



Update on A National Water Census

* Part of the



Initiative



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?

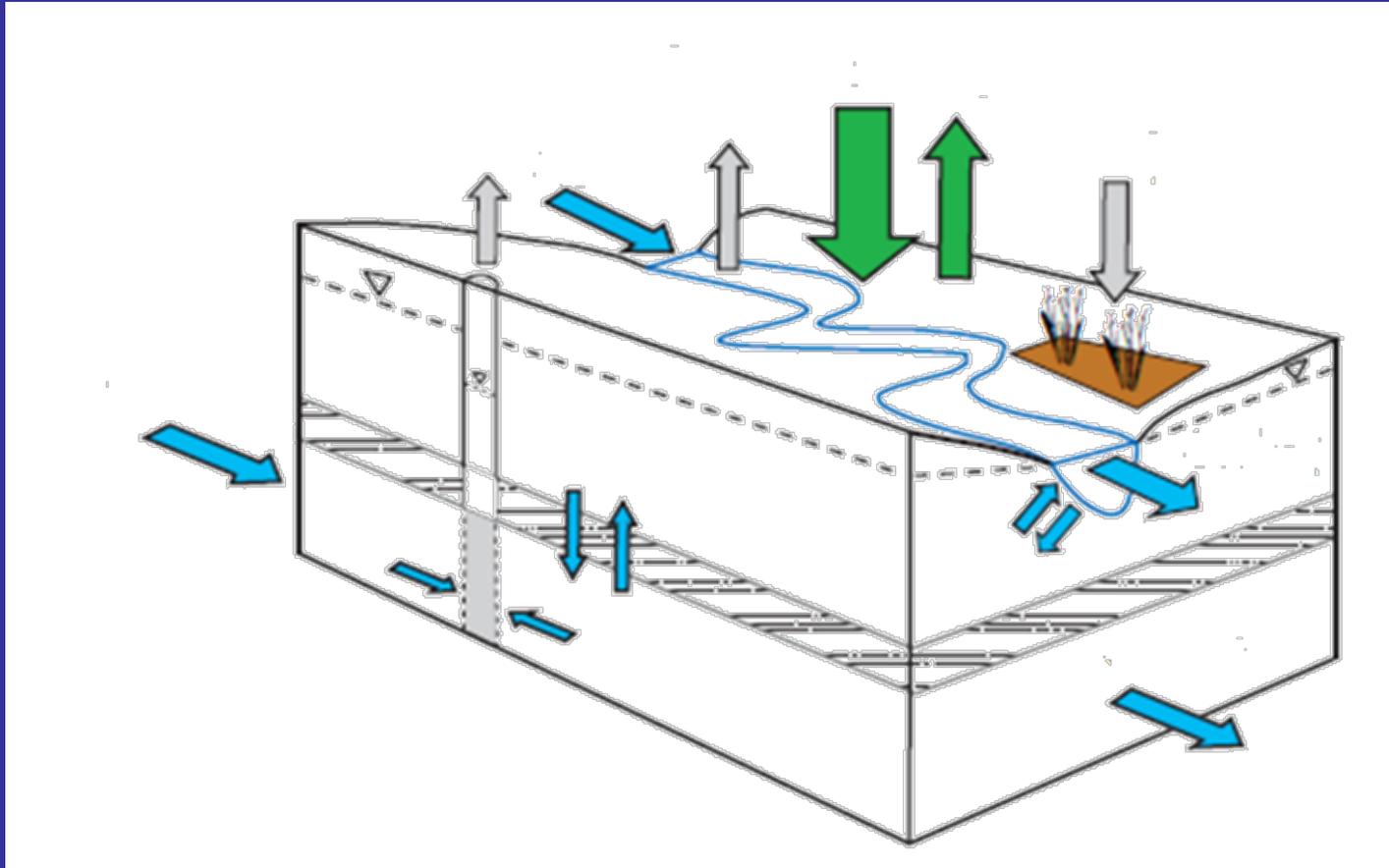
Will this water be present to meet future needs?



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”



Simple: $P + Q_{in} = ET + \Delta S + Q_{out}$

Complex: $P + Q_{swin} + Q_{gwin} = ET_{sw} + ET_{gw} + ET_{uz} + \Delta S_{sw} + \Delta S_{snow} + \Delta S_{uz} + \Delta S_{gw} + Q_{gwout} + RO + Q_{bf}$



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

Information Delivery

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

USGS
Idaho StreamStats

ZoomIn ZoomOut Pan GetInfo FullExtent LastExtent EditBasin FlowStats BasinChar ClearBasin Download GageInfo Print Help

Scale

Zoom To: water GO

Enter Water Resource

Map Layers Locator Map

- BASE LAYERS
- WATER
- POLITICAL

USGS Scale 1:7627084

Refresh Map Reset Layers

Accessibility FOIA Privacy Policies and Notices

U.S. Department of the Interior | U.S. Geological Survey
URL: <http://streamstats.usgs.gov/idstreamstats/>
Page Contact Information: StreamStats Help

Streamstats Status News

FIRST GOV
The U.S. Government's Official Web Portal

TAKE PRIDE IN AMERICA

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

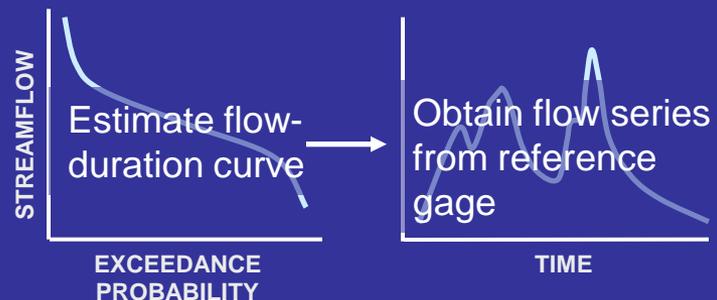
$$Qu_t = \frac{Au}{Ag} Qg_t$$

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

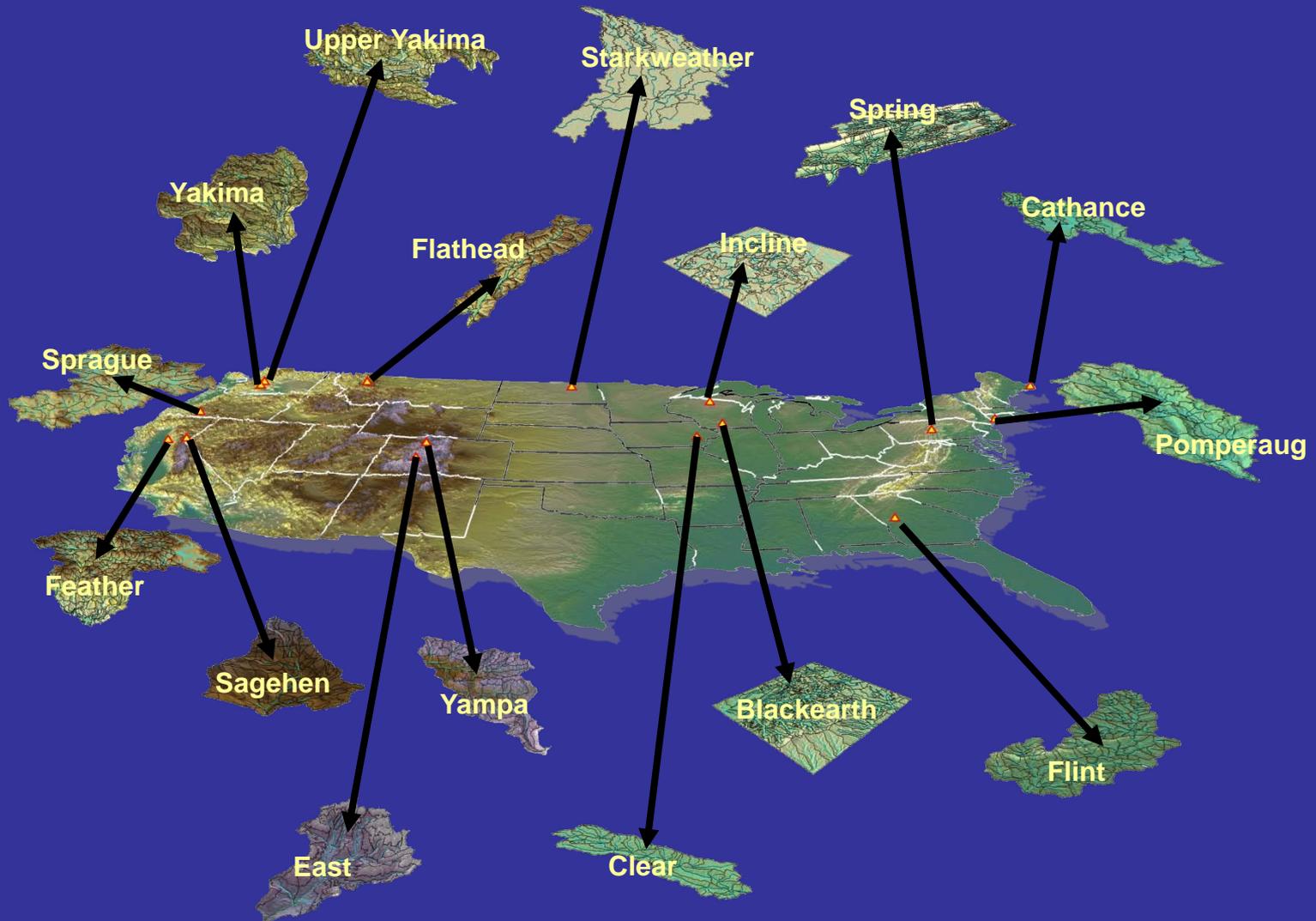
$$Qu_t = \hat{\mu}_u + \hat{\sigma}_u \left(\frac{Qg_t - \hat{\mu}_g}{\hat{\sigma}_g} \right)$$

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)

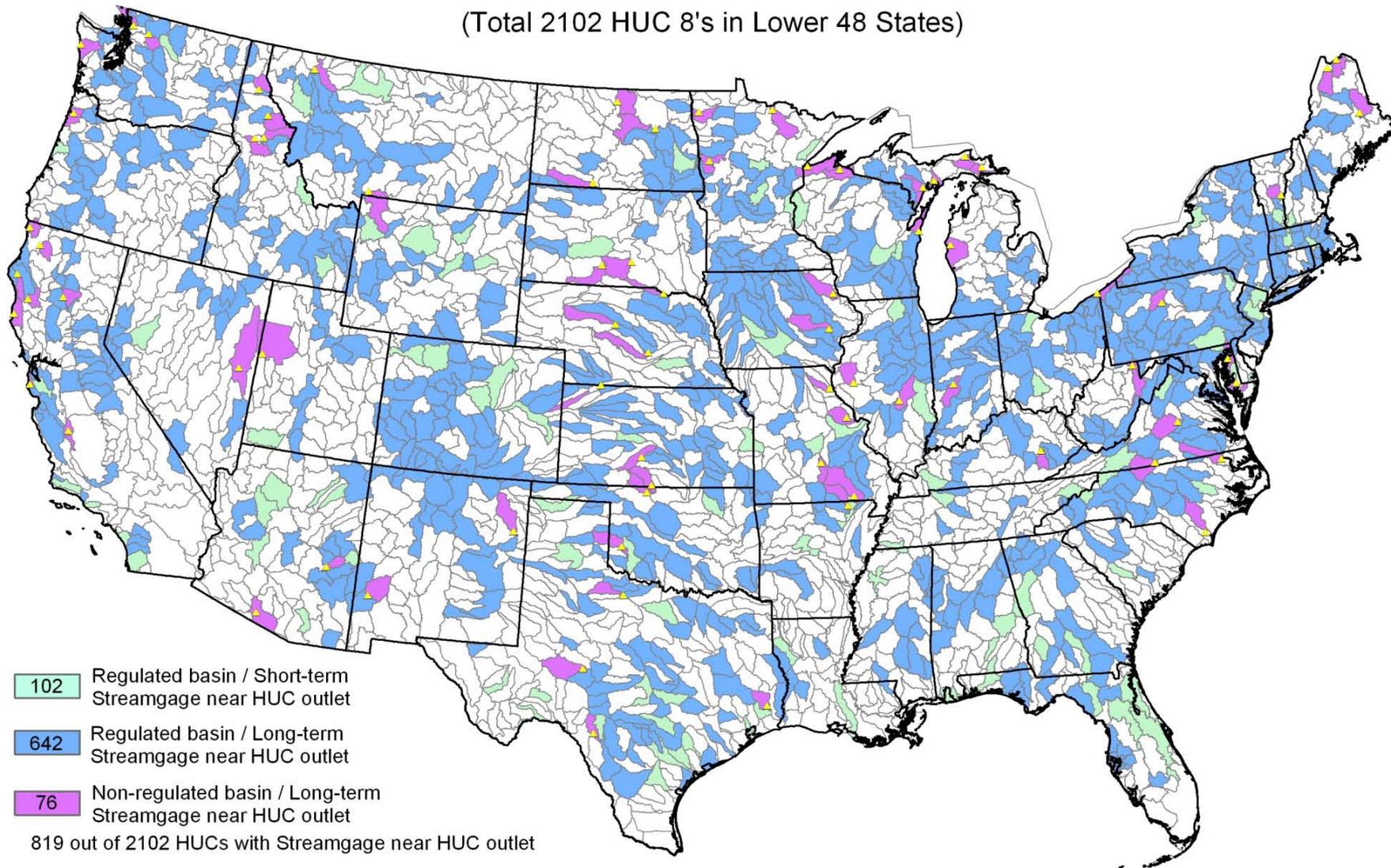


Fig. 5

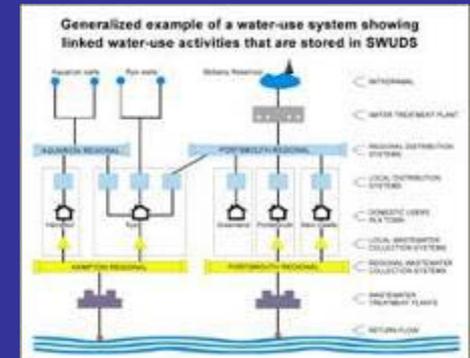
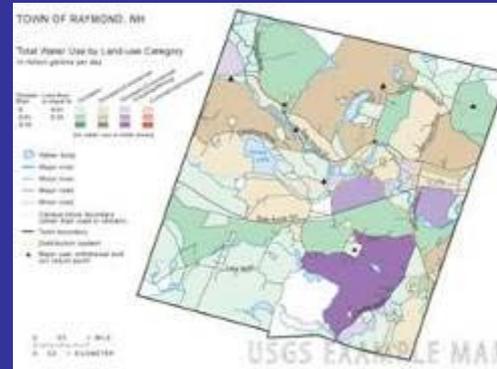
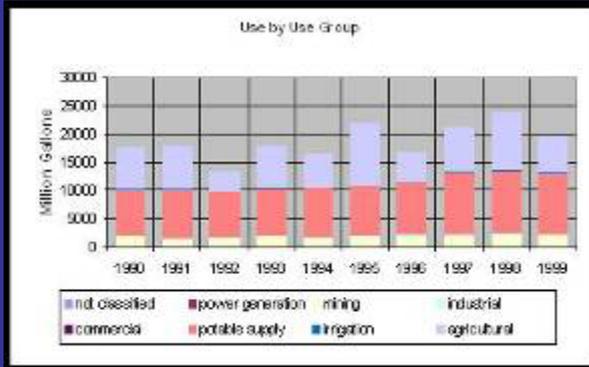
Enhancing the Nation's Water Use Information

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.





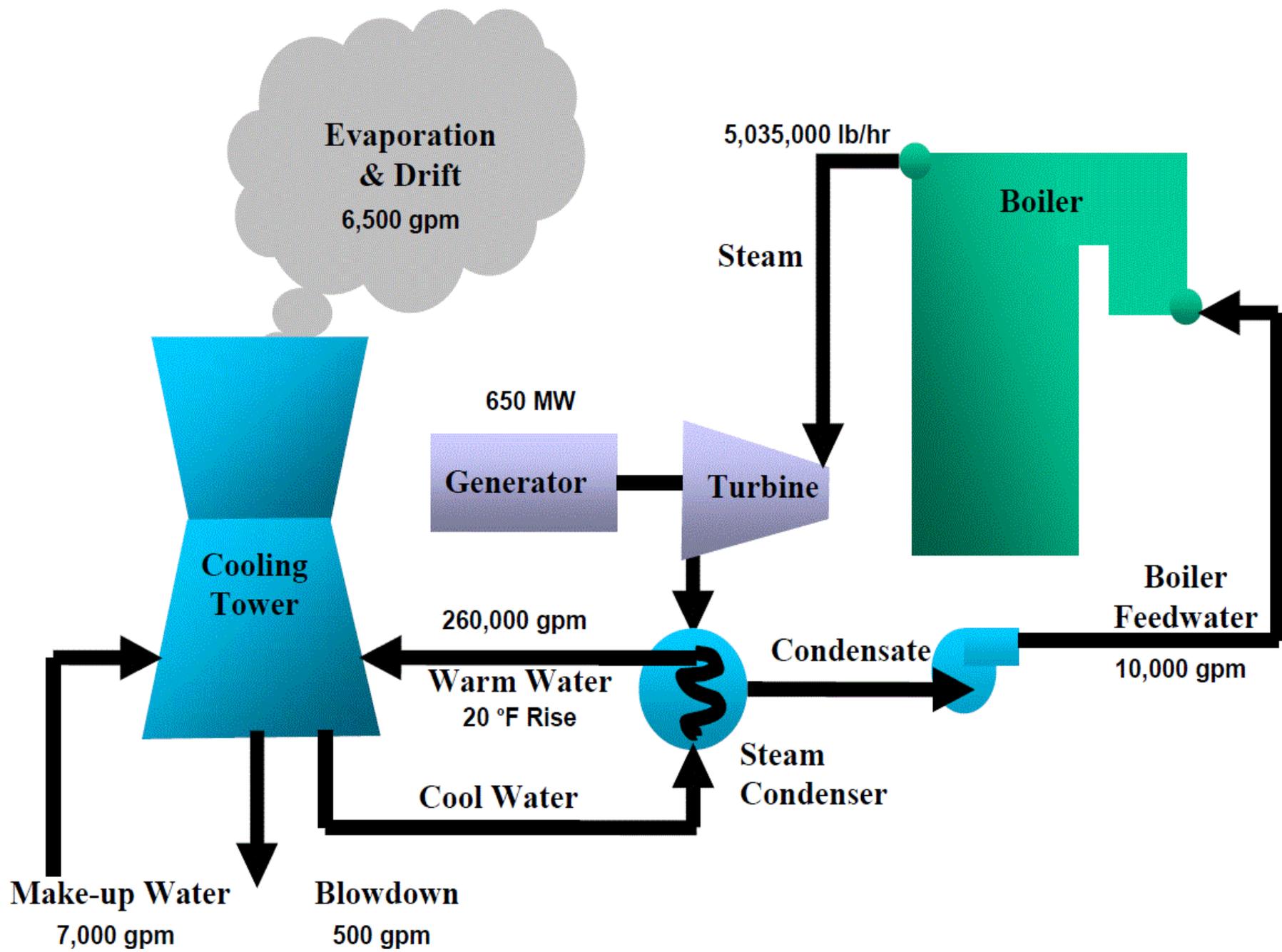
Thermoelectric Withdrawals





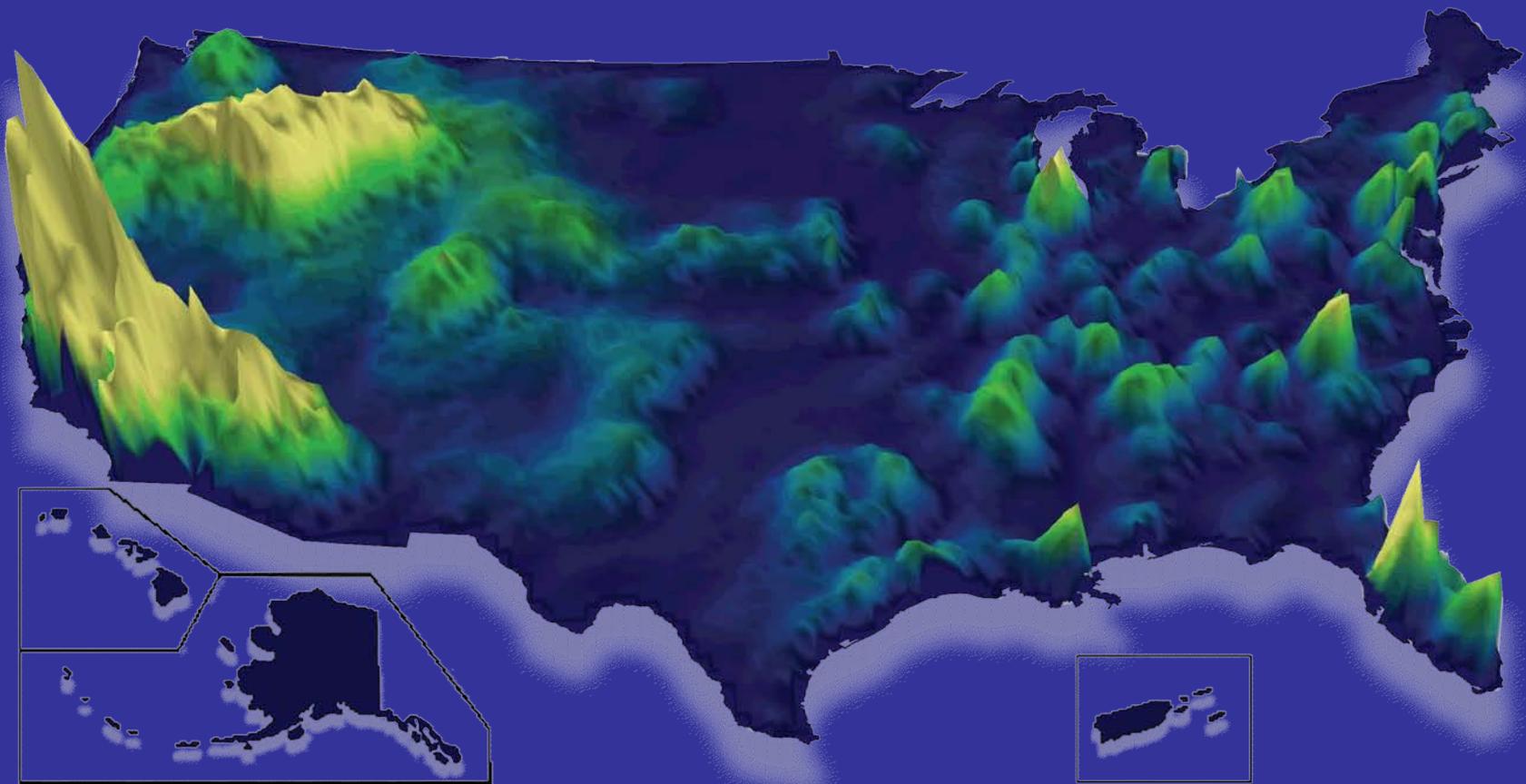
The new frontier -
CONSUMPTION

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





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



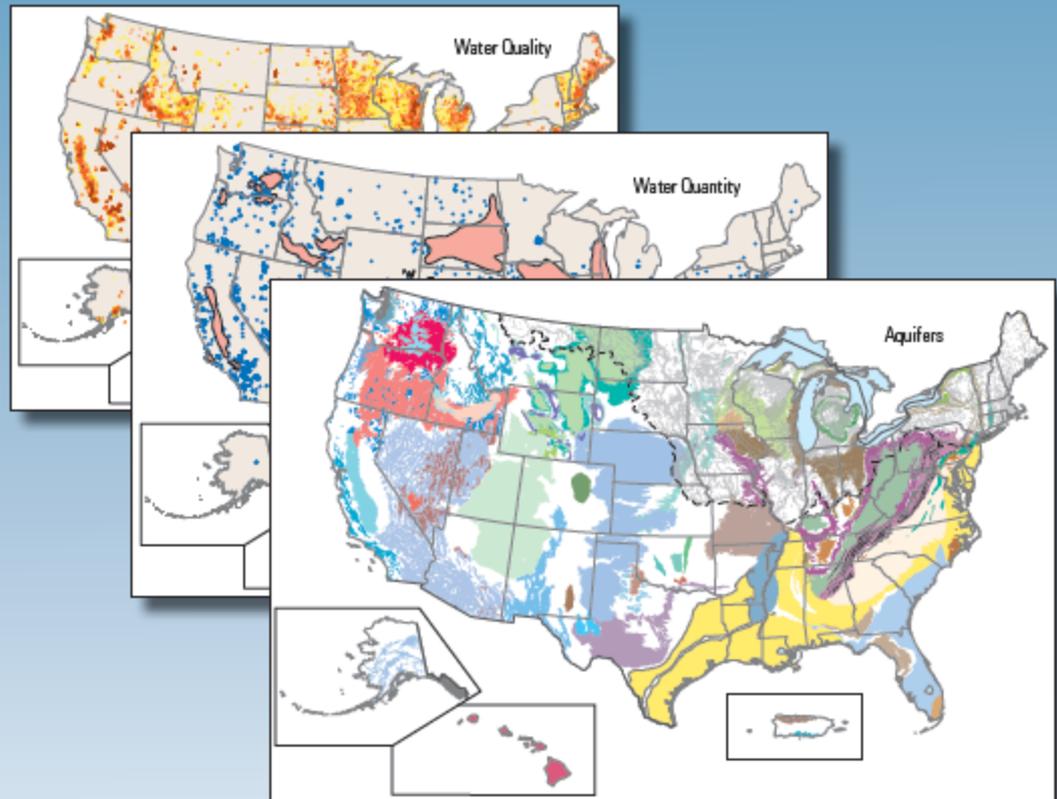
Assess Groundwater's role in Water Availability

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

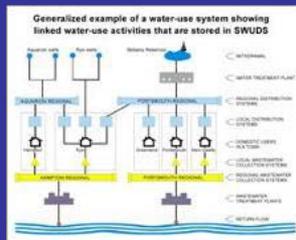
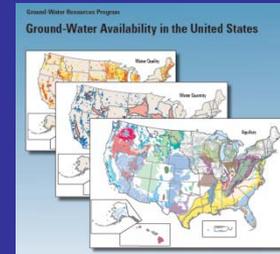
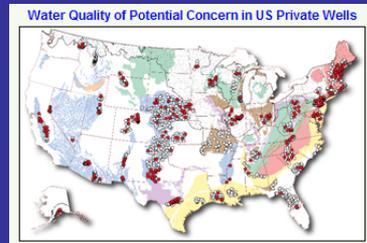
Ground-Water Resources Program

Ground-Water Availability in the United States



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.

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



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

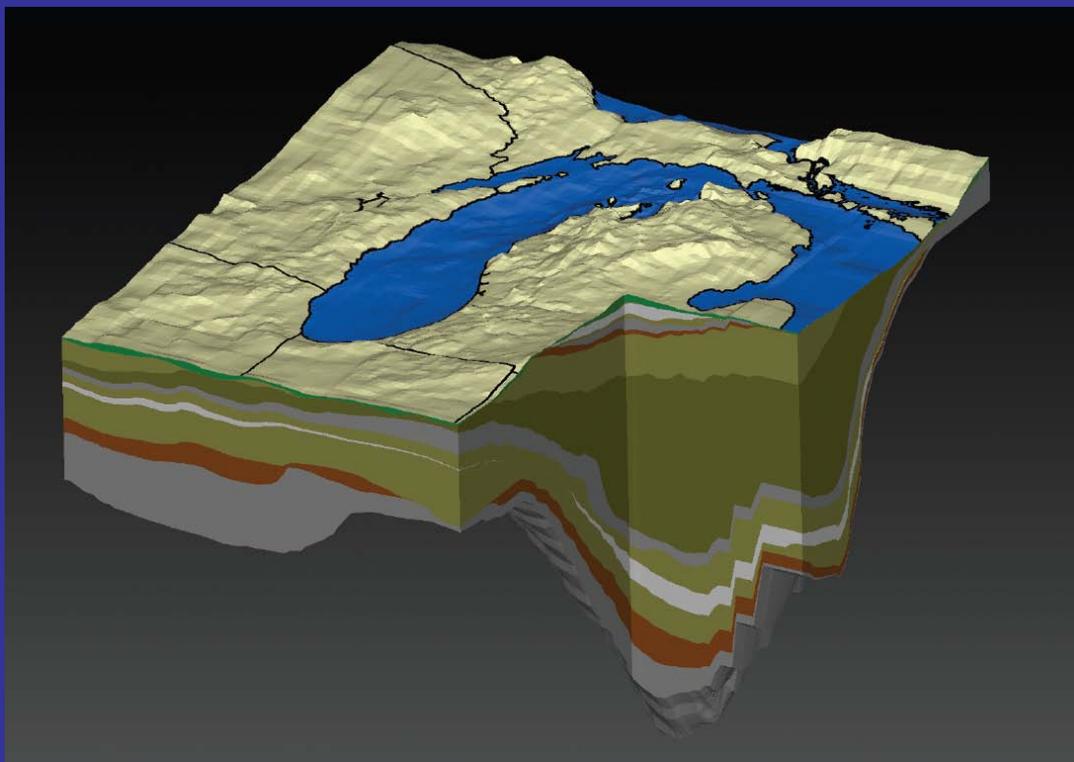
GREAT LAKES BASIN PILOT PROJECT

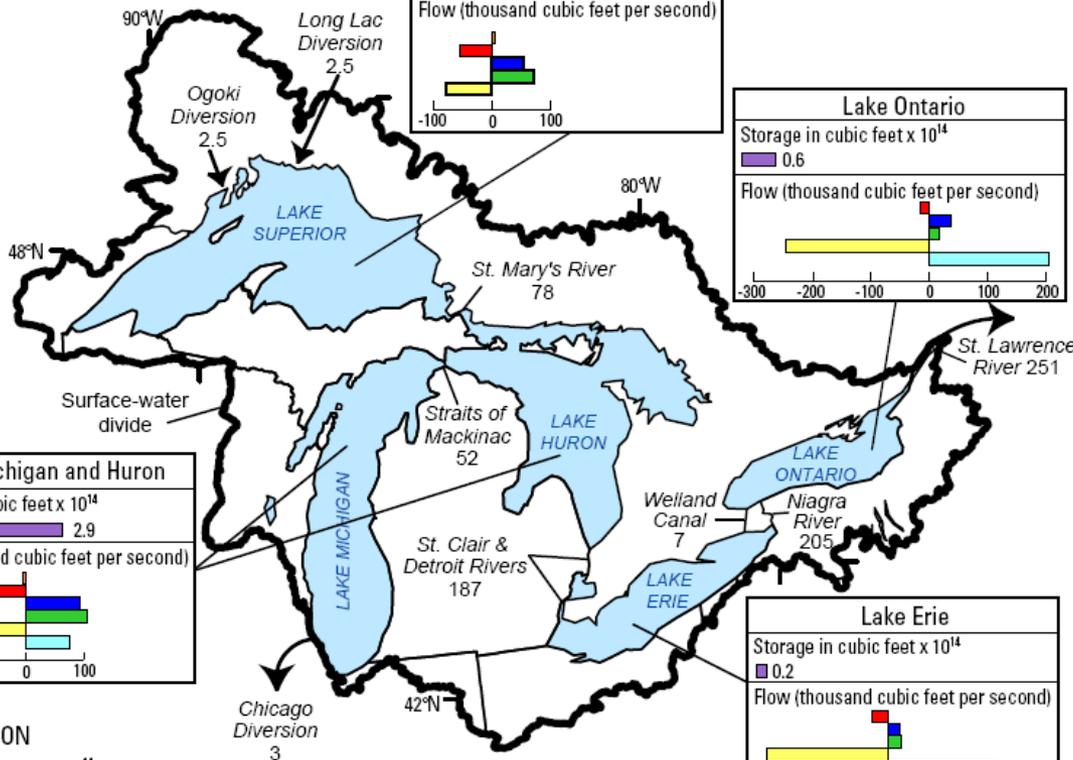
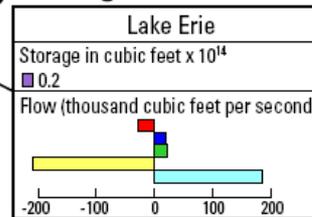
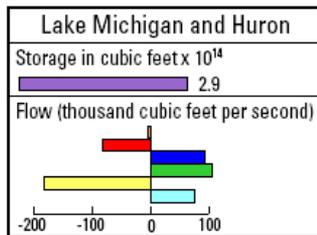
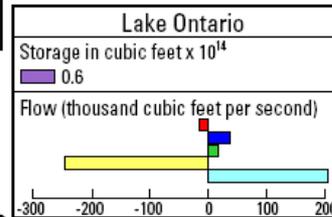
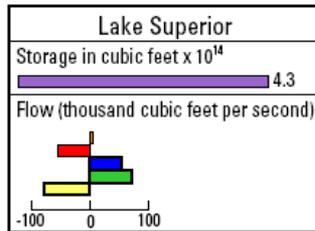
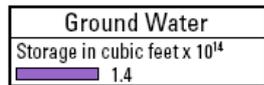


<http://water.usgs.gov/wateravailability/greatlakes>

National Emphasis—Regional Focus

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





EXPLANATION

Storage in cubic feet x 10¹⁴

Flow into a lake (positive) or out of a lake (negative) in cubic feet per second

- Diversion
- Evaporation
- Runoff
- Direct Precipitation
- Connecting Channel Out
- Connecting Channel In

NOTE: Numbers beside Rivers and Diversions represent flow in thousands of cubic feet per second

- Groundwater equals another Great Lake
- Annual flow out of GL is 1 percent of water in storage
- Water use is 65,000 cfs
- Consumptive use is 3000 cfs

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

USGS
National Water Availability and Use Program

Metallurgy in Withdrawal, Return Flow, and Contents of Water in Dike and Inflow, with Collected Data in Wisconsin, 1896-2004



Scientific Investigations Report 2009-1496
U.S. Department of the Interior
U.S. Geological Survey

USGS
National Water Availability and Use Program

Consumptive Water-Use Coefficients for the Great Lakes Basin and Climatologically Similar Areas



Scientific Investigations Report 2007-5197
U.S. Department of the Interior
U.S. Geological Survey

USGS
National Water Availability and Use Program

Consumptive Water Use in the Great Lakes Basin

Abstract

Introduction

Summary

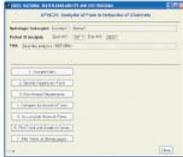
Concluding Remarks



Scientific Investigations Report 2009-5188
U.S. Department of the Interior
U.S. Geological Survey

USGS
National Water Availability and Use Program—Great Lakes Basin File

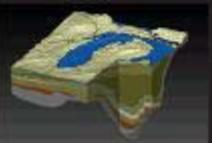
Application Guide for AFINCH (Analysis of Flows in Networks of Channels) Described by NHDPlus



Scientific Investigations Report 2009-5188
U.S. Department of the Interior
U.S. Geological Survey

USGS
National Water Availability and Use Program

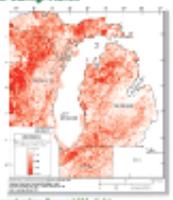
Hydrologic Framework of Bedrock Units and Initial Salinity Distribution for a Simulation of Groundwater for the Lake Michigan Basin



Scientific Investigations Report 2009-5260
U.S. Department of the Interior
U.S. Geological Survey

USGS
National Water Availability and Use Program

Processing, Analysis, and General Evaluation of Wetland Data for Estimating Hydrologic Parameters of the Global Soil Water in a Cross-Water Flow Model of the Lake Michigan Basin



Scientific Investigations Report 2009-5261
U.S. Department of the Interior
U.S. Geological Survey

USGS
National Water Availability and Use Program

Estimates of Ground Water in Storage in the Great Lakes Basin, United States, 2006



Scientific Investigations Report 2008-5120
U.S. Department of the Interior
U.S. Geological Survey

USGS
National Water Availability and Use Program

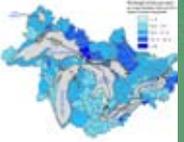
Compilation of Regional Ground-Water Dividers for Principal Aquifers Corresponding to the Great Lakes United States



Scientific Investigations Report 2008-5102
U.S. Department of the Interior
U.S. Geological Survey

USGS
In cooperation with the National Water Research Institute, Environment Canada
National Assessment of Water Availability and Use Program

Estimation of Shallow Ground-Water Recharge Great Lakes Basin



Scientific Investigations Report 2005-5294
U.S. Department of the Interior
U.S. Geological Survey

USGS
National Water Availability and Use Program

Lake-Level Variability and Water Availability in the Great Lakes



October 2011
U.S. Department of the Interior
U.S. Geological Survey

USGS
National Water Availability and Use Program

Great Lakes Basin Water Availability and Use

A Study of the National Assessment of Water Availability and Use Program

Abstract

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Scientific Investigations Report 2007-5176
U.S. Department of the Interior
U.S. Geological Survey

USGS
National Water Availability and Use Program

Historical Changes in Precipitation and Streamflow in the U.S. Great Lakes Basin, 1815-2004



Scientific Investigations Report 2007-5176
U.S. Department of the Interior
U.S. Geological Survey



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