



Assess the Nation's Brackish Resources

Continue and strengthen the effort begun under the Challenge Projects RFP for 2010

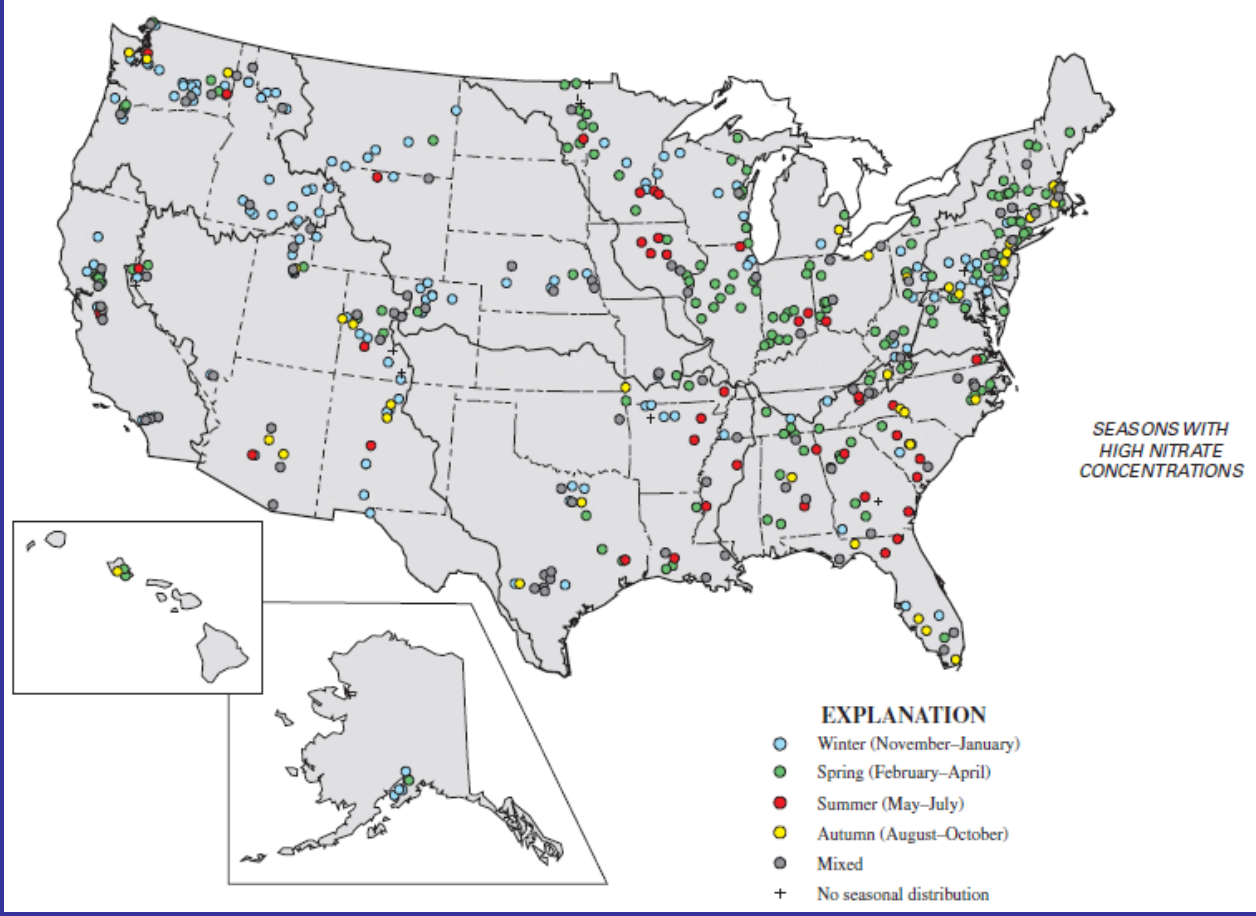
- Locations of the res.
- Hydrologic properties
- Water quality properties
- Current uses



Assess Water Quality's role in Water Availability

Use the strength of the NAWQA Program and tools like SPARROW to:

- Demonstrate the degree of water quality impairment that limits water availability
- Define the main compounds of importance.
- Relate to water use and return
- Trends

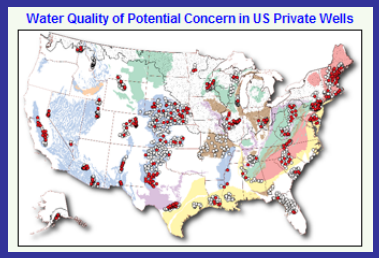


Finally, three studies focused on selected watersheds: the Colorado River, the Delaware River, and the ACF Rivers - where there is significant competition over water resources. Here, the USGS will work collaboratively with stakeholders to comprehensively assess the technical aspects of water availability.

Report to Congress – Section 9508 (d) of P.L. 111-11:

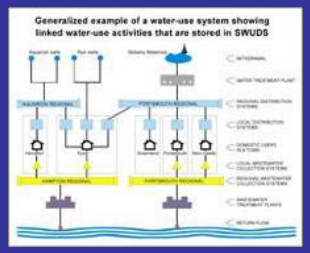
1. The current availability of water resources in the United States,
2. Significant trends affecting water availability, including documented or projected impacts as a result of global climate change,
3. The withdrawal and use of surface water and groundwater by various sectors,
4. Significant trends relating to each water use sector, including significant changes in water use due to the development of new energy supplies,
5. **Significant water use conflicts or shortages that have occurred or are occurring,**
6. **Each factor that has caused, or is causing, a conflict or shortage.**

Focused Water Availability Assessments



Water Quality

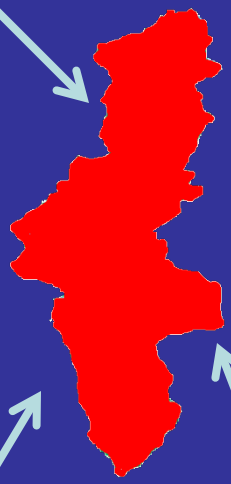
Groundwater Resources



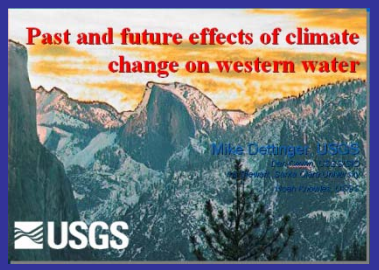
Water Use

Surface Water Trends, Precipitation, etc

Eco Flows



Global Change



State, Local, Regional Stakeholder Involvement

Defined Technical Questions to be Answered

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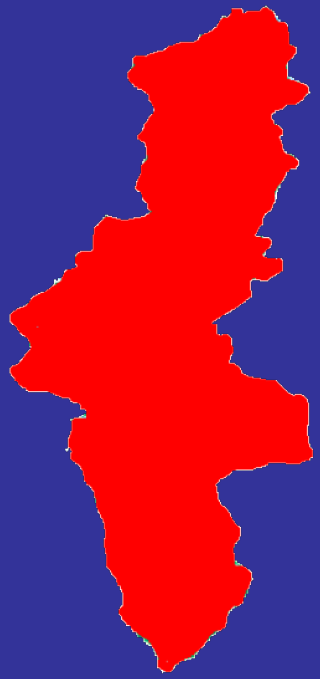
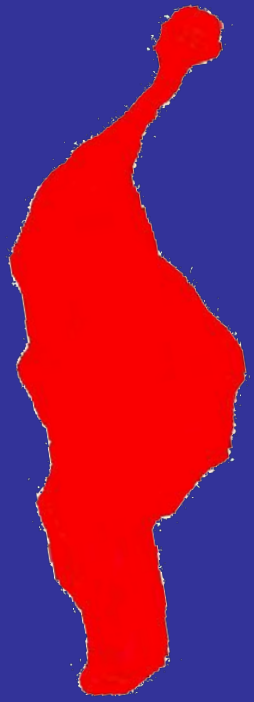
Focused Water Availability Assessments

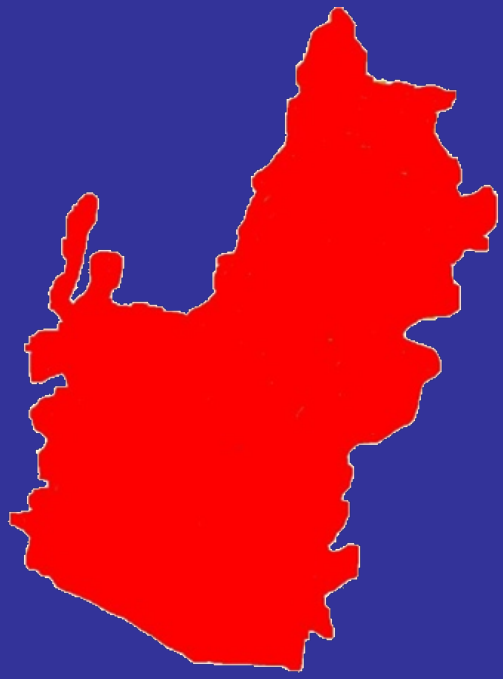
Delaware



Apalachicola-Chattahoochee-Flint



Colorado



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Total	$4.0 M

What are we requesting for full funding?

Nationwide Analysis System	$1.6 M
Water Use	$3.0 M
Ecological Flow	$1.3 M
Groundwater and Brackish Studies	$1.6 M
Focus Area Studies	$1.5 M
Total	$9.0 M

What Programs are involved in WaterSMART?

Hydrologic Networks and Analysis	$6.4 M
Ground Water Resources	$1.1 M
Fisheries, Aquatic and Endangered Resources	$0.5 M
Land Use Change (Geographic Analysis and Monitoring)	$0.5 M
National Cooperative Geologic Mapping	$0.5 M
Total	$9.0 M

The objective is to place the information and tools into stakeholders hands to answer the questions they are facing.

GREAT LAKES BASIN PILOT PROJECT

http://water.usgs.gov/wateravailability/greatlakes

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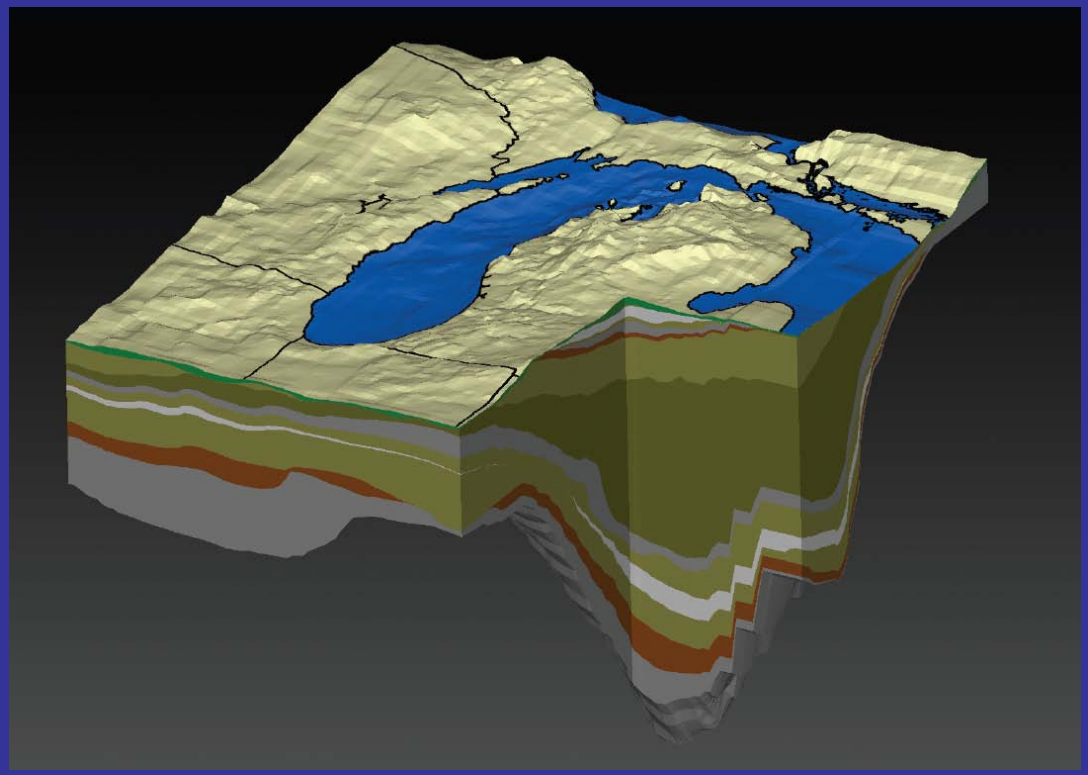
National Emphasis—Regional Focus

- Develop methods applicable to national program
- Respond to Great Lakes issues—Compact



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