Industrial Water Use in the United States

Methods, Status, and Trends

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

Water withdrawals by category

Livestock

Less than 1 percent

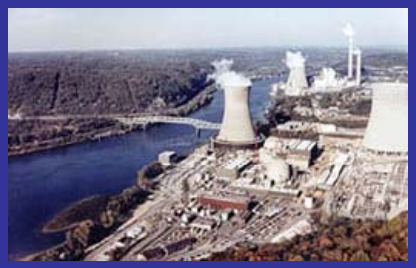
Self-Supplied Domestic

1 percent

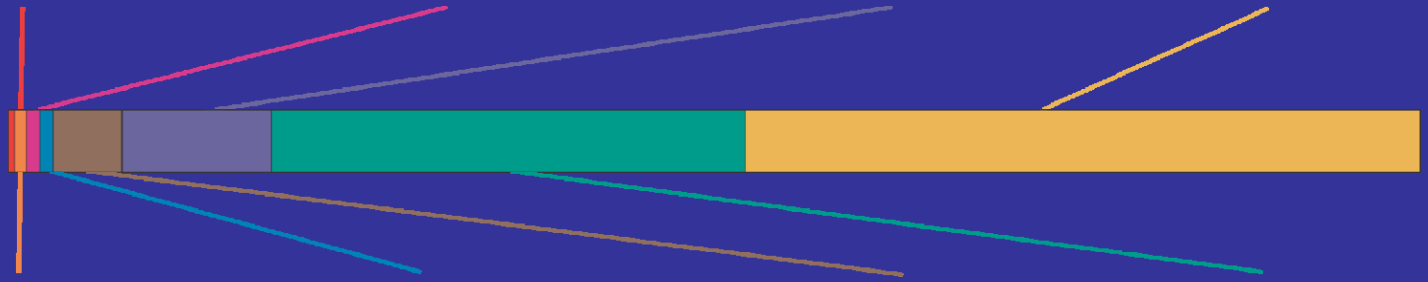
Public Supply

11 percent

Thermoelectric Power



49 percent



1 percent

Mining

2 percent

Aquaculture

4 percent

Self-Supplied Industrial

31 percent

Irrigation

1950

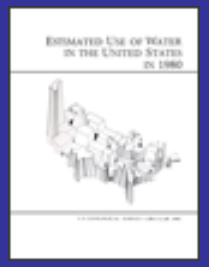
1955

1960

1965

1970

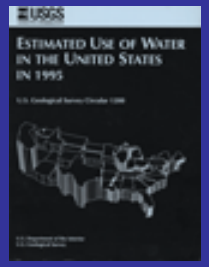
1975



1980

1985

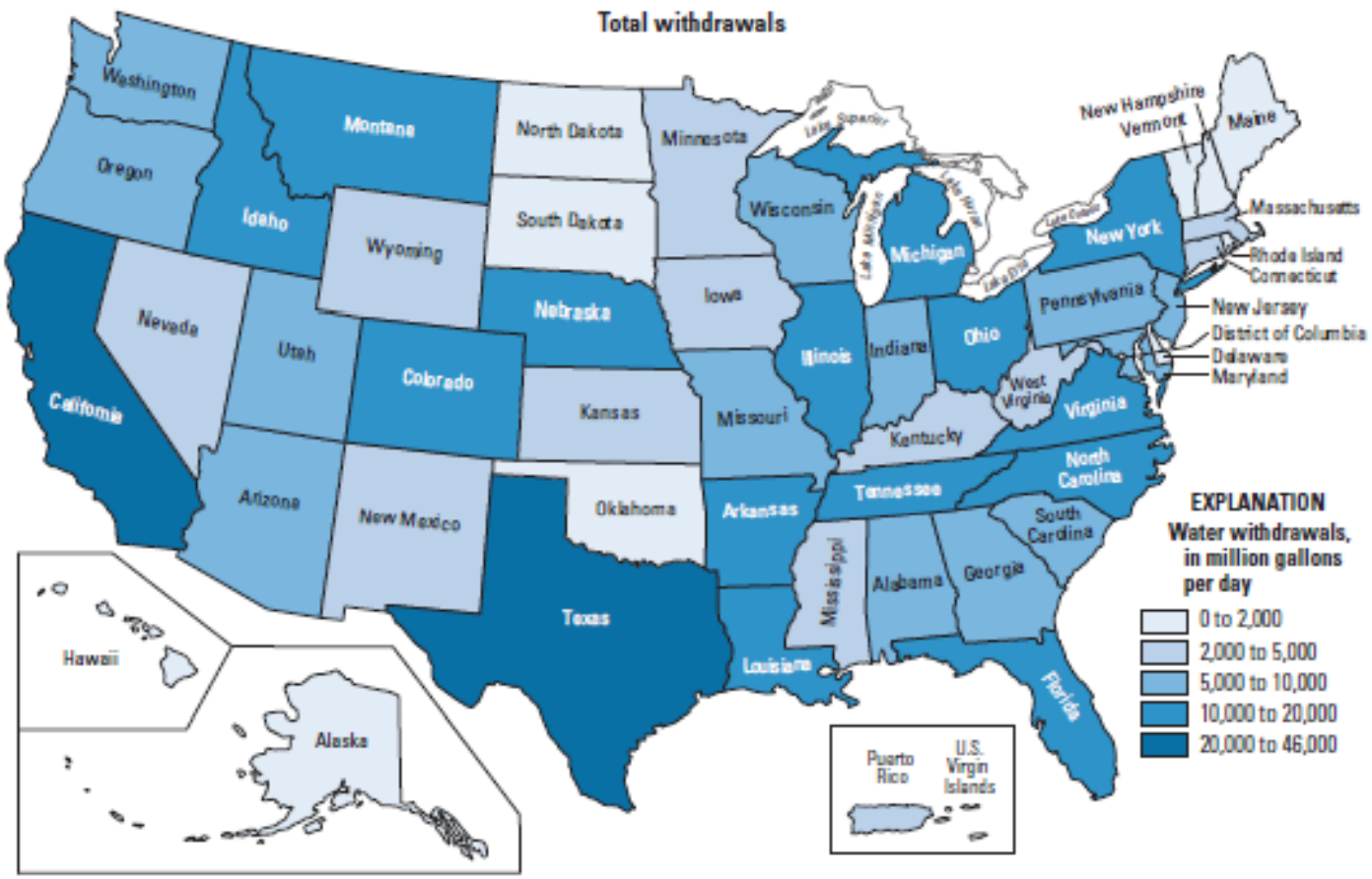
1990

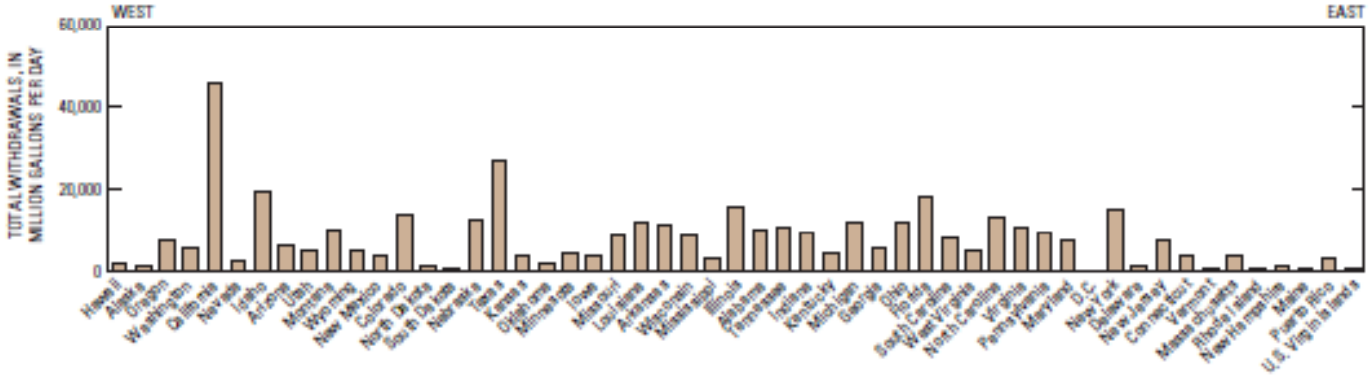


1995

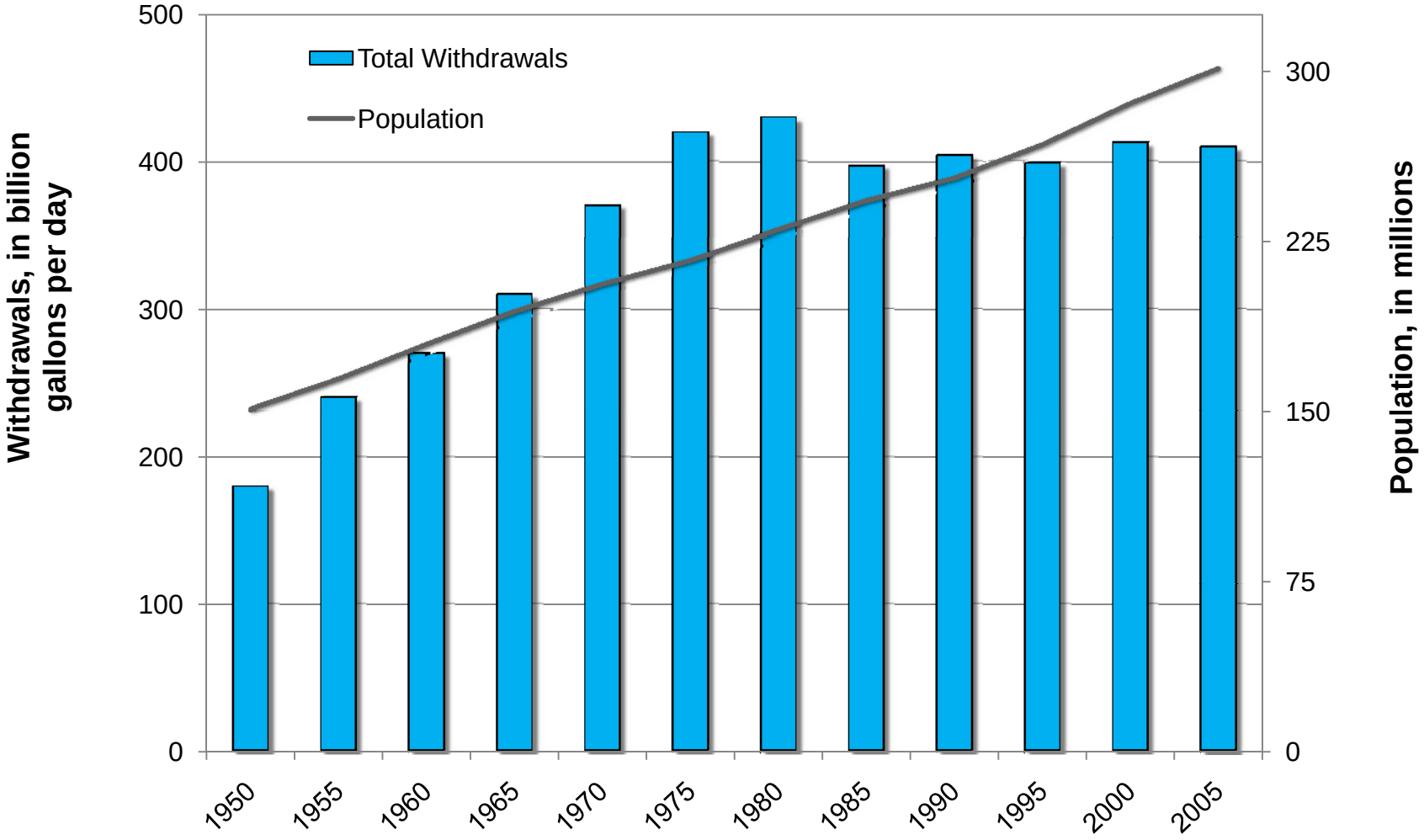
2000

2005


Total withdrawals
Washington
Oregon
California
Nevada
Idaho
Montana
Wyoming
Utah
Arizona
Colorado
New Mexico
North Dakota
South Dakota
Nebraska
Kansas
Oklahoma
Texas
Minnesota
Iowa
Missouri
Arkansas
Louisiana
Wisconsin
Illinois
Michigan
Indiana
Ohio
Kentucky
Tennessee
Mississippi
Alabama
Georgia
Florida
South Carolina
North Carolina
Virginia
West Virginia
Pennsylvania
New York
Maine
New Hampshire
Vermont
Massachusetts
Rhode Island
Connecticut
New Jersey
District of Columbia
Delaware
Maryland
Hawaii
Alaska
Puerto Rico
U.S. Virgin Islands
EXPLANATION
Water withdrawals, in million gallons per day
0 to 2,000
2,000 to 5,000
5,000 to 10,000
10,000 to 20,000
20,000 to 46,000


WEST
EAST
TOTAL WITHDRAWALS, IN MILLION GALLONS PER DAY
60,000
40,000
20,000
0
Hawaii
Alaska
Oregon
Washington
California
Nevada
Idaho
Arizona
Utah
Montana
Wyoming
New Mexico
Colorado
North Dakota
South Dakota
Nebraska
Texas
Kansas
Oklahoma
Minnesota
Iowa
Missouri
Louisiana
Arkansas
Wisconsin
Mississippi
Illinois
Alabama
Tennessee
Indiana
Kentucky
Michigan
Georgia
Ohio
Florida
South Carolina
West Virginia
North Carolina
Virginia
Pennsylvania
Maryland
D.C.
New York
Delaware
New Jersey
Connecticut
Vermont
Massachusetts
Rhode Island
New Hampshire
Maine
Puerto Rico
U.S. Virgin Islands

Trends in population and total withdrawals, 1950-2005



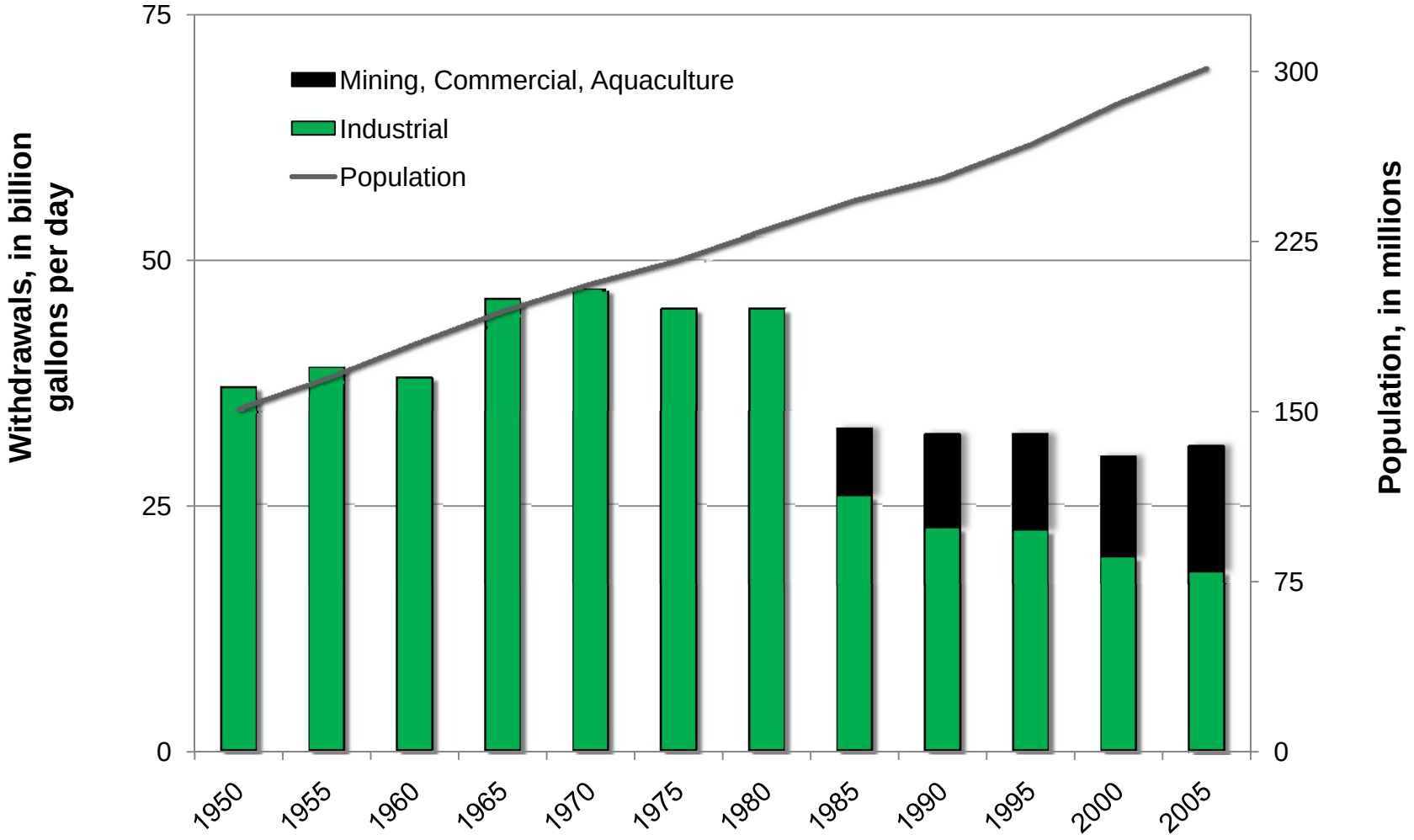
Industrial water use includes water used for:

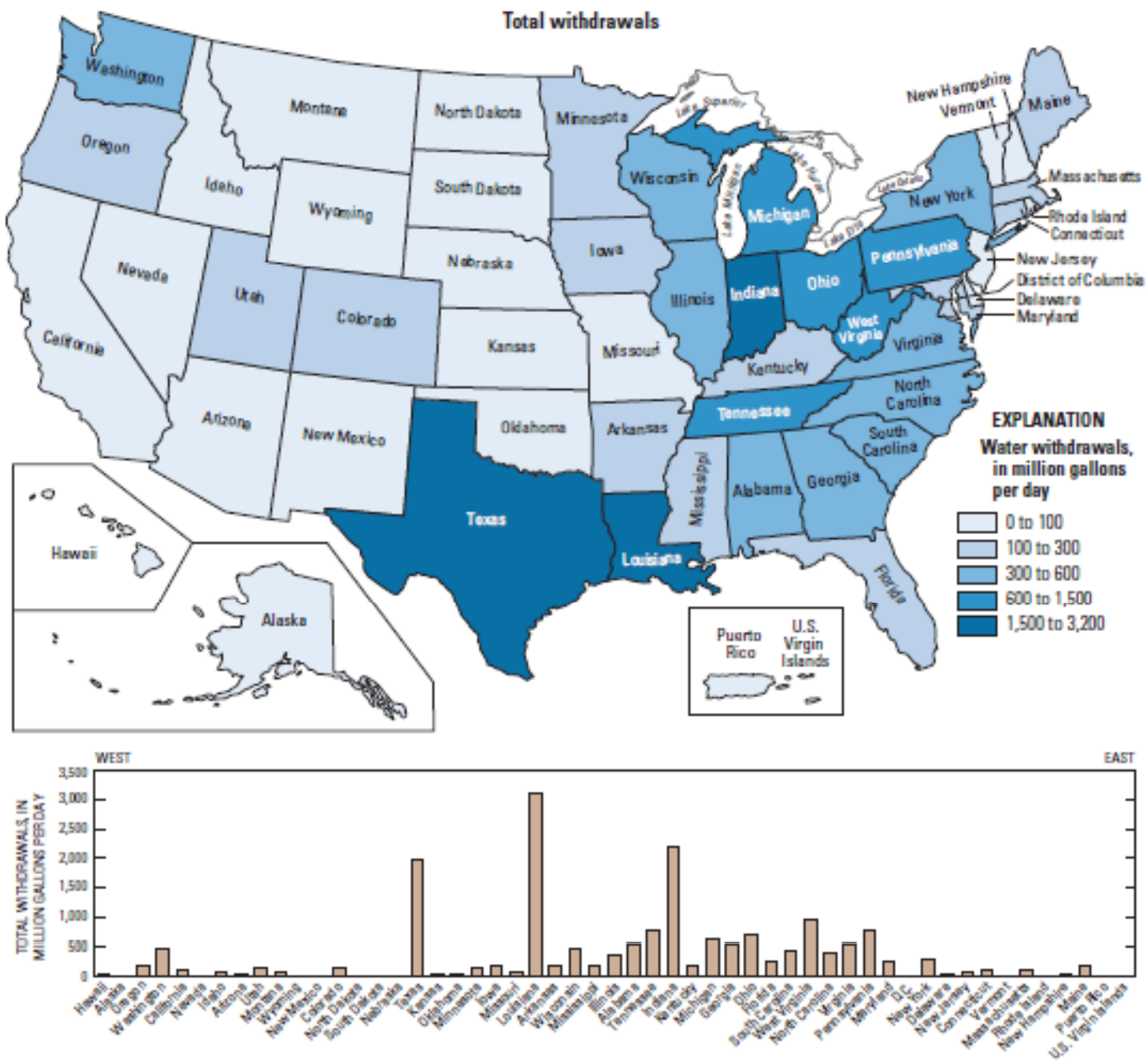
- fabricating
- washing
- diluting
- processing
- transporting
- cooling
- incorporating water into a product
- sanitary needs within facility

Program focuses on <u>self-supplied</u> industrial water use. The following figures do not include water purchased from a public water purveyor for industrial source water

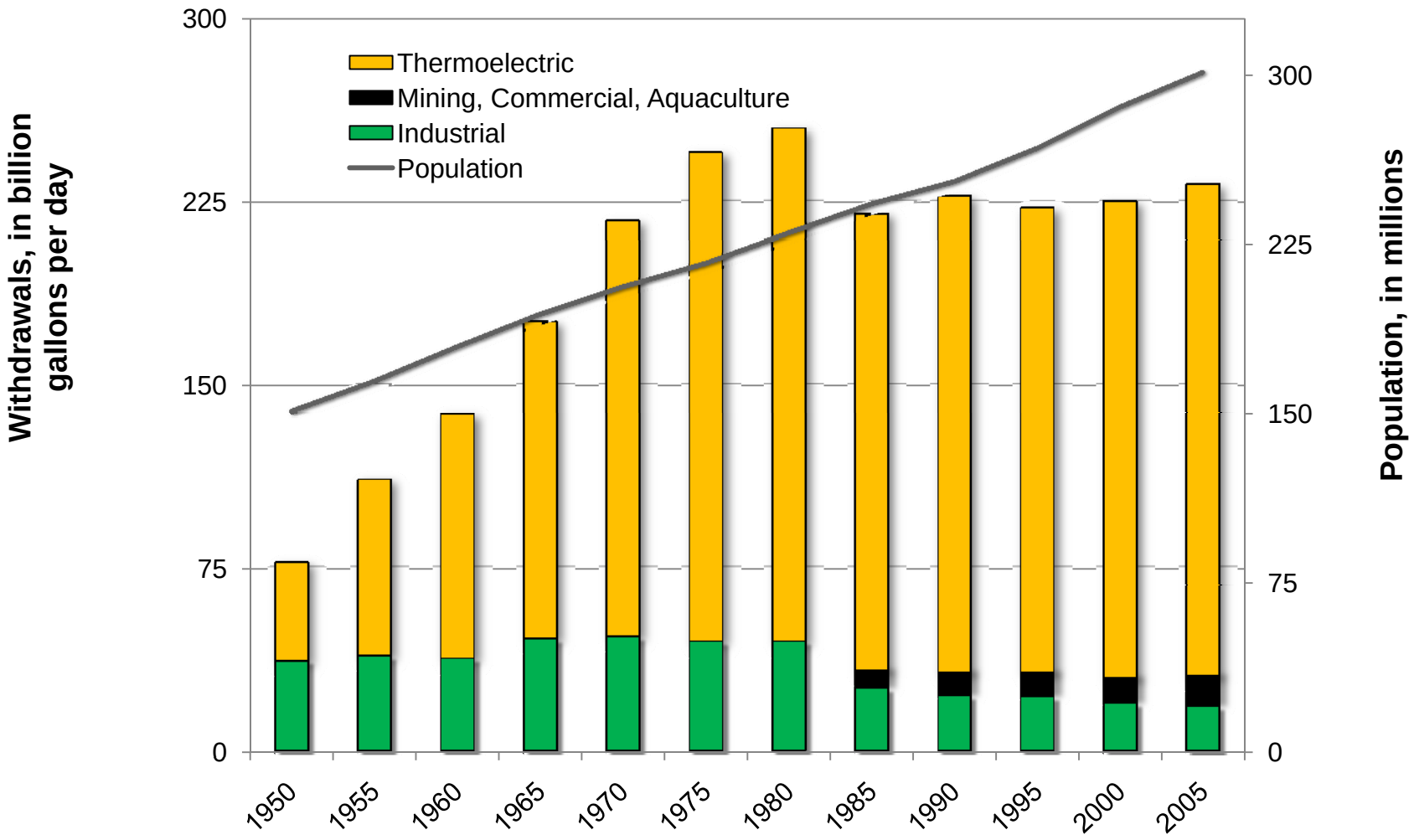
In 1995, 12% of all public supplies deliveries were for industrial uses.

Trends in population and industrial withdrawals, 1950-2005




Total withdrawals
Washington
Oregon
California
Nevada
Idaho
Montana
Wyoming
Utah
Arizona
Colorado
New Mexico
North Dakota
South Dakota
Nebraska
Kansas
Oklahoma
Texas
Minnesota
Iowa
Missouri
Arkansas
Louisiana
Wisconsin
Illinois
Michigan
Indiana
Ohio
Kentucky
Tennessee
Mississippi
Alabama
Georgia
Florida
South Carolina
North Carolina
Virginia
West Virginia
Pennsylvania
New York
Maine
New Hampshire
Vermont
Massachusetts
Rhode Island
Connecticut
New Jersey
District of Columbia
Delaware
Maryland
Hawaii
Alaska
Puerto Rico
U.S. Virgin Islands
EXPLANATION
Water withdrawals, in million gallons per day
0 to 100
100 to 300
300 to 600
600 to 1,500
1,500 to 3,200
WEST
EAST
TOTAL WITHDRAWALS, IN MILLION GALLONS PER DAY
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Hawaii
Alaska
Oregon
Washington
California
Nevada
Idaho
Arizona
Utah
Montana
Wyoming
New Mexico
Colorado
North Dakota
South Dakota
Nebraska
Texas
Kansas
Oklahoma
Minnesota
Iowa
Missouri
Louisiana
Arkansas
Wisconsin
Mississippi
Illinois
Alabama
Tennessee
Indiana
Kentucky
Michigan
Georgia
Ohio
Florida
South Carolina
West Virginia
North Carolina
Virginia
Pennsylvania
Maryland
D.C.
New York
Delaware
New Jersey
Connecticut
Vermont
Massachusetts
Rhode Island
New Hampshire
Maine
Puerto Rico
U.S. Virgin Islands

Trends in population and thermoelectric-power and industrial withdrawals, 1950-2005



Trends in Industrial Water Use

- Prior to 1985, data was aggregated with mining, commercial, and aquaculture withdrawals
- From 1985 to 2005, industrial withdrawals have decreased by 30 percent.
- 90% of industrial withdrawals occur in 23 states
- Changes in economics and legislation have occurred as industrial withdrawals have declined
  - Passage of Clean Water Act in 1972
  - Manufacturing employment declined 19% from 1990 – 2005
  - Major declines occurred in water-intense industries, such as primary metal, paper, and chemical manufacturing as well as petroleum and coal products.

Greatest Challenges in Water Use

- Metering of water withdrawals
- Uniformity between State regulatory and reporting programs
- Frequency of reporting
- Ability to accurately determine consumptive uses

Future Advances in Industrial Water Use

- Identifying withdrawals by NAICS Code
- Advance our understanding of consumptive use information
- Industrial component of public supply
- Concentrate efforts on States that have the largest cumulative withdrawals
- Prepare for new thrusts in industrial water use (example: biofuels refining)
- Look at degree of alternative sources for industrial water use (e.g. wastewater reuse, saline supplies, etc.)

A National Water Census

* Part of the WaterSMART 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?

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**.*

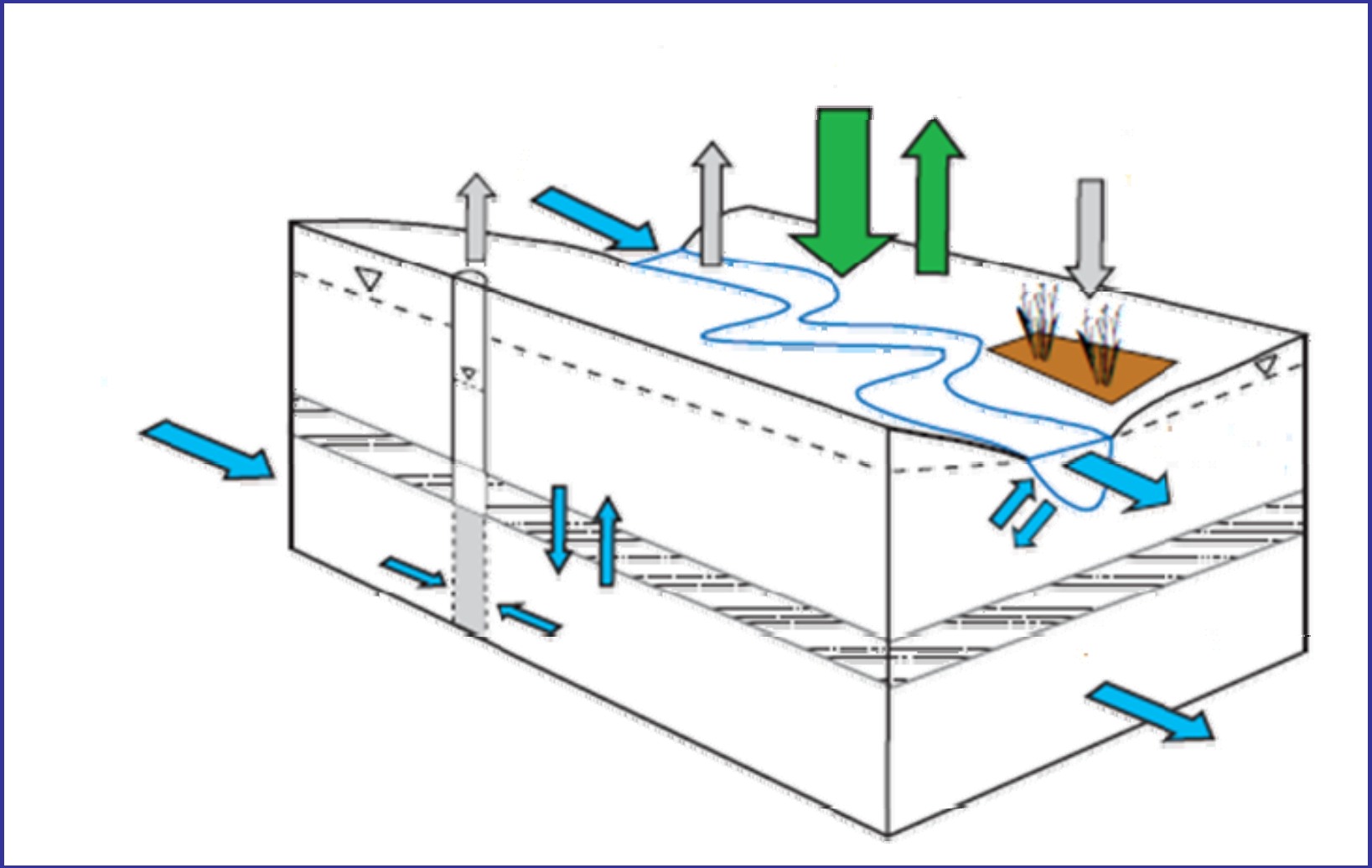
Section 9509: Research Agreement Authority

Section 9510: Effect

Report to Congress - Every 5 years thereafter:

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.

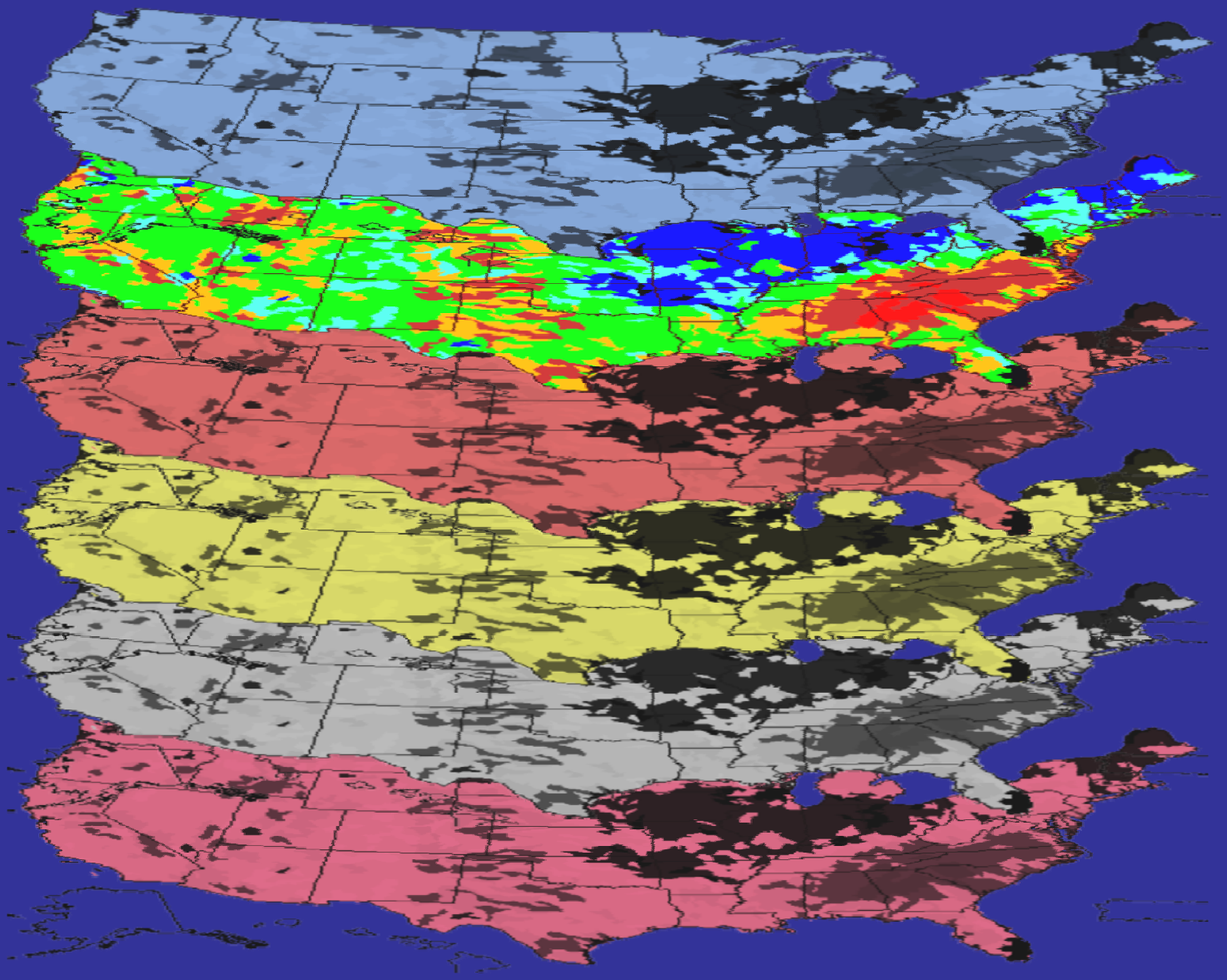
Account for water with a “budget”



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

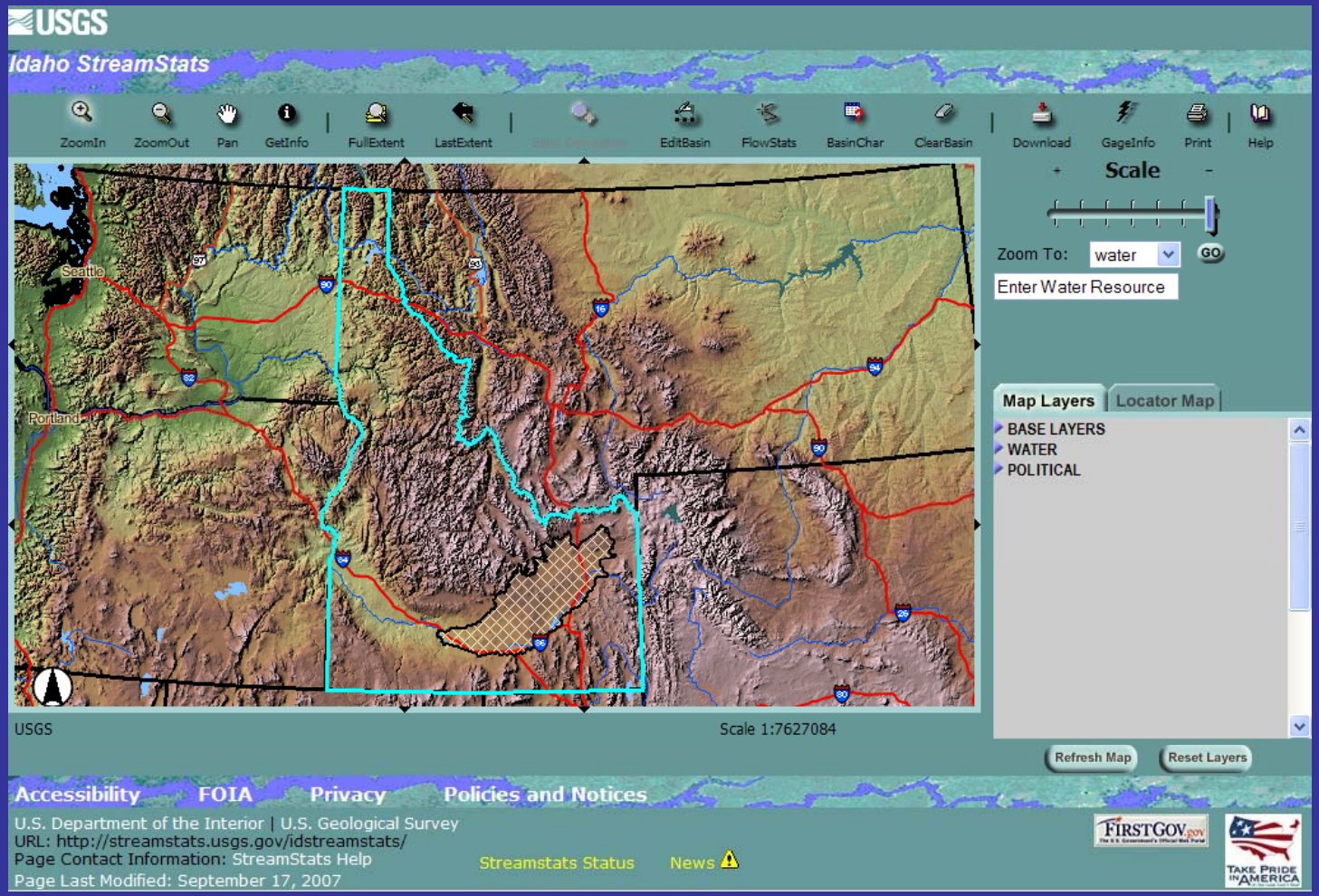
ET

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

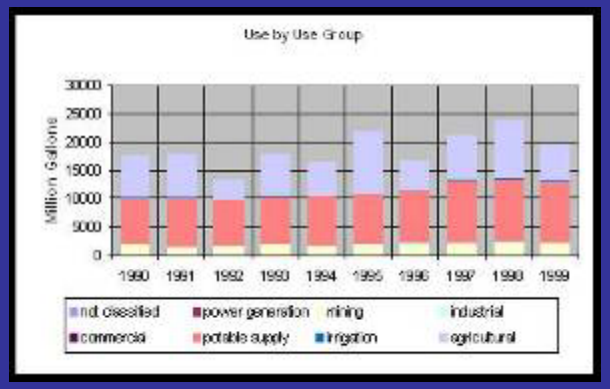
Work with the online tool to construct your water budget

Access trend information

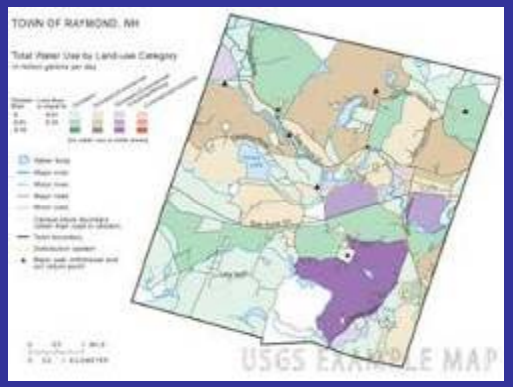
Enhancing the Nation's Water Use Information

Use New Methods to Estimate Water Use

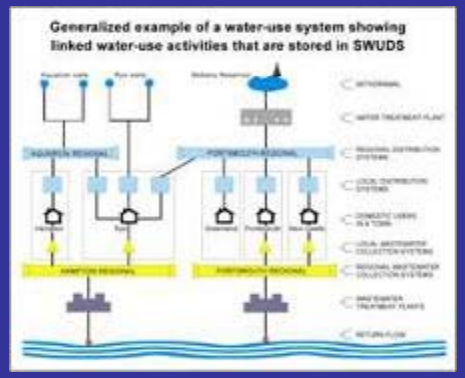
- Stratified Random Sampling
- Regression Models



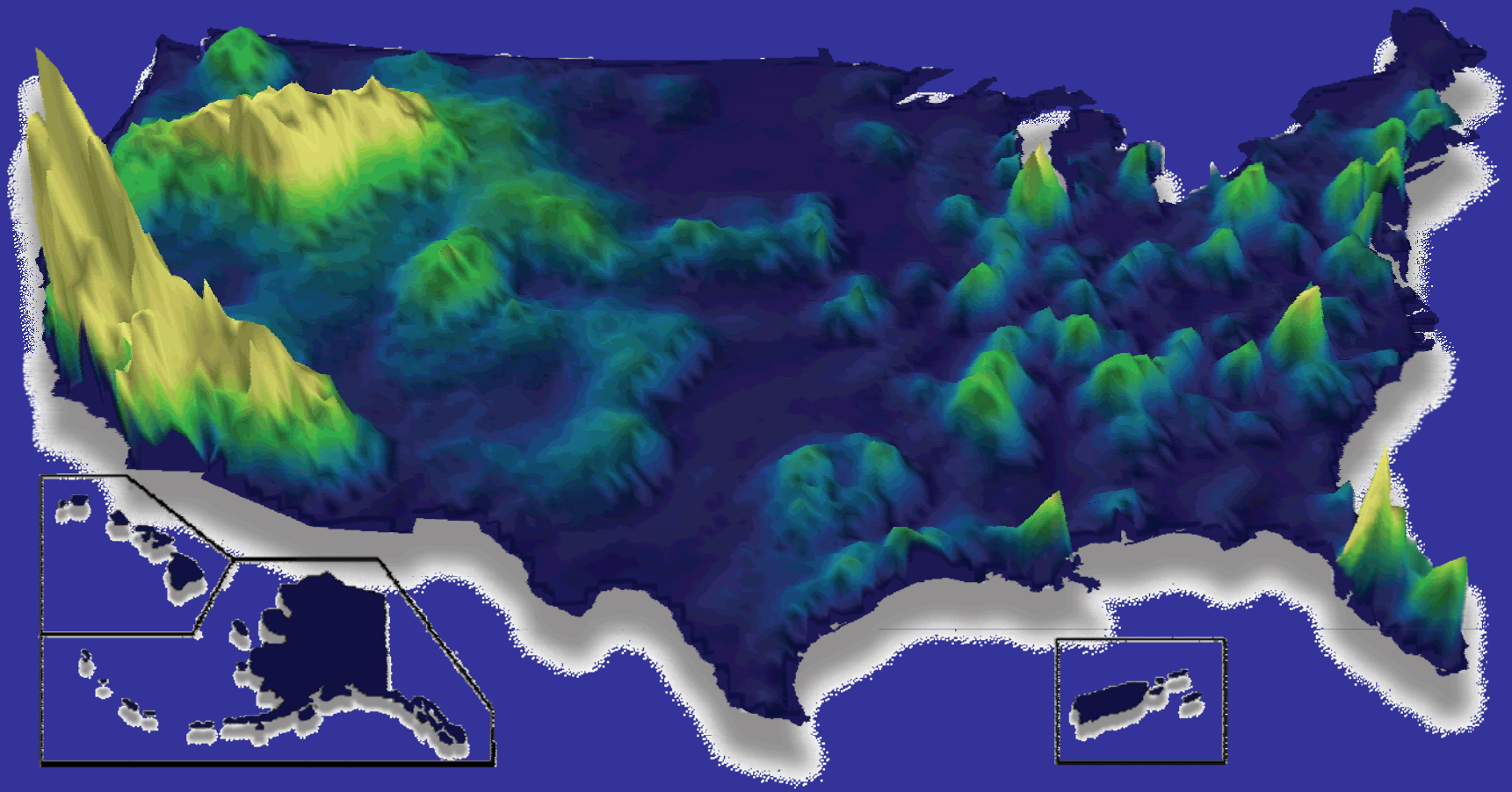
Develop models of water use based on land use



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



New Authority: Water Use Grants to States

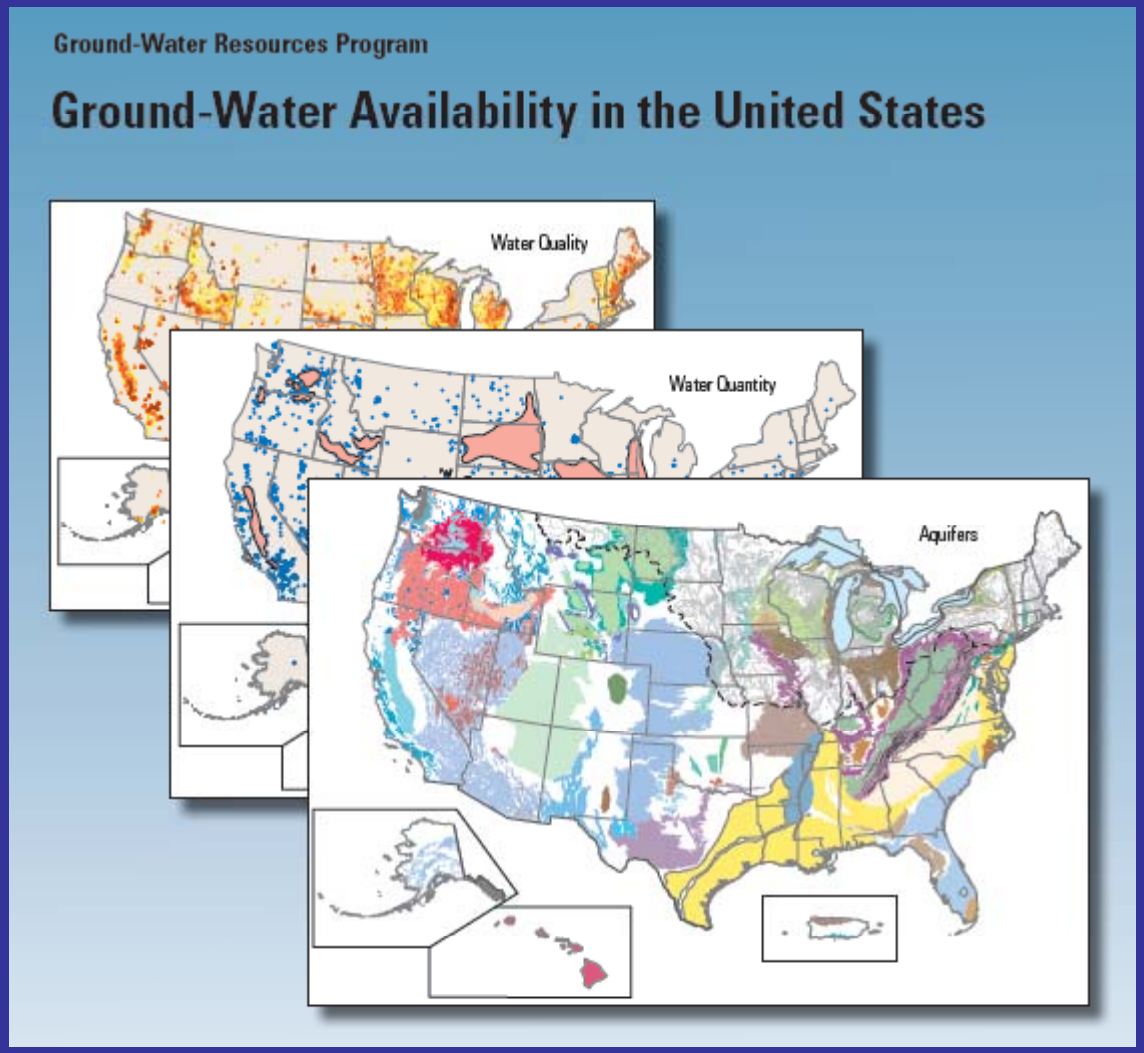


Understanding Flow Needs for Wildlife and Habitat

Assess Groundwater's role in Water Availability

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

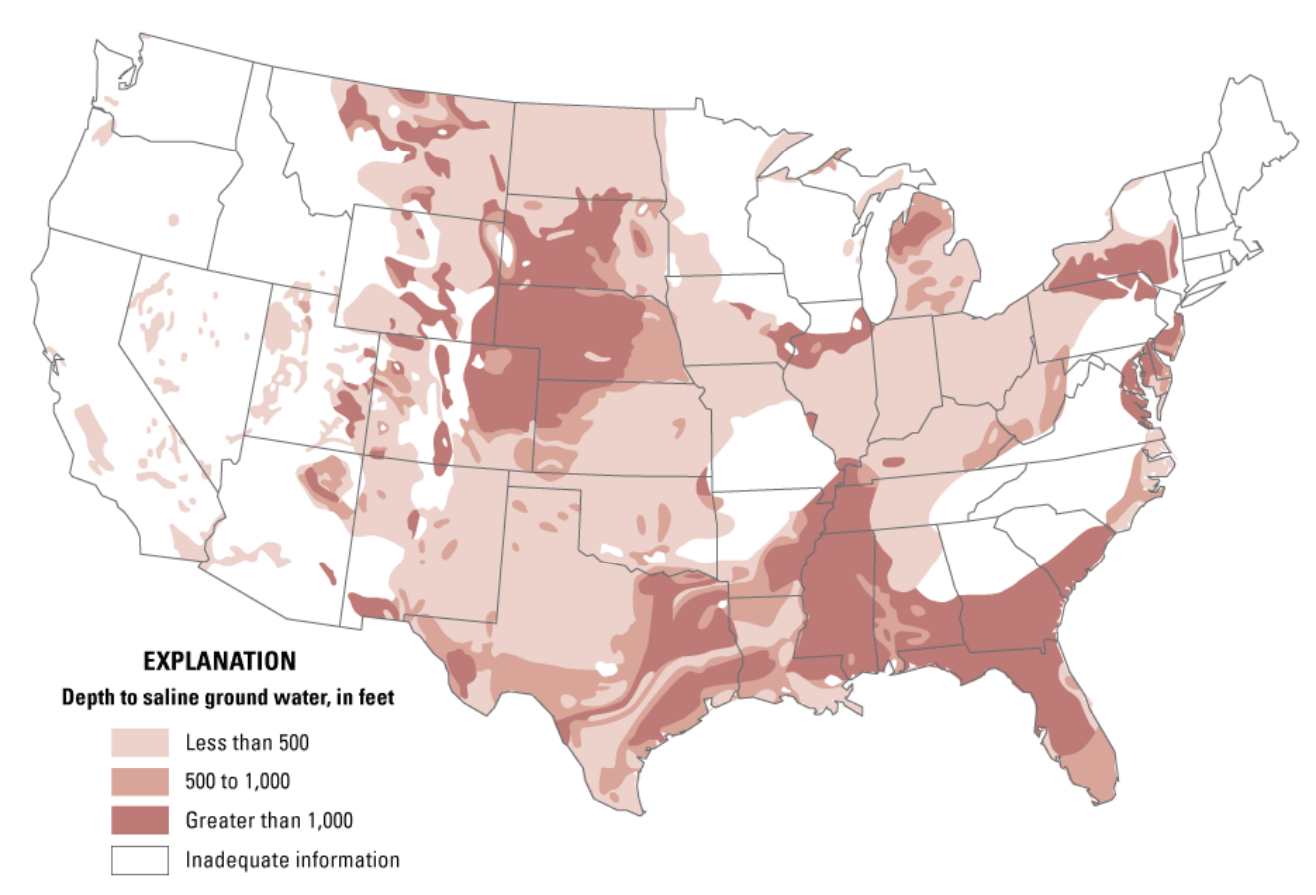
- Recharge
- GW yields
- Changes in storage.
- Saltwater Intrusion
- Trends in GW Indices
- Artificial Recharge
- GW/SW Interactions



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



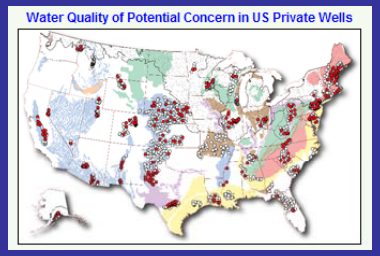
Geographically focused studies in selected watersheds:

- Colorado River
- Delaware River
- ACF Rivers

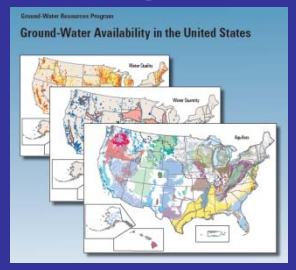
Significant competition over water resources.

Work collaboratively with stakeholders to comprehensively assess the technical aspects of water availability.

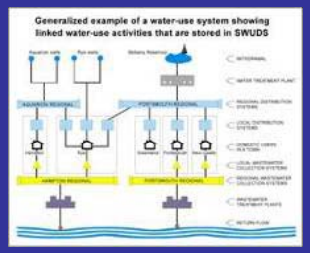
Focused Water Availability Assessments



Water Quality



Groundwater Resources

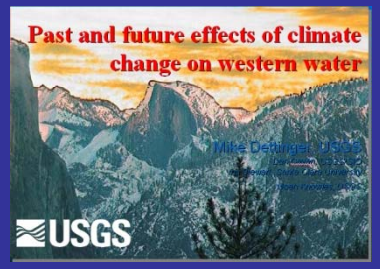


Water Use

SW Trends, Precipitation, etc

Eco Flows

Global Change



State, Local, Regional Stakeholder Involvement

Defined Technical Questions to be Answered

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Trenton, New Jersey 08628

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eevenson@usgs.gov