



United States
Department of
Agriculture

Natural
Resources
Conservation
Service

Arizona

Basin Outlook Report

April 1, 2013



Issued by

Jason Weller
Chief
Natural Resources Conservation Service
U.S. Department of Agriculture

Released by

Curtis Elke
State Conservationist
Natural Resources Conservation Service
Phoenix, Arizona

Basin Outlook Reports And Federal – State – Private Cooperative Snow Surveys

How forecasts are made

Most of the annual streamflow in Arizona originates as snowfall that has accumulated in the mountains during the winter and early spring. As the snowpack accumulates, hydrologists estimate the runoff that will occur when it melts. Measurements of snow water equivalent at selected manual snow courses and automated Snow Telemetry (SNOTEL) sites, along with precipitation and streamflow values, are used in statistical and simulation models to prepare runoff forecasts. These forecasts are coordinated between hydrologists in the Natural Resources Conservation Service (NRCS) the National Weather Service, and the Salt River Project.

Forecasts of any kind are not perfect. Streamflow forecast uncertainty arises from three primary sources: (1) uncertainty of future weather conditions, (2) uncertainty in the forecasting procedure, and (3) errors in the data. The forecast, therefore, must be interpreted not as a single value but rather as a range of values with specific probabilities of occurrence. The middle of the range is expressed by the 50% exceedance probability forecast, for which there is a 50% chance that the actual flow will be above, and a 50% chance that the actual flow will be below, this value. To describe the expected range around this 50% value, four other forecasts are provided, two smaller values (90% and 70% exceedance probability) and two larger values (30%, and 10% exceedance probability). For example, there is a 90% chance that the actual flow will be more than the 90% exceedance probability forecast.

The wider the spread among these values, the more uncertain the forecast. As the season progresses, forecasts become more accurate, primarily because a greater portion of the future weather conditions become known. This is reflected by a narrowing of the range around the 50% exceedance probability forecast. Users should take this uncertainty into consideration when making operational decisions by selecting forecasts corresponding to the level of risk they are willing to assume about the amount of water to be expected. If users anticipate receiving a lesser supply of water, or are concerned about having an adequate water supply, they may want to base their decisions on the 90% or 70% exceedance probability forecasts. On the other hand, if users anticipate receiving too much water, or are concerned about the threat of flooding, they may want to base their decisions on the 30% or 10% exceedance probability forecasts. Regardless of the forecast value users choose, they should be prepared to deal with either more or less water.



For more water supply and resource management information, contact:

Dino DeSimone
Water Supply Specialist
230 N. First Ave., Suite 509
Phoenix, AZ 85003-1706
Phone: (602) 280-8786
Email: dino.desimone@az.usda.gov

The United States Department of Agriculture (USDA) prohibits discrimination in its programs on the basis of race, color, national origin, sex, religion, age, disability, political beliefs and marital or familial status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint, write the Secretary of Agriculture, U.S. Department of Agriculture, Washington, D.C., 20250, or call 1-800-245-6340 (voice) or (202) 720-1127 (TDD). USDA is an equal employment opportunity employer.

ARIZONA Basin Outlook Report as of April 1, 2013

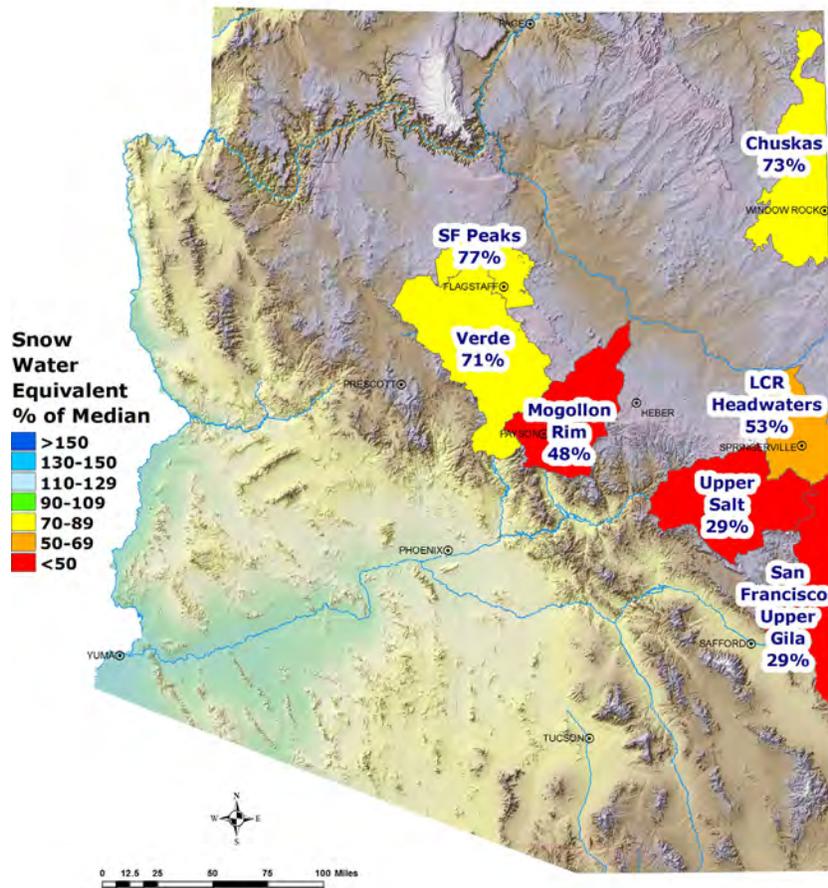
SUMMARY

As of April 1, snowpack levels are below normal to well below normal in the major basins. Precipitation for March was also below normal to well below normal in the basins. The Salt and Verde River reservoir system stands at 63 percent of capacity, while San Carlos Reservoir is at one percent of capacity. The forecast continues to call for well below normal runoff in all of the basins for the remainder of the spring runoff period.

SNOWPACK

Snow water equivalent levels are well below normal to below normal, ranging from a low of 29 percent of median in the Salt and San Francisco-Upper Gila River Basins to a high of 71 percent of median in the Verde River Basin. The statewide snowpack is also well below normal at 63 percent of median.

**Arizona
Snow Water Equivalent
as of April 1, 2013**

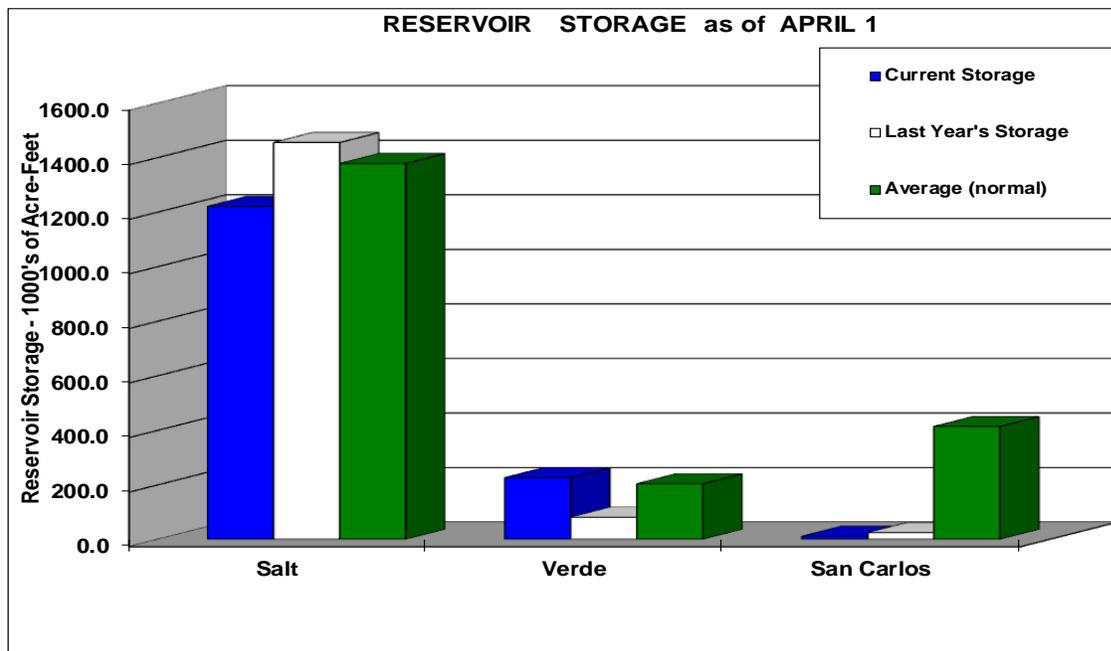


PRECIPITATION

Mountain data from NRCS SNOTEL sites and NWS cooperators gages show that precipitation for March was below normal to well below normal in the major basins, ranging from a low of 56 percent of average in the San Francisco-Upper Gila River Basin to a high of 80 percent of average in the Little Colorado River Basin. Cumulative precipitation since October 1 is ~~cnq~~ below normal in the basins, except for the Little Colorado River Basin, which is near normal for the water year. Please refer to the precipitation bar graphs found in this report for more information on precipitation levels in the basins.

RESERVOIR STORAGE

As of April 1, the Salt and Verde River reservoir system stands at 63 percent of capacity. San Carlos Reservoir remains well below normal at only one percent of capacity.

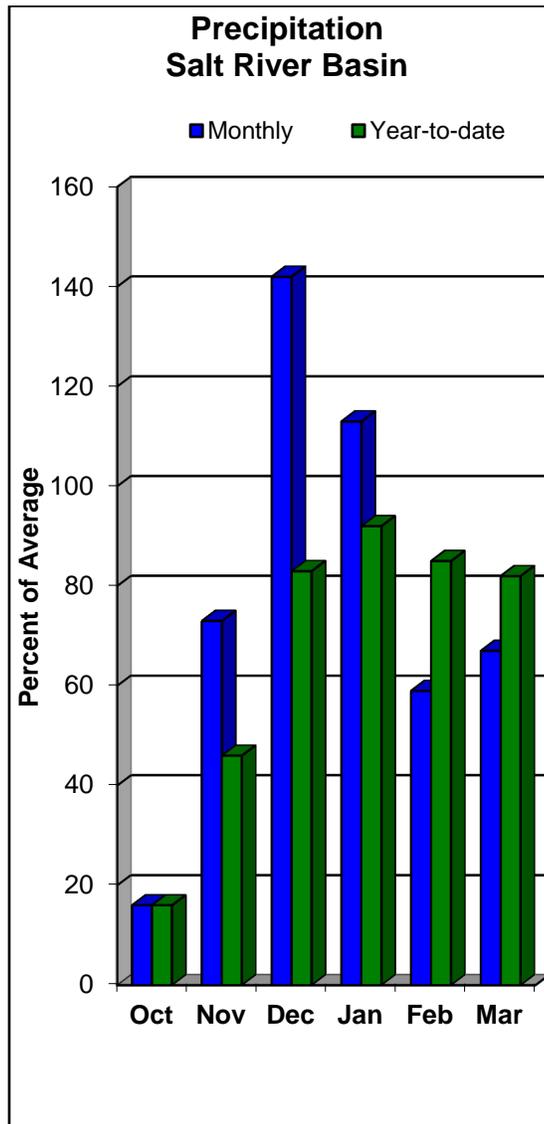
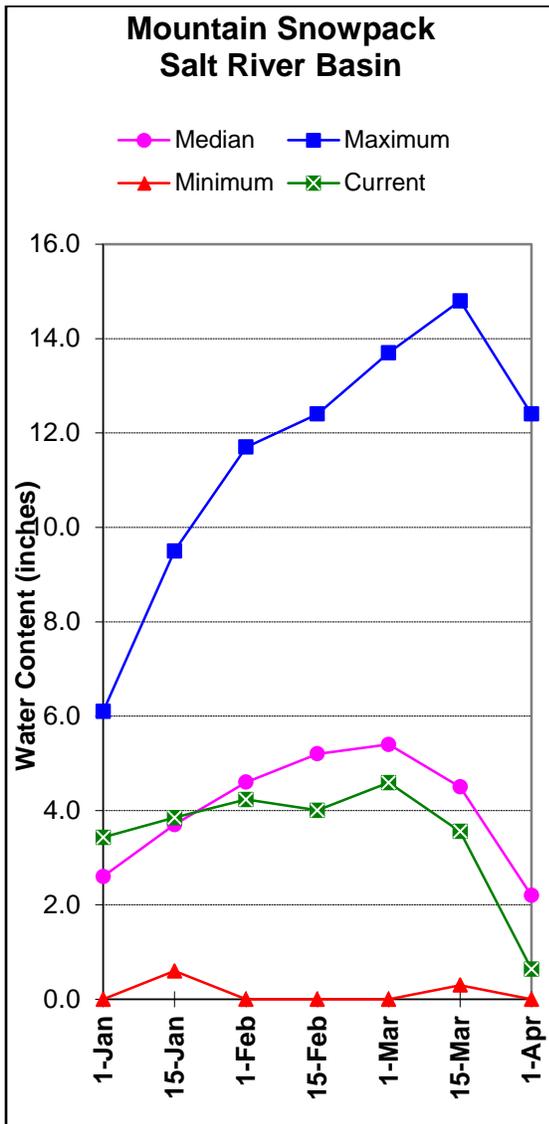


Key storage volumes displayed in thousands of acre-feet (x1000):

<u>Reservoir</u>	<u>Current Storage</u>	<u>Last Year Storage</u>	<u>30-Year Average</u>	<u>Storage Capacity</u>
Salt River System	1220.8	1455.0	1378.0	2025.8
Verde River System	226.2	81.1	203.6	287.4
San Carlos Reservoir	11.1	24.6	413.8	875.0
Lyman Lake	5.1	11.3	14.7	30.0
Lake Havasu	572.0	565.6	562.8	619.0
Lake Mohave	1673.1	1654.1	1687.0	1810.0
Lake Mead	13465.0	14539.0	20450.0	26159.0
Lake Powell	11658.0	15465.0	16942.0	24322.0

SALT RIVER BASIN as of April 1, 2013

Well below normal to below normal streamflow levels are forecast for the basin. In the Salt River, near Roosevelt, the forecast calls for 32% of median streamflow through May, while at Tonto Creek, the forecast calls for 78% of median streamflow through May. Snow survey measurements show the Salt snowpack to be at 29% of median.



SALT RIVER BASIN as of April 1, 2013

```

=====
                        SALT RIVER BASIN
                    Streamflow Forecasts - April 1, 2013
=====
Forecast Pt | <=== Drier === Future Conditions === Wetter ===> |
Forecast | ===== Chance of Exceeding * ===== |
Period | 90% 70% | 50% | 30% 10% | 30 Yr Med
          | (1000AF) (1000AF) | (1000AF) (% MED.) | (1000AF) (1000AF) | (1000AF)
=====
Salt R nr Roosevelt (3)
APR-MAY 19.0 30 40 32 52 73 127
APRIL 28 35 80

Tonto Ck ab Gun Ck nr Roosevelt (3)
APR-MAY 1.35 3.00 4.60 78 6.70 11.00 5.90
APRIL 3.80 86 4.40
=====

```

* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average and median are computed for the 1981-2010 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural volume - actual volume may be affected by upstream water management.
- (3) - Median value used in place of average.

```

=====
                        SALT RIVER BASIN
                    Reservoir Storage (1000AF) End of March
=====
Reservoir | Usable Capacity | ***** Usable Storage *****
          |                 | This Year  Last Year  Average
=====
SALT RIVER RES SYSTEM | 2025.8 | 1220.8 | 1455.0 | 1378.0
=====

```

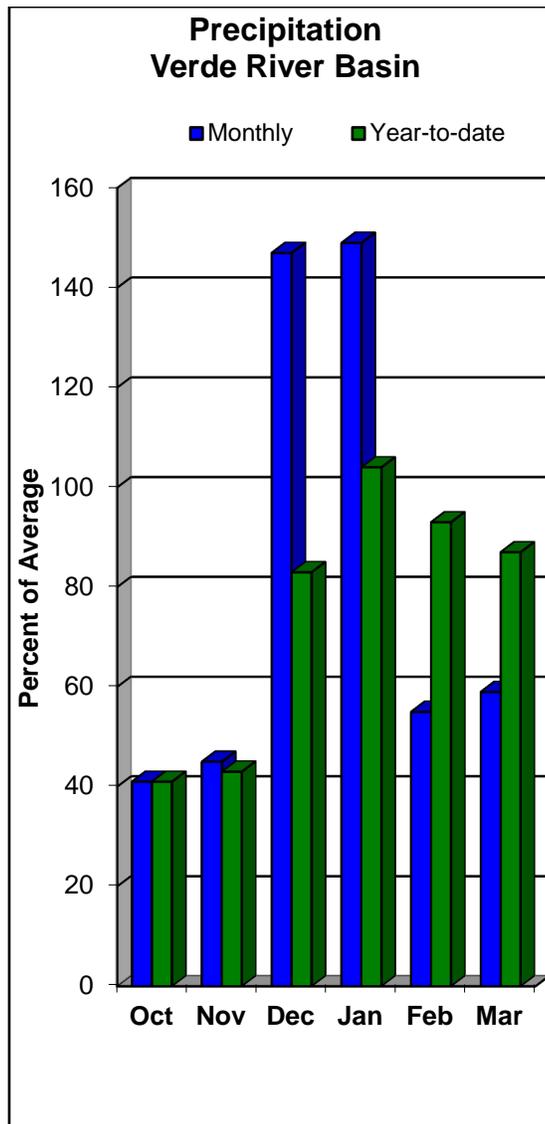
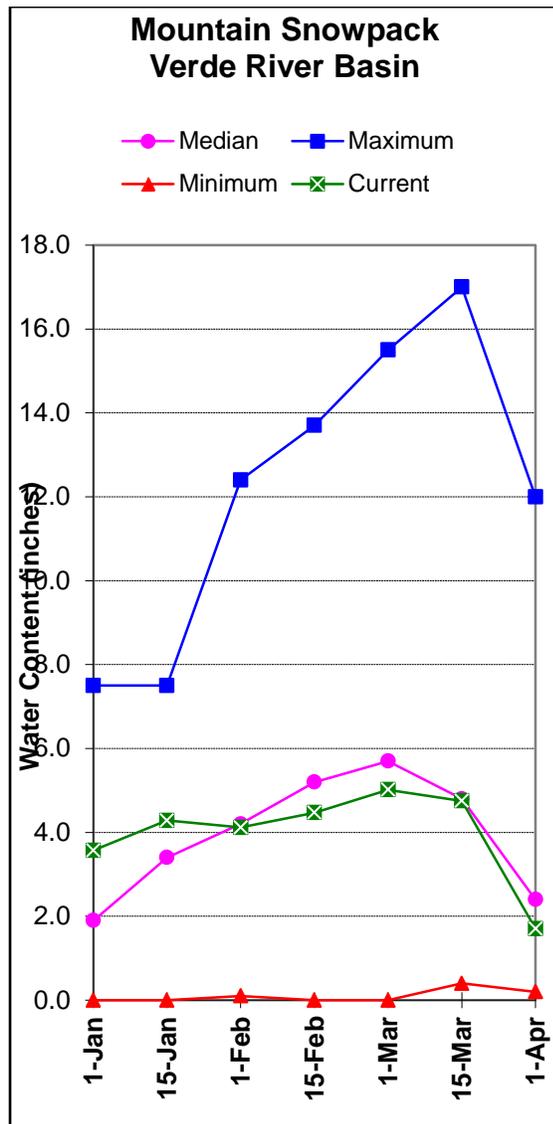
```

=====
                        SALT RIVER BASIN
                    Watershed Snowpack Analysis - April 1, 2013
=====
Watershed | Number of Data Sites | This Year as Percent of Last Year | Median
=====
SALT RIVER BASIN | 10 | 137 | 29
=====

```

VERDE RIVER BASIN as of April 1, 2013

Well below normal streamflow levels are forecast for the basin. In the Verde River, at Horseshoe Dam, the forecast calls for 69% of median streamflow through May. Snow survey measurements show the Verde snowpack to be at 71% of median.



VERDE RIVER BASIN as of April 1, 2013

```

=====
                        VERDE RIVER BASIN
                        Streamflow Forecasts - April 1, 2013
=====
Forecast Pt | <=== Drier === Future Conditions === Wetter ===> |
Forecast    | ===== Chance of Exceeding * ===== |
Period      | 90%    70%    | 50%    | 30%    10%    | 30 Yr Med
              |(1000AF) (1000AF)|(1000AF) (% MED.)|(1000AF) (1000AF)| (1000AF)
=====
Verde R bl Tangle Ck ab Horseshoe Dam (3
APR-MAY      8.2    16.7    25    69    36    56    36

Verde R bl Tangle Ck ab Horseshoe Dam
APR          15.0    63    24
    
```

* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average and median are computed for the 1981-2010 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural volume - actual volume may be affected by upstream water management.
- (3) - Median value used in place of average.

```

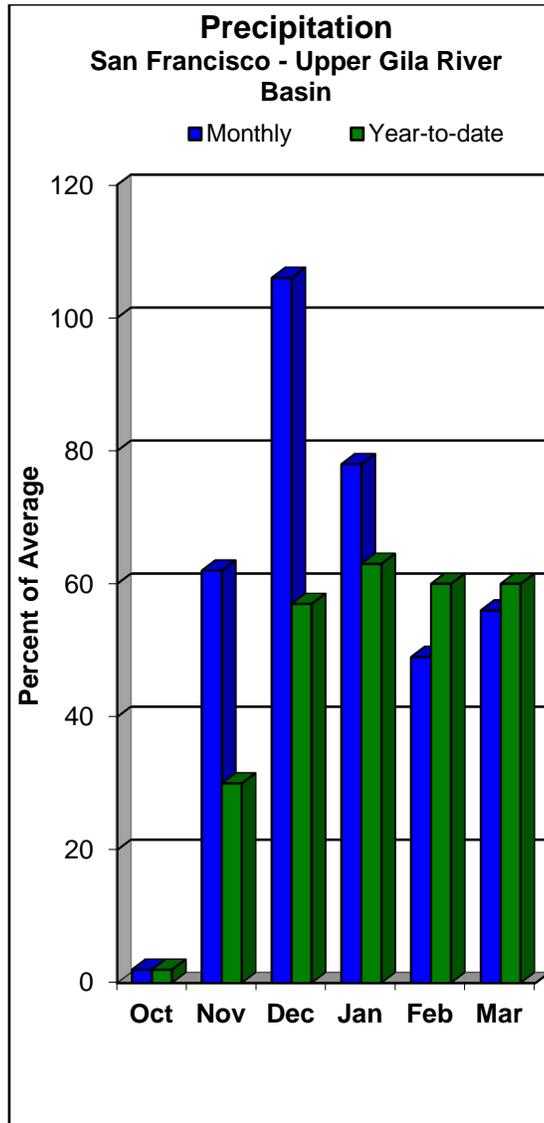
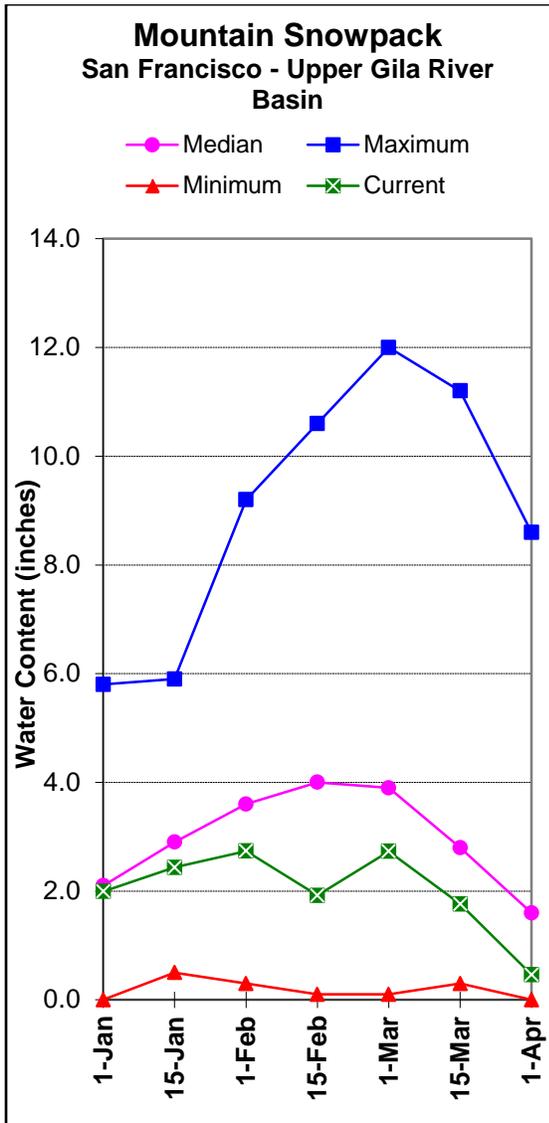
=====
                        VERDE RIVER BASIN
                        Reservoir Storage (1000AF) End of March
=====
Reservoir    Usable Capacity    ***** Usable Storage *****
              |                    | This Year    Last Year    Average
=====
VERDE RIVER RES SYSTEM    287.4    226.2    81.1    203.6
    
```

```

=====
                        VERDE RIVER BASIN
                        Watershed Snowpack Analysis - April 1, 2013
=====
Watershed    Number of Data Sites    This Year as Percent of Last Year    Median
=====
VERDE RIVER BASIN    11    97    71
SAN FRANCISCO PEAKS    2    128    77
    
```

SAN FRANCISCO-UPPER GILA RIVER BASIN as of April 1, 2013

Well below normal streamflow levels are forecast for the basin. In the San Francisco River, at Clifton, the forecast calls for 50% of median streamflow levels through May. In the Gila River, near Solomon, the forecast calls for 37% of median streamflow levels through May. At San Carlos Reservoir, inflow to the lake is forecast at 5% of median through May. Snow survey measurements show the snowpack for this basin to be at 29% of median.



SAN FRANCISCO - UPPER GILA RIVER BASIN as of April 1, 2013

SAN FRANCISCO - UPPER GILA RIVER BASIN Streamflow Forecasts - April 1, 2013							
Forecast Pt Forecast Period	<=== Drier === Future Conditions === Wetter ===>					30 Yr Med (1000AF)	
	Chance of Exceeding * 90% 70% 50% 30% 10%						
	(1000AF)	(1000AF)	(1000AF) (% MED.)	(1000AF)	(1000AF)	(1000AF)	
Gila R at Gila (3)							
APR-MAY	3.4	5.4	7.1	43	9.1	12.8	16.5
Gila R bl Blue Ck nr Virden (3)							
APR-MAY	0.9	3.7	6.7	32	10.6	18.0	21
San Francisco R at Glenwood (3)							
APR-MAY	1.13	2.30	3.40	47	4.80	7.60	7.30
San Francisco R at Clifton (3)							
APR-MAY	2.2	5.5	8.7	50	12.6	19.5	17.3
Gila R nr Solomon (3)							
APR-MAY	2.8	8.6	14.4	37	22	35	39
APRIL			11.6	46			25
San Carlos Reservoir Inflow (2,3)							
APR-MAY	0.0	0.0	1.0	5	18.1	43	18.4

* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average and median are computed for the 1981-2010 base period.

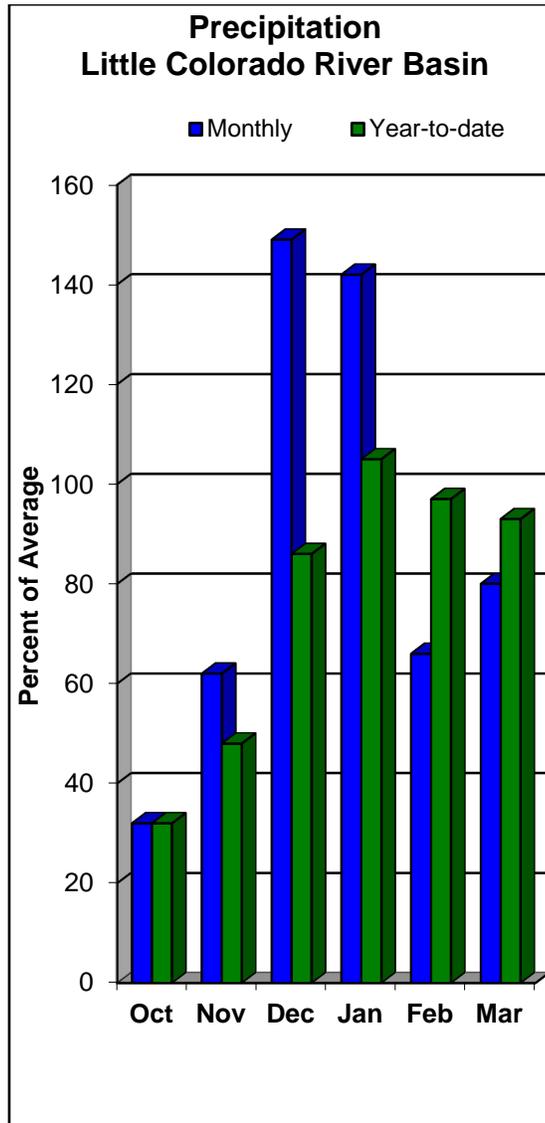
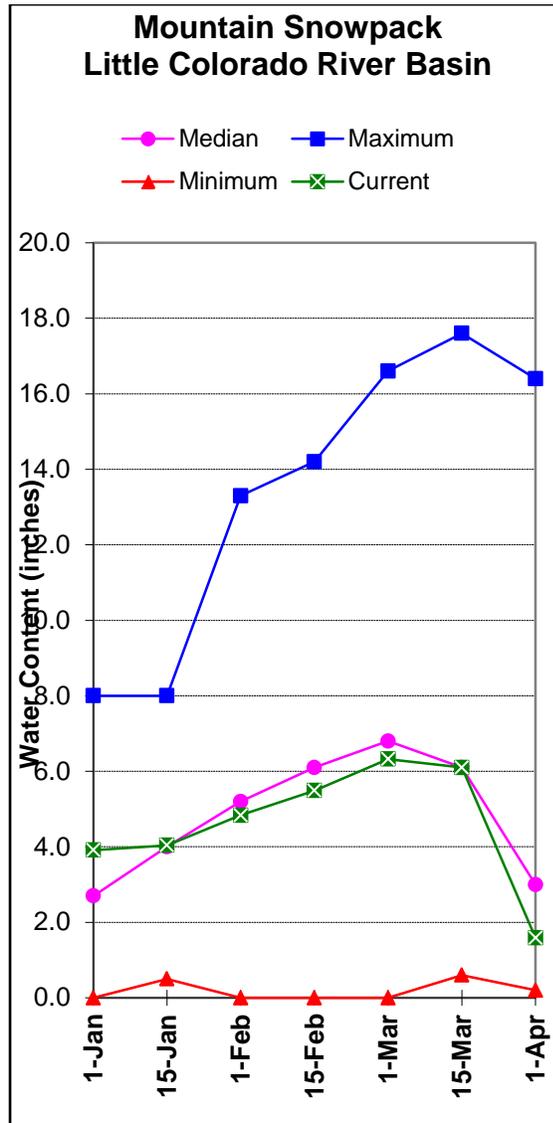
- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural volume - actual volume may be affected by upstream water management.
- (3) - Median value used in place of average.

SAN FRANCISCO - UPPER GILA RIVER BASIN Reservoir Storage (1000AF) End of March				
Reservoir	Usable Capacity	***** This Year	Usable Storage Last Year	***** Average
SAN CARLOS	875.0	11.1	24.6	413.8

SAN FRANCISCO - UPPER GILA RIVER BASIN Watershed Snowpack Analysis - April 1, 2013			
Watershed	Number of Data Sites	This Year as Percent of Last Year	Median
SAN FRANCISCO - UPPER GILA R	11	42	29

LITTLE COLORADO RIVER BASIN as of April 1, 2013

Well below normal streamflow levels are forecast for the basin. In the Little Colorado River, at Lyman Lake, the forecast calls for 29% of median streamflow through June. At Blue Ridge (C.C. Cragin) Reservoir, inflow to the lake is forecast at 66% of median through May. Snowpacks along the southern headwaters of the Little Colorado River, and along the central Mogollon Rim, were measured at 53% and 48% of median, respectively.



LITTLE COLORADO RIVER BASIN as of April 1, 2013

```

=====
                        LITTLE COLORADO RIVER BASIN
                        Streamflow Forecasts - April 1, 2013
=====
Forecast Pt | <=== Drier === Future Conditions === Wetter ===> |
Forecast | ===== Chance of Exceeding * ===== |
Period | (1000AF) (1000AF) | (1000AF) (% MED.) | (1000AF) (1000AF) | (1000AF)
=====
Little Colorado R ab Lyman Lake
APR-JUN      0.23      0.60      1.00      29      1.55      2.70      3.50

Rio Nutria nr Ramah (3)
APR-MAY      0.00      0.03      0.12      63      0.29      0.76      0.19

Ramah Reservoir Inflow (3)
APR-MAY      0.00      0.01      0.07      64      0.20      0.52      0.11

Zuni R ab Black Rock Reservoir (3)
APR-MAY      0.00      0.00      0.05      50      0.36      1.35      0.10

Blue Ridge Reservoir Inflow (3)
APR-MAY      0.58      1.59      2.70      66      4.20      7.40      4.10

Lake Mary Reservoir Inflow (3)
APR-MAY      0.19      0.40      0.60      60      0.86      1.38      1.00
=====

```

* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average and median are computed for the 1981-2010 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural volume - actual volume may be affected by upstream water management.
- (3) - Median value used in place of average.

```

=====
                        LITTLE COLORADO RIVER BASIN
                        Reservoir Storage (1000AF) End of March
=====
Reservoir | Usable Capacity | ***** Usable Storage ***** |
| | This Year | Last Year | Average |
=====
LYMAN RESERVOIR | 30.0 | 5.1 | 11.3 | 14.7
=====

```

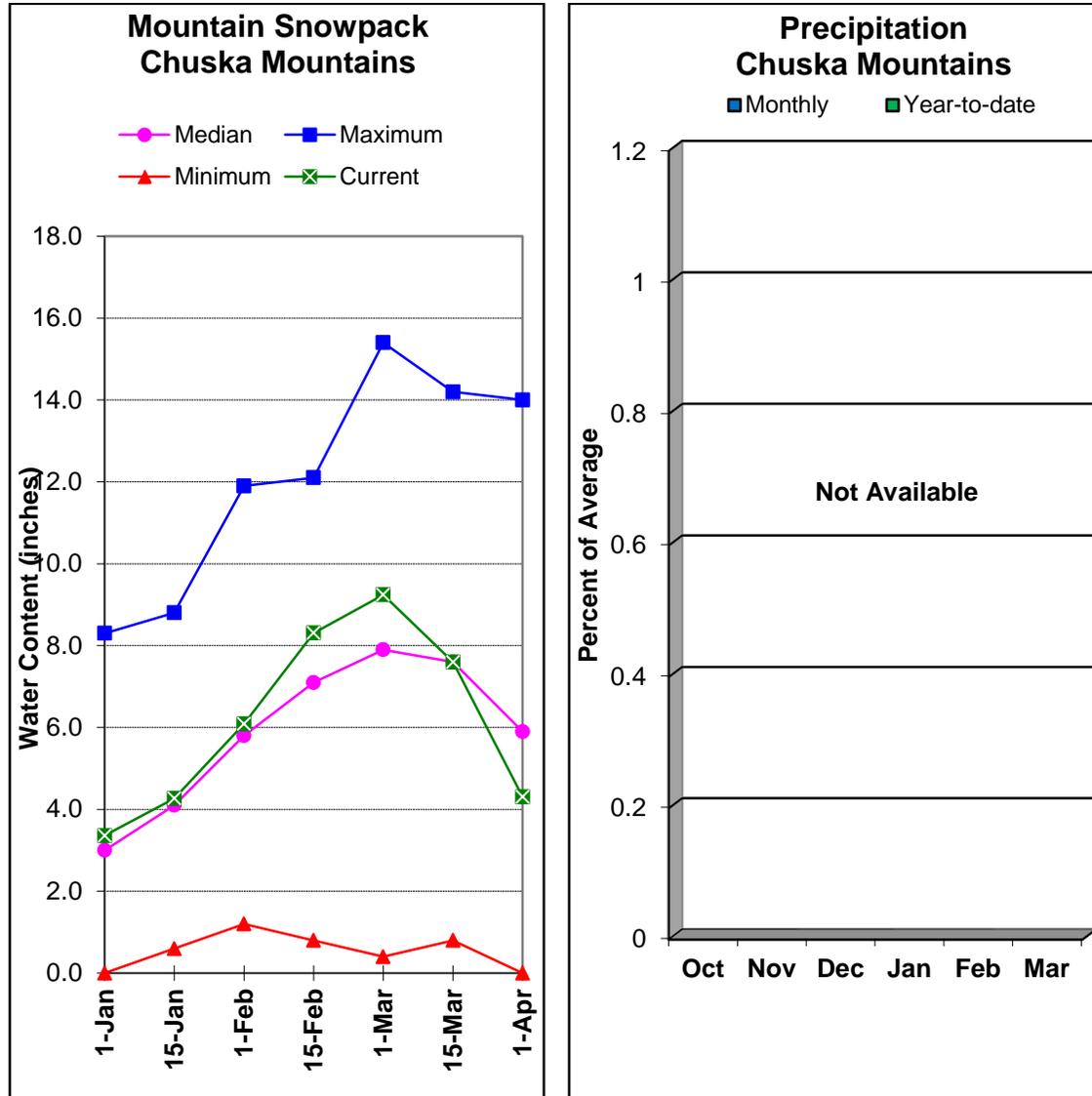
```

=====
                        LITTLE COLORADO RIVER BASIN
                        Watershed Snowpack Analysis - April 1, 2013
=====
Watershed | Number of Data Sites | This Year as Percent of Last Year | Median |
=====
LITTLE COLORADO - SOUTHERN H | 10 | 113 | 53 |
CENTRAL MOGOLLON RIM | 4 | 102 | 48 |
=====

```

CHUSKA MOUNTAINS as of April 1, 2013

Snow survey measurements conducted by staff of the Navajo Water Management Branch show the Chuska snowpack to be at 73% of median. Well below normal runoff is forecast for Captain Tom Wash, Wheatfields Creek, Bowl Canyon Creek, and Kinlichee Creek.



CHUSKA MOUNTAINS as of April 1, 2013

```

=====
                        CHUSKA MOUNTAINS
                    Streamflow Forecasts - April 1, 2013
=====
Forecast Pt | <=== Drier === Future Conditions === Wetter ===> |
Forecast    | ===== Chance of Exceeding * ===== |
Period      | (1000AF) (1000AF) | (1000AF) (% AVG.) | (1000AF) (1000AF) | (1000AF)
=====
Captain Tom Wash nr Two Gray Hills
MAR-MAY     0.13    0.58    1.18    45    2.10    4.20    2.60

Wheatfields Ck nr Wheatfields
MAR-MAY     0.65    1.00    1.29    61    1.61    2.20    2.10

Bowl Canyon Ck ab Asaayi Lake
MAR-MAY     0.30    0.54    0.74    57    0.98    1.38    1.30

Kinlichee Ck
MAR-MAY     0.07    0.33    0.67    44    1.19    2.40    1.52
=====

```

* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1981-2010 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural volume - actual volume may be affected by upstream water management.
- (3) - Median value used in place of average.

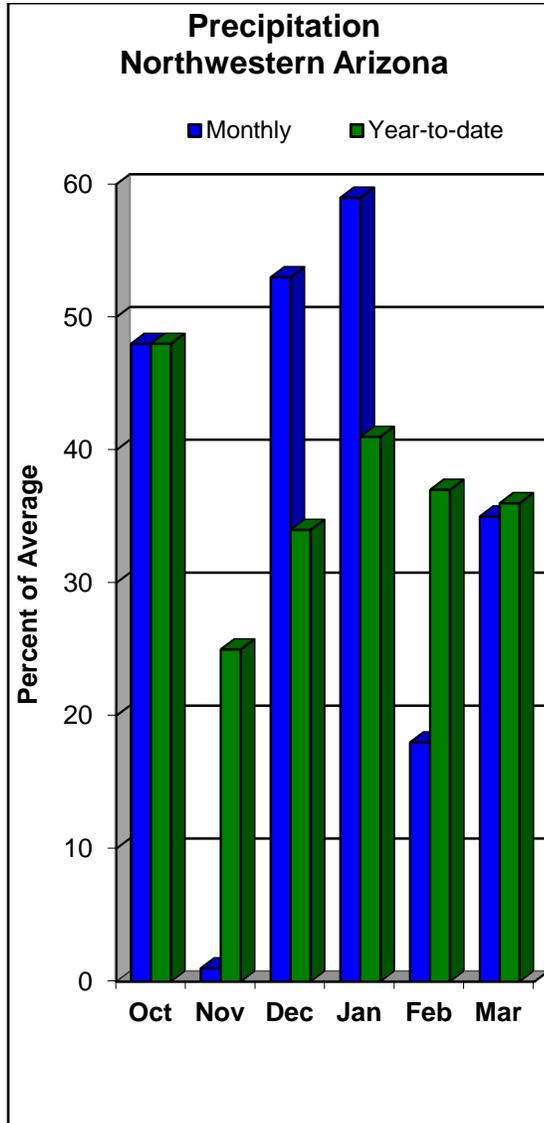
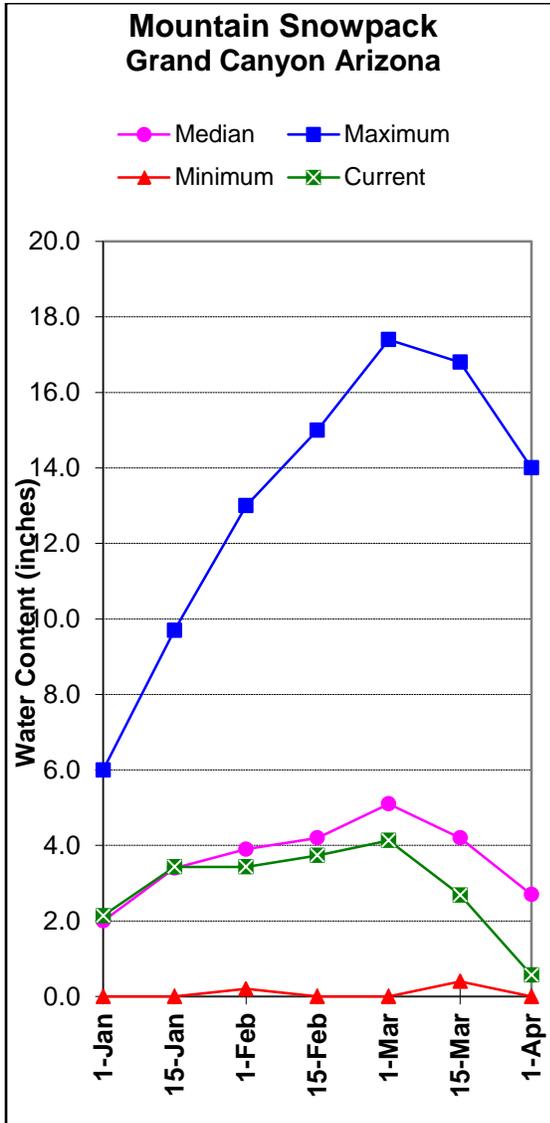
```

=====
                        CHUSKA MOUNTAINS
                    Watershed Snowpack Analysis - April 1, 2013
=====
Watershed           Number of           This Year as Percent of
                    Data Sites           Last Year           Median
=====
CHUSKA MOUNTAINS           6           247           73
DEFIANCE PLATEAU           2           0           0
=====

```

NORTHWESTERN ARIZONA as of April 1, 2013

On the Colorado River, well below normal inflow to Lake Powell is forecast at 34% of the 30-year average for the forecast period April-July. At the Grand Canyon, measurements conducted by park rangers show the snowpack to be at 21% of median.



NORTHWESTERN ARIZONA as of April 1, 2013

```

=====
                                NORTHWESTERN ARIZONA
                                Streamflow Forecasts - April 1, 2013
=====
Forecast Pt | <=== Drier === Future Conditions === Wetter ===> |
Forecast     | ===== Chance of Exceeding * ===== |
Period       | 90%    70%    | 50%    | 30%    10%    | 30 Yr Avg
              |(1000AF) (1000AF)|(1000AF) (% AVG.)|(1000AF) (1000AF)| (1000AF)
=====
Virgin R at Littlefield
  APR-JUL      5.6    14.1      22     34     32     49     65

Lake Powell Inflow (2)
  APR-JUL     1183   1856     2400    34    3014   4044   7160
=====

```

* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1981-2010 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural volume - actual volume may be affected by upstream water management.
- (3) - Median value used in place of average.

```

=====
                                NORTHWESTERN ARIZONA
                                Reservoir Storage (1000AF) End of March
=====
Reservoir      Usable Capacity      ***** Usable Storage *****
                | This Year | Last Year | Average
=====
LAKE HAVASU    619.0      572.0      568.2      562.8
LAKE MOHAVE    1810.0     1673.1     1668.0     1687.0
LAKE MEAD     26159.0    13465.0    14539.0    20450.0
LAKE POWELL   24322.0    11658.0    15458.0    16942.0
=====

```

```

=====
                                NORTHWESTERN ARIZONA
                                Watershed Snowpack Analysis - April 1, 2013
=====
Watershed      Number of Data Sites      This Year as Percent of
                | Last Year | Median
=====
GRAND CANYON      2              367              21
=====

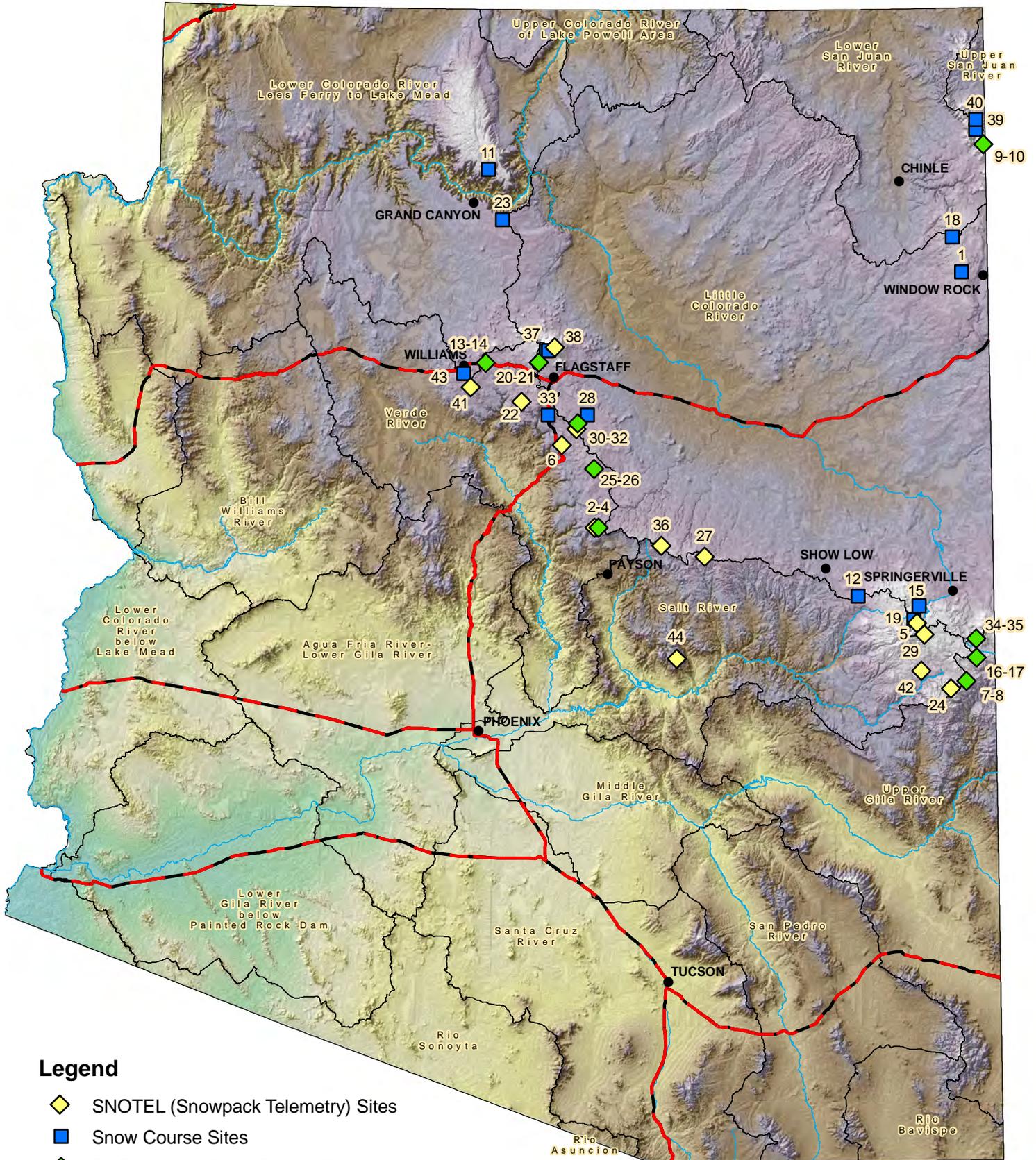
```

S N O W S U R V E Y D A T A

APRIL 1, 2013

MAP NUM.	SNOW COURSE	ELEV.	DATE	SNOW DEPTH	WATER CONTENT	LAST YEAR	MEDIAN 81-10
1.	ARBABS FOREST (AK)	7680	3/27	0	.0	.0	.0
2.	BAKER BUTTE SNOTEL	7330	4/01	0	.0	.0	.0
3.	BAKER BUTTE #2	7700	3/28	18	6.2	6.4	8.9
4.	BAKER BUTTE SMT SNTL	7700	4/01	28	10.8	10.6	-
5.	BALDY SNOTEL	9220	4/01	1	.1	.0	2.5
6.	BAR M SNOTEL	6393	4/01	0	.0	-	-
7.	BEAVER HEAD	8000	4/01	0	.0	.0	.0
8.	BEAVER HEAD SNOTEL	7990	4/01	0	.0	.0	.0
9.	BEAVER SPRING	9220	3/26	14	5.8	-	8.0
10.	BEAVER SPRING SNOTEL	9200	4/01	7	2.0	.0	-
11.	BRIGHT ANGEL	8400	3/29	3	1.1	.3	5.3
12.	BUCK SPRING	7400	4/01	0	.0	.0	.0
13.	CHALENDER	7100	3/29	0	.0	.0	.0
14.	CHALENDER SNOTEL	7100	4/01	-	.0	.0	-
15.	CHEESE SPRINGS	8600	3/28	7	2.8	2.1	1.6
16.	CORONADO TRL SNOTEL	8400	4/01	-	.0	.0	.0
17.	CORONADO TRAIL	8350	4/01	0	.0	.0	.0
18.	FLUTED ROCK	7800	3/27	0	.0	.0	.0
19.	FORT APACHE	9160	3/28	16	6.1	4.1	6.2
20.	FORT VALLEY	7350	3/28	0	.0	.0	.0
21.	FORT VALLEY SNOTEL	7350	4/01	0	.0	.0	-
22.	FRY SNOTEL	7220	4/01	0	.0	.0	.0
23.	GRAND CANYON	7500	4/01	0	.0	.0	.0
24.	HANNAGAN MDWS SNOTEL	9020	4/01	2	.1	.2	7.7
25.	HAPPY JACK	7630	3/29	0	.0	.0	.0
26.	HAPPY JACK SNOTEL	7630	4/01	2	1.1	.0	.3
27.	HEBER SNOTEL	7640	4/01	0	.0	.3	.0
28.	LAKE MARY	6930	3/28	0	.0	.0	.0
29.	MAVERICK FORK SNOTEL	9200	4/01	-	.0	.1	5.3
30.	MORMON MTN SNOTEL	7500	4/01	0	.1	.1	.7
31.	MORMON MT. SUMMIT #2	8470	3/28	11	4.9	6.1	10.2
32.	MORMON MTN SUMMIT SN	8500	4/01	3	2.7	4.9	-
33.	NEWMAN PARK	6750	3/28	0	.0	.0	.0
34.	NUTRIOSO	8500	4/01	0	.0	.0	.0
35.	NUTRIOSO SNOTEL	8500	4/01	0	.0	.2	-
36.	PROMONTORY SNOTEL	7900	4/01	2	.7	.0	5.5
37.	SNOW BOWL #2	11000	3/29	48	14.4	10.4	19.2
38.	SNOWSLIDE CYN SNOTEL	9750	4/01	37	13.5	11.4	17.0
39.	TSAILE CANYON #1	8160	3/25	8	2.5	.0	3.4
40.	TSAILE CANYON #3	8920	3/25	18	7.6	2.2	7.2
41.	WHITE HORSE SNOTEL	7180	4/01	0	.0	.0	.0
42.	WILDCAT SNOTEL	7850	4/01	0	.0	.0	.0
43.	WILLIAMS SKI RUN	7720	3/29	18	6.5	5.2	6.5
44.	WORKMAN CREEK SNOTEL	6900	4/01	0	.0	.0	.0

Arizona Snow Survey Data Sites



Legend

- ◆ SNOTEL (Snowpack Telemetry) Sites
- Snow Course Sites
- ◆ SNOTEL and Snow Course Sites
- Basin Boundaries

