

# **USGS National Water Information System**

**Western U.S. University Library Forum**

**Denver, CO**

**October 2010**

**John Faundeen**

**U.S. Geological Survey**

**Earth Resources Observation and Science (EROS) Center**

**Sioux Falls, SD, USA**



# Outline

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- **Background**
- **Offices**
- **Organization**
- **Real-Time Data**
- **Site Information**
- **Surface Water**
- **Ground Water**
- **Water Quality**
- **Summary**



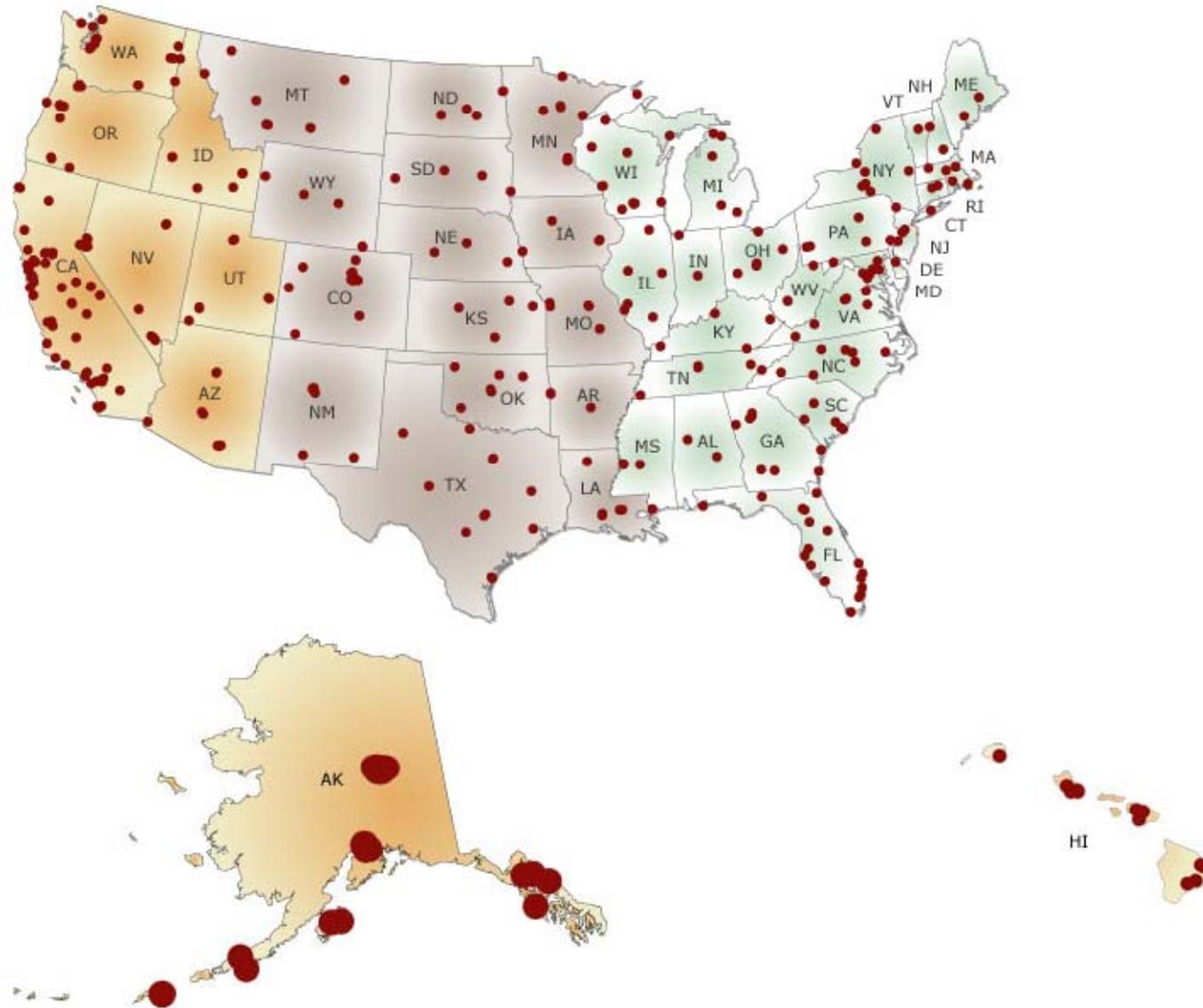
# Background

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- **U.S. Geological Survey**

- ◆ 1879 under President Rutherford B. Hayes
- ◆ Pioneered hydrologic techniques for gaging the discharge in rivers and streams and modeling the flow of complex ground-water systems
- ◆ Nation's largest water, earth, and biological science and civilian mapping agency
  - 9,000 Employees

# USGS Centers and Offices



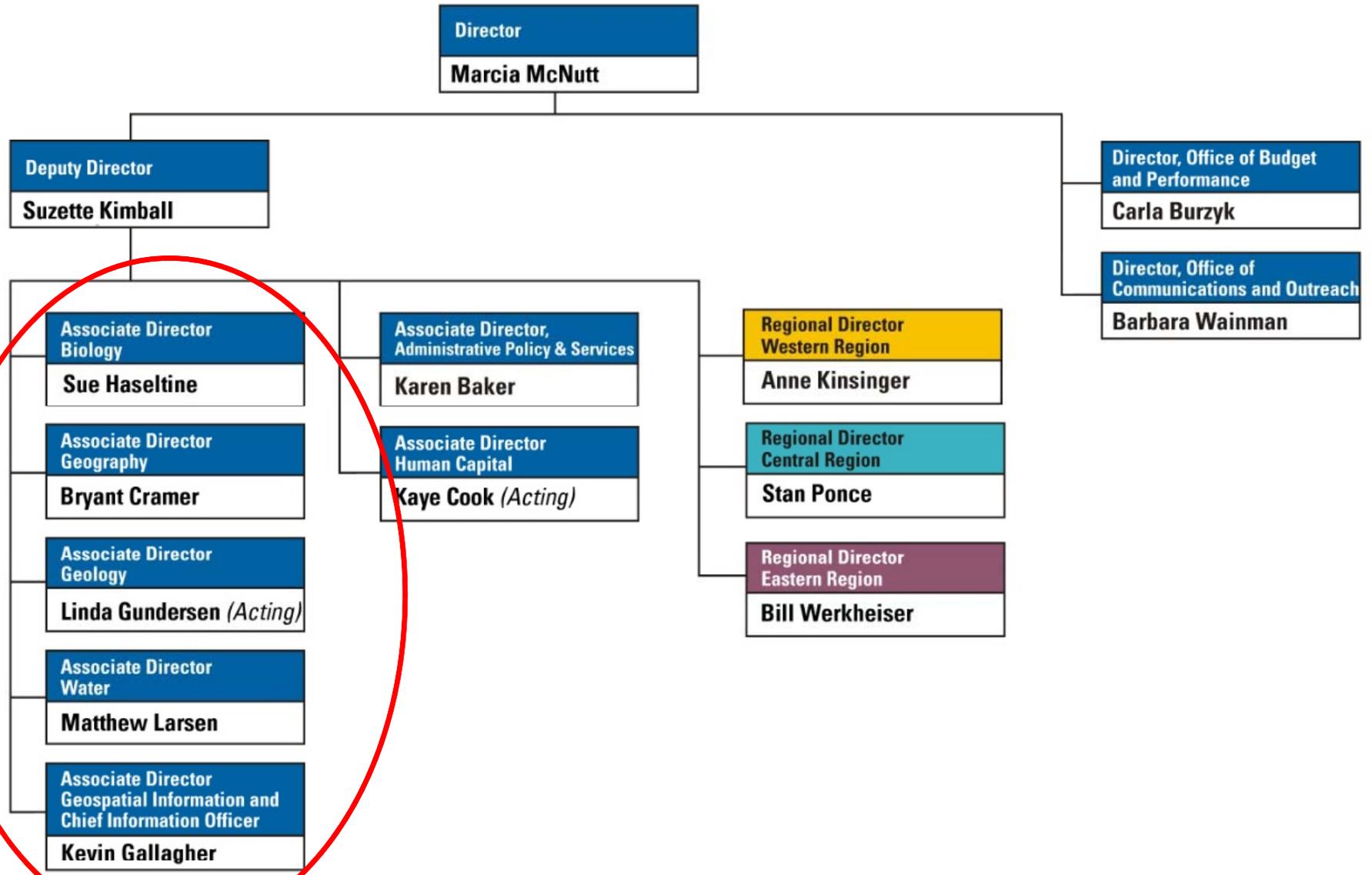


# USGS Disciplinary Focuses

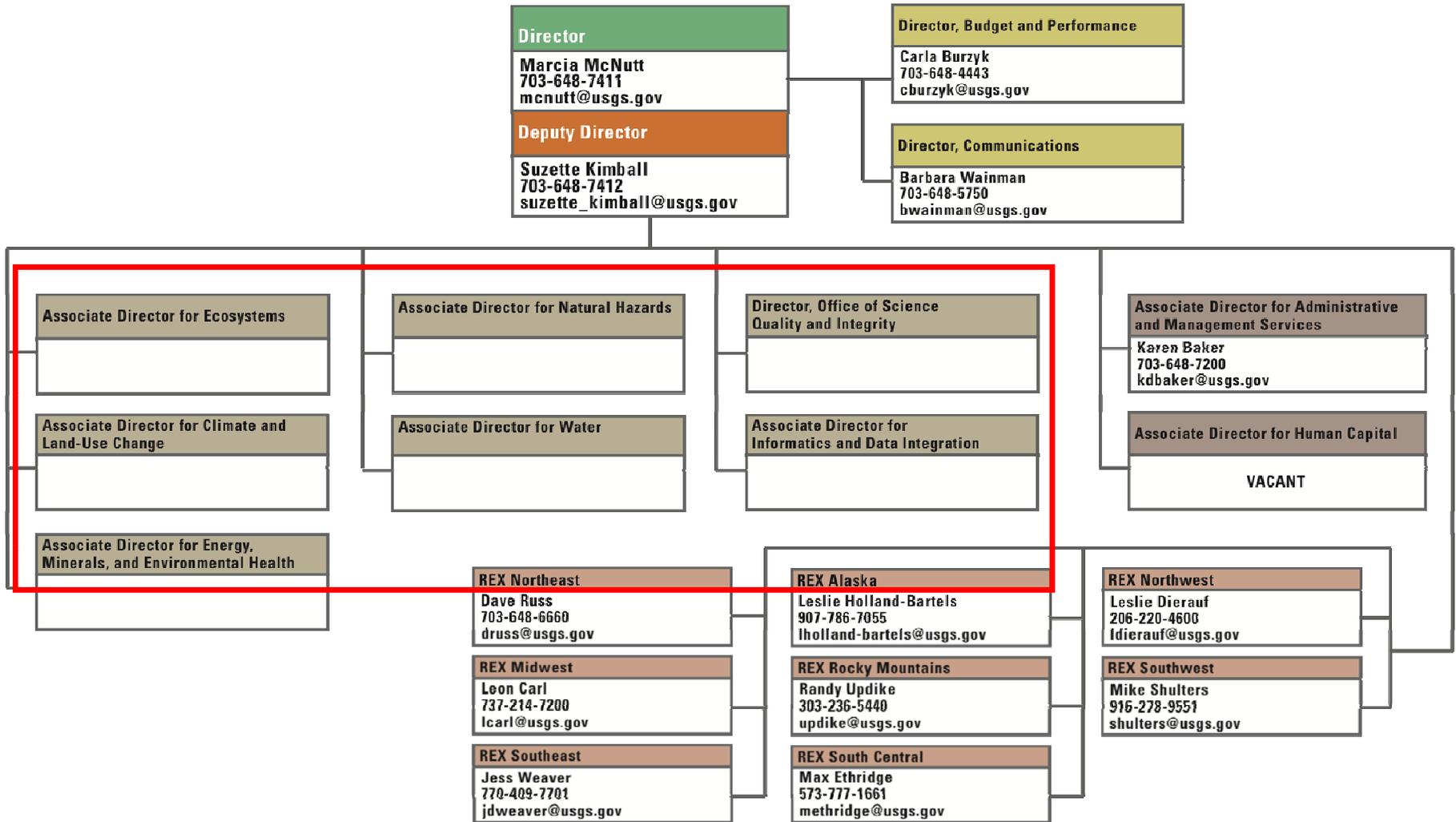
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- **Hold on a Minute.....Realignment In-Progress!**
- **New Director, Dr. Marcia McNutt**
  - ◆ Dr. McNutt previously served as president and chief executive officer of the Monterey Bay Aquarium Research Institute (MBARI), in Moss Landing, CA.
  - ◆ She is a member of the National Academy of Sciences, the American Philosophical Society, and the American Academy of Arts and Sciences.
  - ◆ Dr. McNutt received a bachelor's in Physics from Colorado College and a doctorate in Earth Sciences from Scripps Institution of Oceanography.

# Former Organization Structure



# New Organizational Structure





# National Water Information System

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- Real-Time Data
- Site Information
- Surface Water
- Ground Water
- Water Quality



# Real-Time Data

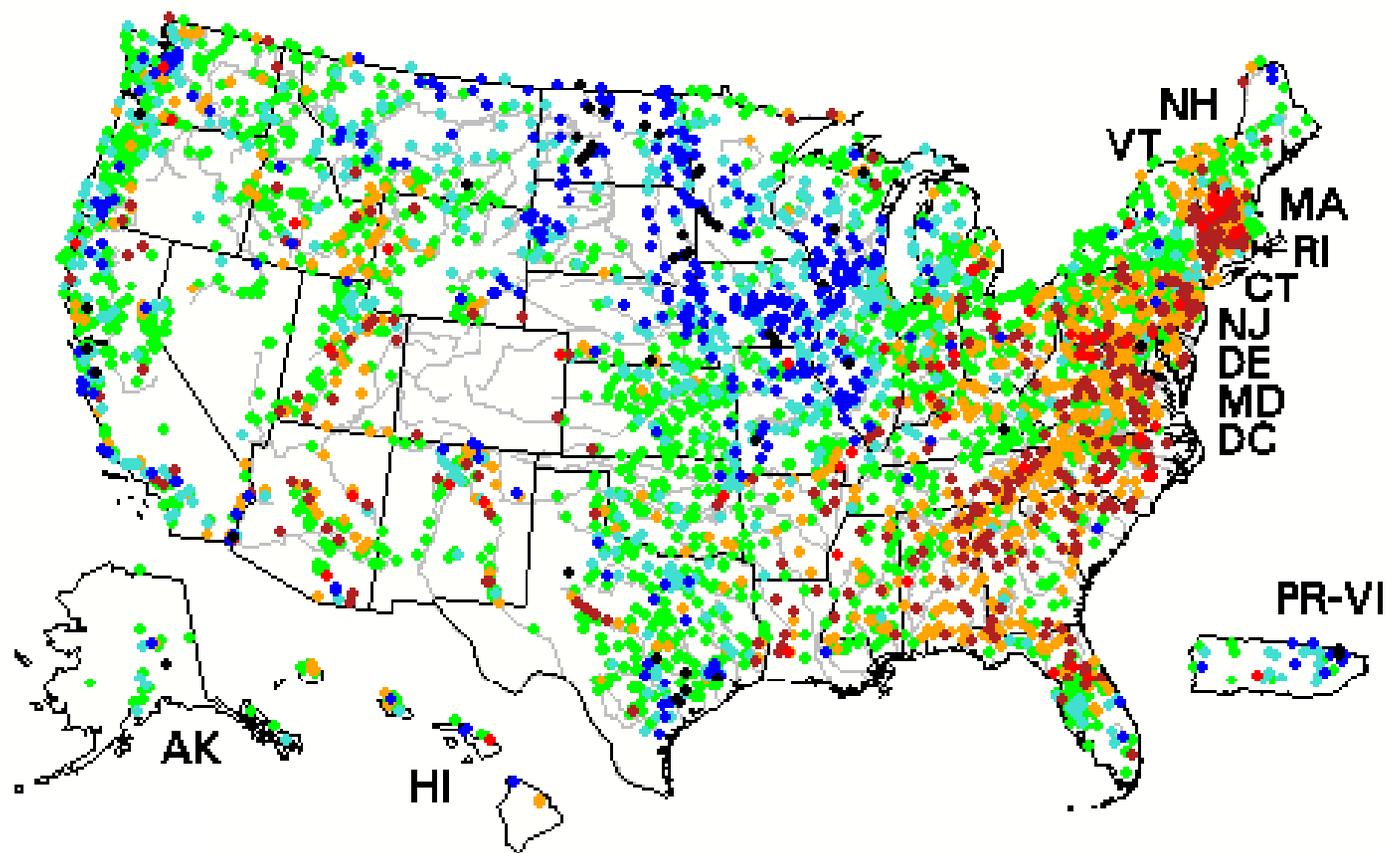
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- **Real-time data typically are recorded at 15- to 60-minute intervals, stored onsite, and then transmitted to USGS offices every 1 to 4 hours, depending on the data relay technique used. Recording and transmission times may be more frequent during critical events. Data from real-time sites are relayed to USGS offices via satellite, telephone, and/or radio telemetry and are available for viewing within minutes of arrival.**

# Real-Time Data

- Daily Streamflow Conditions

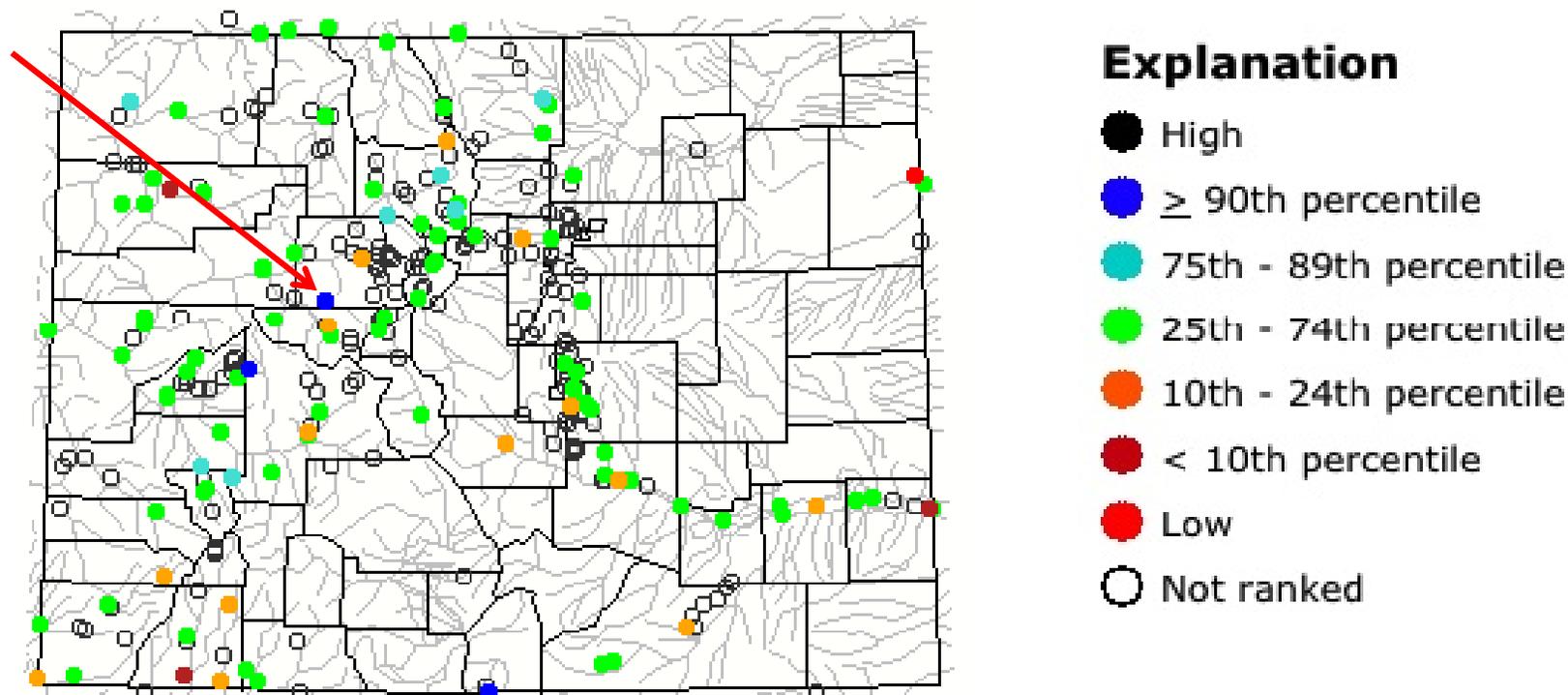
Tuesday, September 07, 2010 10:30ET



# Real-Time Data

## ● Daily Streamflow Conditions

Tuesday, September 07, 2010 11:30ET



The colored dots depict streamflow conditions as a percentile computed from the period of record to the current day. Records must have at least 30 years of history.

# Real-Time Data

## USGS 09080400 FRYINGPAN RIVER NEAR RUEDI, CO. <sup>\*</sup> PROVISIONAL DATA SUBJECT TO REVISION

**Available data for this site**

Station operated by the U.S. Geological Survey in cooperation with [U.S. Bureau of Reclamation](#).

Additional [station information](#).

Current shift adjusted [rating table](#)  
[What is a shift adjusted stage-d](#)  
[table?](#)

Time-series: Real-time data

- SUMMARY OF ALL AVAILABLE DATA
- Site map
- Time-series: Real-time data**
- Time-series: Daily data
- Time-series: Daily statistics
- Time-series: Monthly statistics
- Time-series: Annual statistics
- Surface-water: Peak streamflow
- Surface-water: Field measurements
- Water-Quality: Field/Lab samples
- USGS Instantaneous-data archive: (Offsite)
- USGS Annual water-data report(s): (Offsite)
- EPA Surf your watershed: Offsite
- <INTERNAL -- Sitefile review>



This station managed by the Grand Junction Western Colorado Office.

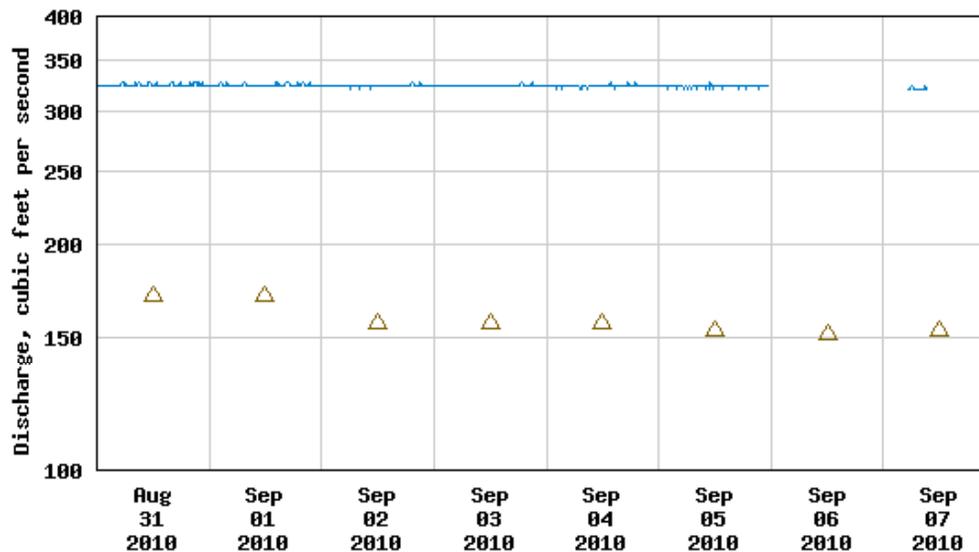
\* Data are provisional and subject to revision until they have been thoroughly reviewed and received final approval.

# Real-Time Data

## Discharge, cubic feet per second

Most recent instantaneous value: 320 09-07-2010 09:15 MDT

USGS 09080400 FRYINGPAN RIVER NEAR RUEDI, CO.



----- Provisional Data Subject to Revision -----

△ Median daily statistic (41 years) — Discharge

Create [presentation-quality](#) / [stand-alone](#) graph

parm 00060 DD14

Daily discharge statistics, in cfs, for Sep 7 based on 41 years of record [more](#)

Min (1977)	20th percentile	Median	Mean	80th percentile	Most Recent Instantaneous Value Sep 7	Max (2001)
45	110.	153	176	237	320	345



# Site Information

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- **The Site Inventory System contains and provides access to inventory information about sites at stream reaches, wells, test holes, springs, tunnels, drains, lakes, reservoirs, ponds, excavations, and water-use facilities.**
- **About 300 components make up the descriptive elements of the site inventory. The retrieval program can be used for retrieving information about sites in summary lists, in detailed tables, or a file suitable for input to other programs.**

# Site Information

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## Choose Site Selection Criteria

Choose from the following criteria to constrain the number of sites selected. If no additional site-selection criteria are chosen and no additional specifications are defined on the following page then output will be for all sites in USA that have .

- 
- | Site<br>-- Location --                                       | Site<br>-- Identifier --   | Site<br>-- Attribute --   | Data<br>-- Attribute --                                |
|--|--|---|--|
| <input type="checkbox"/> <a href="#">?</a> State/Territory   | <input type="checkbox"/> <a href="#">?</a> Site Name             | <input type="checkbox"/> <a href="#">?</a> Site type                  | <input type="checkbox"/> <a href="#">?</a> Update time |
| <input type="checkbox"/> <a href="#">?</a> Hydrologic Region | <input type="checkbox"/> <a href="#">?</a> Site Number           | <input type="checkbox"/> <a href="#">?</a> Altitude                   |  |
| <input type="checkbox"/> <a href="#">?</a> Lat-Long box      | <input type="checkbox"/> <a href="#">?</a> Multiple Site Numbers | <input type="checkbox"/> <a href="#">?</a> Drainage area              |  |
|  | <input type="checkbox"/> <a href="#">?</a> Agency Code           | <input type="checkbox"/> <a href="#">?</a> Data type                  |  |
|  | <input type="checkbox"/> <a href="#">?</a> File of Site Numbers  | <input type="checkbox"/> <a href="#">?</a> Well depth                 |  |
|  |  | <input type="checkbox"/> <a href="#">?</a> Hole depth                 |  |
|  |  | <input type="checkbox"/> <a href="#">?</a> National aquifer (by code) |  |
|  |  | <input type="checkbox"/> <a href="#">?</a> National aquifer (by name) |  |
|  |  | <input type="checkbox"/> <a href="#">?</a> Local aquifer (by code)    |  |
|  |  | <input type="checkbox"/> <a href="#">?</a> Local aquifer (by name)    |  |

# Site Information

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## Well Site

### DESCRIPTION:

Latitude 38°00'47", Longitude 106°02'48" NAD27

Saguache County, Colorado

Well depth: 560 feet

Land surface altitude: 7,595 feet above sea level NGVD29.

### AVAILABLE DATA:

Data Type	Begin Date	End Date	Count
<a href="#">Field groundwater-level measurements</a>	1998-04-17	2010-06-21	93
Additional Data Sources	Begin Date	End Date	Count
<a href="#">Groundwater Watch</a> **offsite**	1998	2010	93

### OPERATION:

Record for this site is maintained by the USGS Colorado Water Science Center

Email questions about this site to [Colorado Water Science Center Water-Data Inquiries](#)

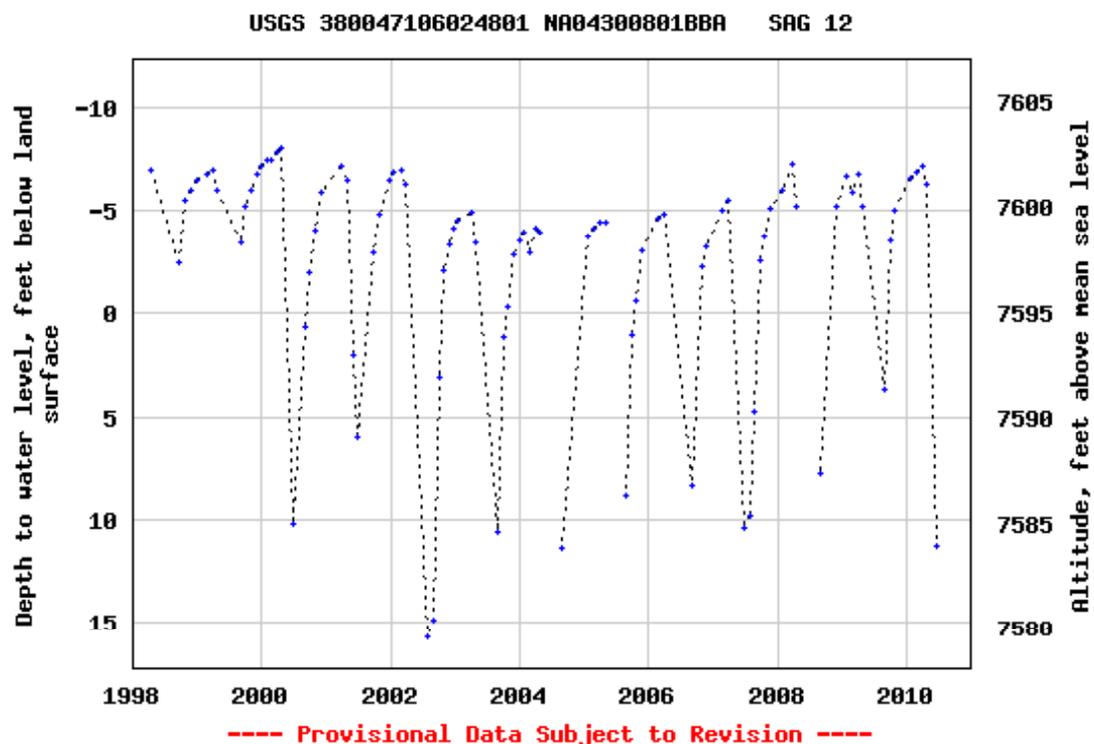
# Site Information

## Well Depth

Saguache County, Colorado  
Hydrologic Unit Code --  
Latitude 38°00'47", Longitude 106°02'48" NAD27  
Land-surface elevation 7,595 feet above sea level NGVD29  
The depth of the well is 560 feet below land surface.

### Output formats

- [Table of data](#)
- [Tab-separated data](#)
- [Graph of data](#)
- [Reselect period](#)



Breaks in the plot represent a gap of at least one year between field measurements.  
[Download a presentation-quality graph](#)

# Site Information

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## Stream Site

### DESCRIPTION:

Latitude 38°01'00", Longitude 106°41'31" NAD27  
Saguache County, Colorado, Hydrologic Unit 13010004

### AVAILABLE DATA:

Data Type	Begin Date	End Date	Count
<a href="#">Field/Lab water-quality samples</a>	1972-06-23	1972-06-23	1

### OPERATION:

Record for this site is maintained by the USGS Colorado Water Science Center  
Email questions about this site to [Colorado Water Science Center Water-Data Inquiries](#)

# Site Information

Parameter Code	Count	Begin Date	End Date	Parameter Code Complete Name
00010	22	1972-06-23		Temperature, water, degrees Celsius
00028	22	1972-06-23		Agency analyzing sample, code
00095	22	1972-06-23		Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees Celsius
00191	22	1972-06-23		Hydrogen ion, water, unfiltered, calculated, milligrams per liter
00400	22	1972-06-23		pH, water, unfiltered, field, standard units
00945	22	1972-06-23		Sulfate, water, filtered, milligrams per liter
01000	22	1972-06-23		Arsenic, water, filtered, micrograms per liter
01025	22	1972-06-23		Cadmium, water, filtered, micrograms per liter
01030	22	1972-06-23		Chromium, water, filtered, micrograms per liter
01035	22	1972-06-23		Cobalt, water, filtered, micrograms per liter
01040	22	1972-06-23		Copper, water, filtered, micrograms per liter
01046	22	1972-06-23		Iron, water, filtered, micrograms per liter
01049	22	1972-06-23		Lead, water, filtered, micrograms per liter
01056	22	1972-06-23		Manganese, water, filtered, micrograms per liter
01060	22	1972-06-23		Molybdenum, water, filtered, micrograms per liter
01065	22	1972-06-23		Nickel, water, filtered, micrograms per liter
01075	22	1972-06-23		Silver, water, filtered, micrograms per liter
01085	22	1972-06-23		Vanadium, water, filtered, micrograms per liter
01090	22	1972-06-23		Zinc, water, filtered, micrograms per liter
01145	22	1972-06-23		Selenium, water, filtered, micrograms per liter
01350	22	1972-06-23		Turbidity, severity, code
71890	22	1972-06-23		Mercury, water, filtered, micrograms per liter

# Surface Water

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- **Data are collected by field personnel or relayed through telephones or satellites to offices where it is stored and processed. The data relayed through the Geostationary Operational Environmental Satellite (GOES) system are processed automatically in near real time, and in many cases, real-time data are available online within minutes.**
- **Once a complete day of readings are received from a site, daily summary data are generated and stored in the data base. Recent provisional daily data are updated on the web once a day when the computation is completed.**
- **Annually, the USGS finalizes and publishes the daily data in a series of water-data reports. Daily streamflow data and peak data are updated annually following publication of the reports.**



# Surface Water

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- **Daily data are derived by summarizing time-series data for each day for the period of record. The time-series data used to derive daily values, sometimes referred to as real-time or instantaneous values may be collected as often as every minute. These data are used to calculate daily data, such as the daily mean, median, maximum, minimum, and/or other derived values. Daily data include approved, quality-assured data that may be published, and provisional data, whose accuracy has not been verified.**

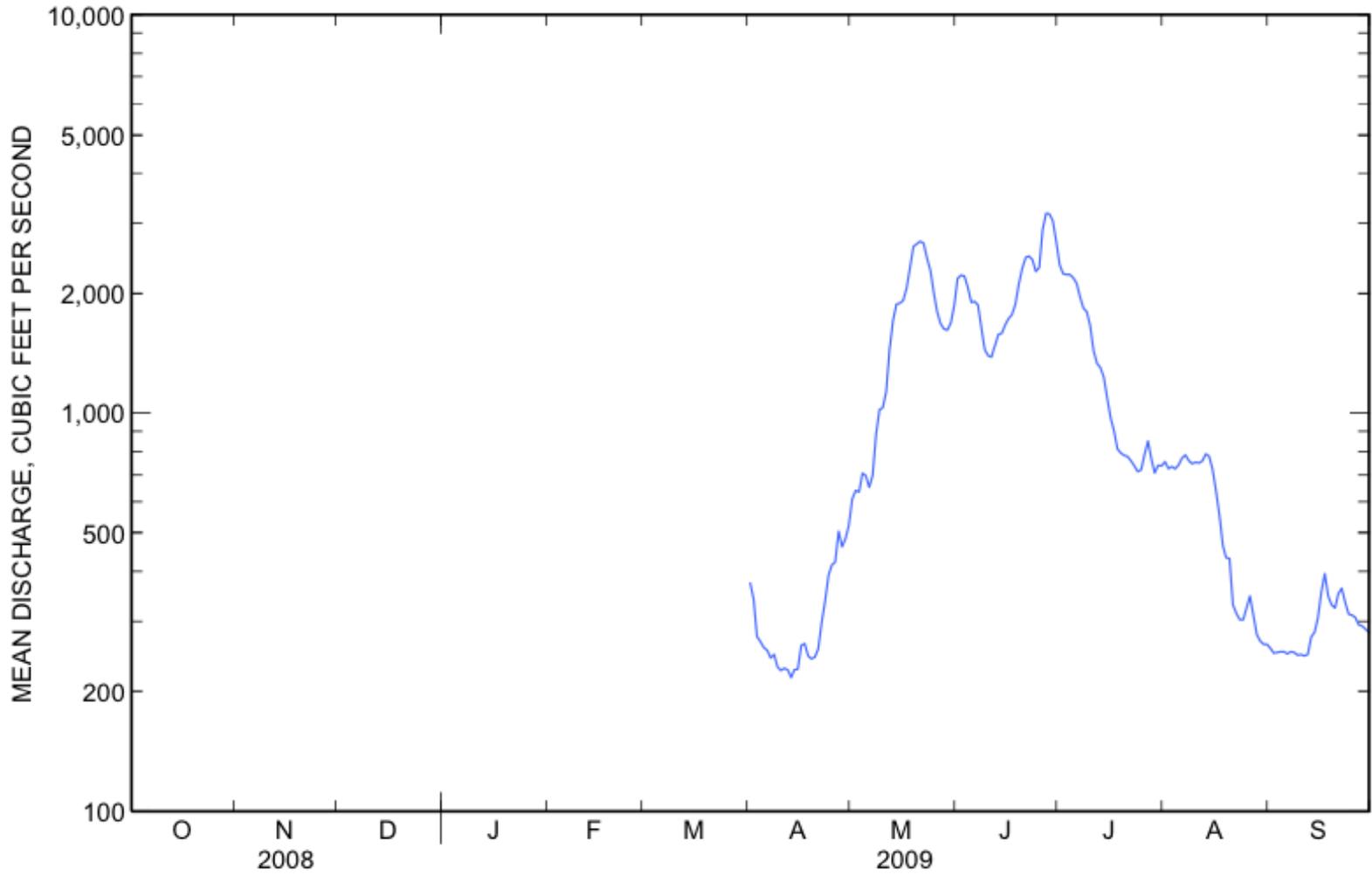
# Surface Water

Data Type	Begin Date	End Date	Count
<a href="#">Real-time</a>	-- Previous 120 days --		
<a href="#">Daily Data</a>			
Temperature, water, degrees Celsius	1989-04-08	2006-09-29	7010
Discharge, cubic feet per second	1964-10-01	2010-09-04	11468
Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees Celsius	1989-10-01	1993-09-30	1382
pH, water, unfiltered, field, standard units	1989-10-01	1993-09-30	2598
<a href="#">Daily Statistics</a>			
Discharge, cubic feet per second	1964-10-01	2009-09-30	11312
Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees Celsius	1989-10-02	1993-09-30	1381
<a href="#">Monthly Statistics</a>			
Discharge, cubic feet per second	1964-10	2009-09	
Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees Celsius	1989-10	1993-09	
<a href="#">Annual Statistics</a>			
Discharge, cubic feet per second	1965	2009	
Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees Celsius	1990	1993	
<a href="#">Peak streamflow</a>	1965-07-13	2009-06-28	39
<a href="#">Field measurements</a>	1980-06-10	2010-08-03	189
<a href="#">Field/Lab water-quality samples</a>	1964-10-08	2007-10-02	393
<b>Additional Data Sources</b>	<b>Begin Date</b>	<b>End Date</b>	<b>Count</b>
<a href="#">Instantaneous-Data Archive</a> **offsite**	1989-04-11	2009-09-30	339450
<a href="#">Annual Water-Data Report (pdf)</a> **offsite**	2005	2009	5

# Surface Water



07091200 ARKANSAS RIVER NEAR NATHROP, CO—Continued





# Ground Water

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- **The Groundwater database consists of more than 850,000 records of wells, springs, test holes, tunnels, drains, and excavations in the United States. Available site descriptive information includes well location information such as latitude and longitude, well depth, and aquifer.**
- **The USGS annually monitors groundwater levels in thousands of wells in the United States. Groundwater level data are collected and stored as either discrete field-water-level measurements or as continuous time-series data from automated recorders. Data from some of the continuous record stations are relayed to USGS offices nationwide through telephone lines or by satellite transmissions providing access to realtime groundwater data. Once a complete day of readings are received from a site, daily summary data are generated and made available online. Annually, the USGS finalizes and publishes the daily data in a series of water-data reports.**

# Ground Water

## Groundwater levels for USA Grouped by Hydrologic Unit

### Site Selection Results -- 2 sites found

lat_long_bounding_box =	Position	Latitude	Longitude
	Corner 1	39°00'00"	107°00'00"
	Corner 2	38°00'00"	106°00'00"
Coordinates are entered as Degrees-Minutes-Seconds (DMS). DMS values are converted to Decimal degrees using NAD83 as the datum. Make your bounding box bigger if you are using NAD27 Datum for your DMS values			
Minimum number of levels = 1			
Date range = 08/01/2010 . 09/01/2010			

[Save file of selected sites](#) to local disk for future upload

### Data for individual sites can be obtained by selecting the site number below

Agency	Site Number	Site Name	Period of Record		
			Begin Date	End Date	Levels
USGS	<a href="#">380421106033001</a>	NA04400814ABB RG06	1979-03-05	2010-08-09	372
USGS	<a href="#">380512106004901</a>	NA04400906DDD2 RG05A	1979-10-02	2010-08-09	362

[Questions about sites/data?](#)  
[Feedback on this web site](#)  
[Automated retrievals](#)  
[Help](#)

[Top](#)  
[Explanation of terms](#)  
[Subscribe for system changes](#)  
[News](#)

# Water Quality

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- **The USGS collects and analyzes chemical, physical, and biological properties of water, sediment and tissue samples from across the Nation. The NWISWeb discrete sample data base is a compilation of over 4.4 million historical water quality analyses in the USGS district data bases through September 2005. The discrete sample data is a large and complex set of data that has been collected by a variety of projects ranging from national programs to studies in small watersheds. Users should review the help notes and particularly the data retrieval precautions before beginning any retrieval or analysis of data from this data set. Additions of more current data, modifications to ancillary information, and enhanced retrieval options to help users find and appropriately use the data they need are planned for a future release of NWISWeb.**
- **At selected surface-water and groundwater sites, the USGS maintains instruments that continuously record physical and chemical characteristics of the water including pH, specific conductance, temperature, dissolved oxygen, and percent dissolved-oxygen saturation. Supporting data such as air temperature and barometric pressure are also available at some sites. At sites where this information is transmitted automatically, data are available from the real-time data system. Once a complete day of readings are received from a site, daily summary data are generated and made available online. Annually, the USGS finalizes and publishes the daily data in a series of water-data reports.**
- **You may find additional water-quality data of interest in EPA STORET.**

# Water Quality

Data for individual sites can be obtained by selecting the site number below

Agency	Site Number	Site Name	Period of Record		
			Begin Date	End Date	Samples
USGS	<a href="#">07087050</a>	ARKANSAS RIVER BELOW GRANITE, CO	1999-03-03	2004-10-06	52
USGS	<a href="#">07087200</a>	ARKANSAS RIVER AT BUENA VISTA, CO.	1964-10-07	1993-03-23	272
USGS	<a href="#">07089000</a>	COTTONWOOD C BL HOT SPRINGS, NR BUENA VISTA, CO.	1959-07-07	1984-09-06	232
USGS	<a href="#">07089520</a>	COTTONWOOD CREEK AT BUENA VISTA, CO.	1911-07-18	1992-11-17	85
USGS	<a href="#">07091000</a>	CHALK CREEK NEAR NATHROP, CO.	1990-05-22	1993-01-11	72
USGS	<a href="#">07091200</a>	ARKANSAS RIVER NEAR NATHROP, CO	1964-10-08	2007-10-02	393
USGS	<a href="#">07091500</a>	ARKANSAS RIVER AT SALIDA, CO.	1978-03-17	1993-03-23	134
USGS	<a href="#">07093000</a>	PONCHA CREEK AT PONCHA, CO.	1992-05-14	1992-05-14	1
USGS	<a href="#">08224110</a>	SAN LUIS CREEK NEAR PONCHA PASS, CO.	1979-06-14	1984-09-17	60
USGS	<a href="#">08224113</a>	SAN LUIS CREEK ABOVE VILLA GROVE, CO.	1979-06-14	1984-08-20	50
USGS	<a href="#">08224500</a>	KERBER CR ABV LITTLE KERBER CR NR VILLA GROVE, CO	1967-10-18	1981-06-16	86
USGS	<a href="#">08227000</a>	SAGUACHE CREEK NEAR SAGUACHE, CO	1967-10-18	2004-08-31	126
USGS	<a href="#">09107000</a>	TAYLOR RIVER AT TAYLOR PARK, CO.	1987-10-14	2010-08-18	175
USGS	<a href="#">09107500</a>	TEXAS CREEK AT TAYLOR PARK, CO.	1987-10-14	1992-09-09	51
USGS	<a href="#">09108500</a>	TAYLOR PARK RESERVOIR AT TAYLOR PARK, CO.	1973-08-28	1973-08-28	12

# Water Quality

## Water Quality Samples for the Nation

USGS 383130106574100 NB04900110DBD-DOS RIOS GOLF COURSE

Available data for this site

Water-Quality: Field/Lab samples

GO

Gunnison County, Colorado  
 Hydrologic Unit Code  
 14020003  
 Latitude 38°31'29.66",  
 Longitude 106°57'42.63"  
 NAD83  
 Land-surface elevation  
 7,620 feet above sea level  
 NGVD29  
 The depth of the well is 26.5  
 feet below land surface.  
 The depth of the hole is  
 28.5 feet below land  
 surface.  
 This well is completed in the  
 Alluvial aquifers  
 (N100ALLUVL) national  
 aquifer.  
 This well is completed in the  
 Valley-Fill Deposits  
 (111VLFL) local aquifer.

### Output formats

- Parameter Group Period of Record table
- Inventory of available water-quality data for printing
- Inventory of water-quality data with retrieval
- Tab-separated data, one result per row
- Tab-separated data one sample per row with remark codes combined with values
- Tab-separated data one sample per row with tab-delimiter for remark codes
- Reselect output format

Parameter Code	Count	Begin Date	End Date	Parameter Code Complete Name
00003	640	1997-05-08	1997-10-09	Sampling depth, feet
00010	960	1997-05-08	2010-06-03	Temperature, water, degrees Celsius
00020	320	2010-06-03		Temperature, air, degrees Celsius
00025	960	1997-05-08	2010-06-03	Barometric pressure, millimeters of mercury
00028	1280	1997-05-08	1997-10-09	Agency analyzing sample, code
00076	640	1997-05-08	1997-10-09	Turbidity, water, unfiltered, nephelometric turbidity units
00095	960	1997-05-08	2010-06-03	Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees Celsius

# Water Quality

00191	960	1997-05-08	2010-06-03	Hydrogen ion, water, unfiltered, calculated, milligrams per liter
00300	960	1997-05-08	2010-06-03	Dissolved oxygen, water, unfiltered, milligrams per liter
00301	960	1997-05-08	2010-06-03	Dissolved oxygen, water, unfiltered, percent of saturation
00400	960	1997-05-08	2010-06-03	pH, water, unfiltered, field, standard units
00403	960	1997-05-08	2010-06-03	pH, water, unfiltered, laboratory, standard units
00405	640	1997-05-08	1997-10-09	Carbon dioxide, water, unfiltered, milligrams per liter
00453	640	1997-05-08	2010-06-03	Bicarbonate, water, filtered, inflection-point titration method (incremental titration method), field, milligrams per liter
00608	960	1997-05-08	2010-06-03	Ammonia, water, filtered, milligrams per liter as nitrogen
00613	960	1997-05-08	2010-06-03	Nitrite, water, filtered, milligrams per liter as nitrogen
00623	640	1997-05-08	1997-10-09	Ammonia plus organic nitrogen, water, filtered, milligrams per liter as nitrogen
00631	960	1997-05-08	2010-06-03	Nitrate plus nitrite, water, filtered, milligrams per liter as nitrogen
00660	320	2010-06-03		Orthophosphate, water, filtered, milligrams per liter
00666	640	1997-05-08	1997-10-09	Phosphorus, water, filtered, milligrams per liter as phosphorus
00671	960	1997-05-08	2010-06-03	Orthophosphate, water, filtered, milligrams per liter as phosphorus
00681	960	1997-05-08	2010-06-03	Organic carbon, water, filtered, milligrams per liter
00900	960	1997-05-08	2010-06-03	Hardness, water, milligrams per liter as calcium carbonate
00904	960	1997-05-08	2010-06-03	Noncarbonate hardness, water, filtered, field, milligrams per liter as calcium carbonate
				Noncarbonate hardness, water, filtered, lab,

# Summary

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- **National Water Information System**
  - ◆ <http://waterdata.usgs.gov/nwis>
- **1.5 million sites in all 50 States, the District of Columbia, Puerto Rico, the Virgin Islands, Guam, American Samoa and the Commonwealth of the Northern Mariana Islands.**
- **Online**
- **Real-Time and Summarized Data**

**John Faundeen**  
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**605-594-6092**