United States Department of Agriculture

Natural Resources Conservation Service

Arizona Basin Outlook Report March 15, 2005

Basin Outlook Reports and Federal - State - Private Cooperative Snow Surveys

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How forecasts are made

Most of the annual streamflow in the western United States 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 SNOTEL sites, along with precipitation and streamflow values are used in computerized statistical and simulation models to prepare runoff forecasts. These forecasts are coordinated between hydrologists in the Natural Resources Conservation Service and the National Weather Service. Unless otherwise specified, all forecasts are for flows that would occur naturally without any upstream influences.

Forecasts of any kind, of course, are not perfect. Streamflow forecast uncertainty arises from three primary sources: (1) uncertain knowledge 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 others can be interpreted similarly.

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 if they wish to increase their chances of having an adequate supply of water for their operations, they may want to base their decisions on the 90% or 70% exceedance probability forecasts, or something in between. On the other hand, if users are concerned about receiving too much water (for example, threat of flooding), they may want to base their decisions on the 30% or 10% exceedance probability forecasts, or something in between. Regardless of the forecast value users choose for operations, they should be prepared to deal with either more or less water. (Users should remember that even if the 90% exceedance probability forecast is used, there is still a 10% chance of receiving less than this amount.) By using the exceedance probability information, users can easily determine the chances of receiving more or less water.

ARIZONA
Water Supply Outlook Report
as of March 15, 2005

A full range of Snow Survey and Water Supply Forecasting products is available on the Arizona NRCS Home Page

Snow Survey Program
http://www.az.nrcs.usda.gov/snow/index.html

Helpful Internet Sites

Defending Against Drought – NRCS
http://www.nrcs.usda.gov/feature/highlights/drought.html

- **Ideas on water, land, and crop management for you to consider while creating your drought plan.**

Arizona Agri-Weekly
http://www.nass.usda.gov/az/cur-agwk.pdf

- **Provides an overview of Arizona's crop, livestock, range and pasture conditions as reported by local staffs of the USDA's Agricultural Statistic Service and University of Arizona, College of Agriculture.**

SUMMARY

The water supply outlook for Arizona continues to improve. Forecasts call for near median to well above median streamflow levels through the snowmelt season. Most areas have near average or above average snowpack levels for mid March. Reservoir levels are rising and this condition should continue through springtime.

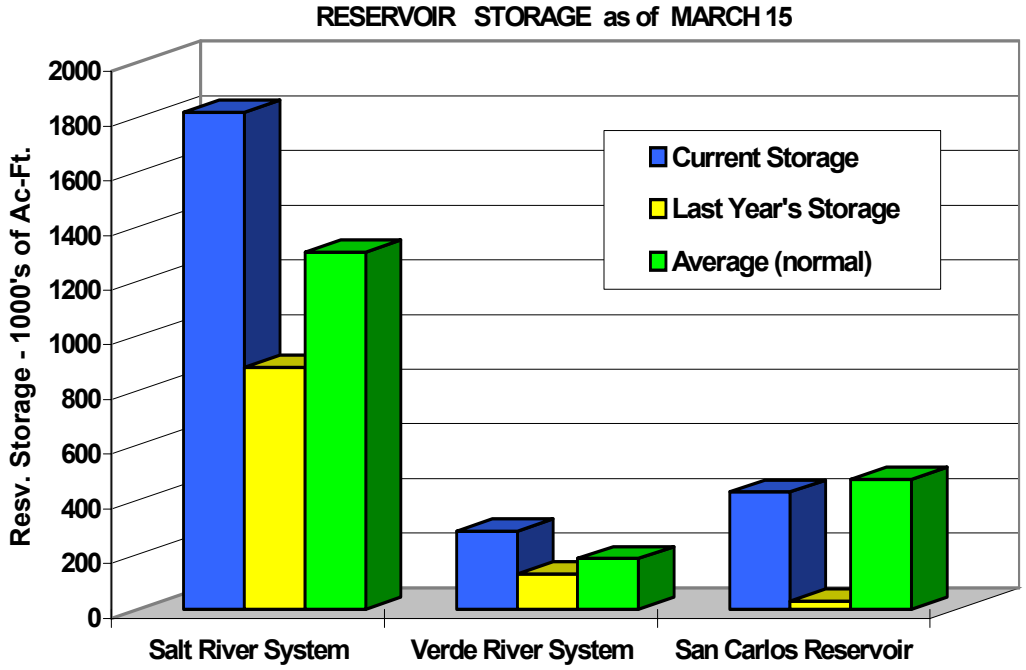
SNOWPACK

Watershed	Percent (%) of 30-Yr. Average Snowpack Levels as of March 15
Salt River Basin	95%
Verde River Basin	118%
Little Colorado River Basin	103%
San Francisco-Upper Gila River Basin	98%
Other Points of Interest	
Chuska Mountains	119%
Central Mogollon Rim	104%
Grand Canyon	121%
San Francisco Peaks	197%
Statewide Snowpack	123%

PRECIPITATION

Water year precipitation amounts recorded at high elevation SNOTEL sites indicate well above normal conditions for mid March, ranging from 140% to 203% of average. Additionally, total precipitation amounts for March will be illustrated in the next report, which will be the final issue for the 2005 snow survey season.

RESERVOIR



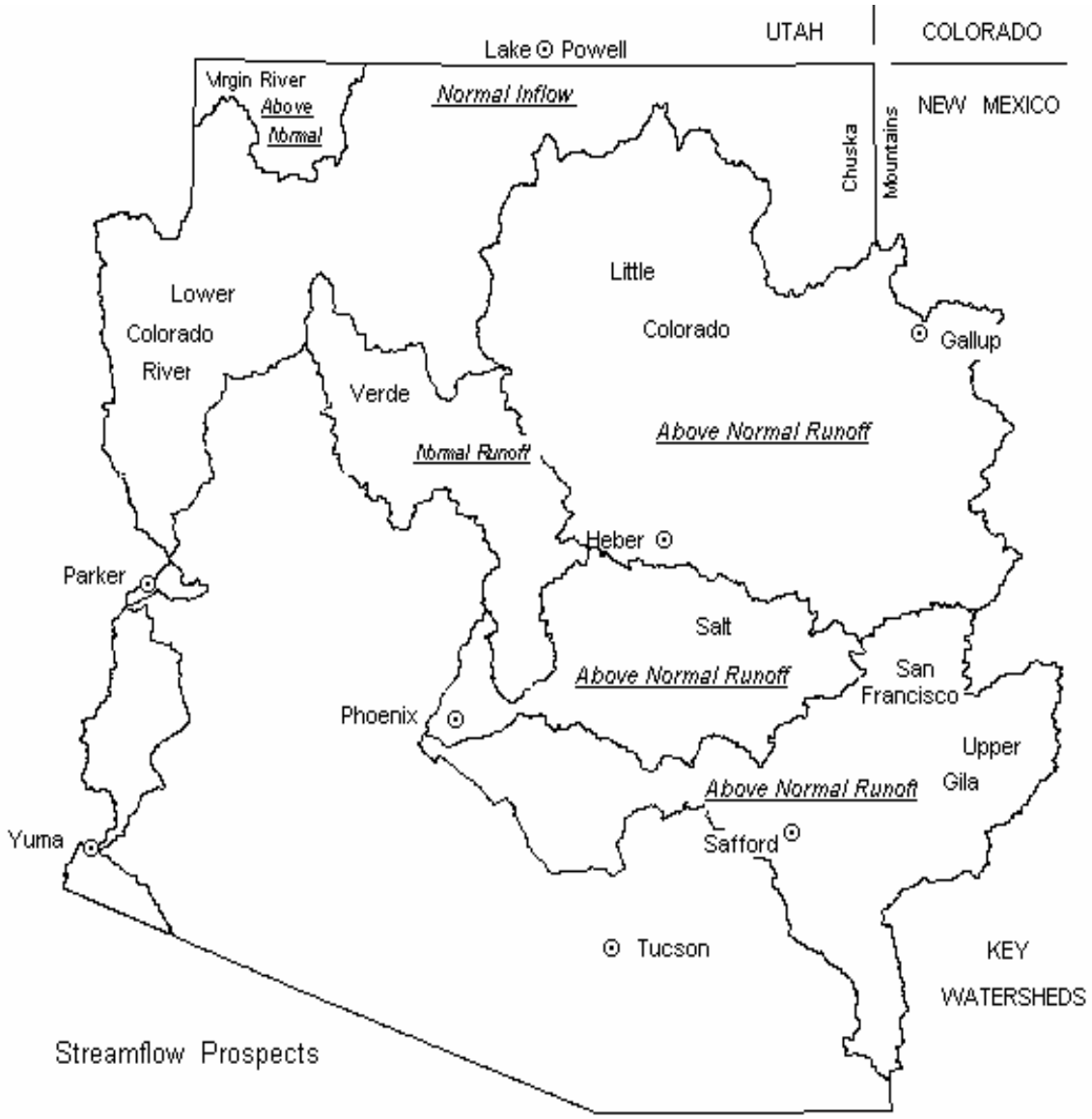
Key storage volumes displayed in thousands of acre-feet (1000 x):

RESERVOIR	CURRENT STORAGE	LAST YEAR STORAGE	30-YEAR AVERAGE
Lyman Lake	5.4	2.6	16.2
Show Low Lake	6.2	3.5	3.6
Lake Pleasant	801.5	704.4	----
Lake Havasu	546.6	550.7	552.6
Lake Mohave	1728.1	1701.5	1694.0
Lake Mead	16062.0	15371.0	22090.0
Lake Powell	8128.0	10340.0	18366.0
Salt River System	1817.3	883.9	1306.3
Verde River System	284.9	128.5	187.9
San Carlos Reservoir	428.2	29.8	476.9

STREAMFLOW

Near median to well above median streamflow levels are forecast for all rivers and streams monitored in this report. Additionally, Colorado River inflow forecasts to Lake Powell for the April-July period have decreased from earlier projections to 101% of average.

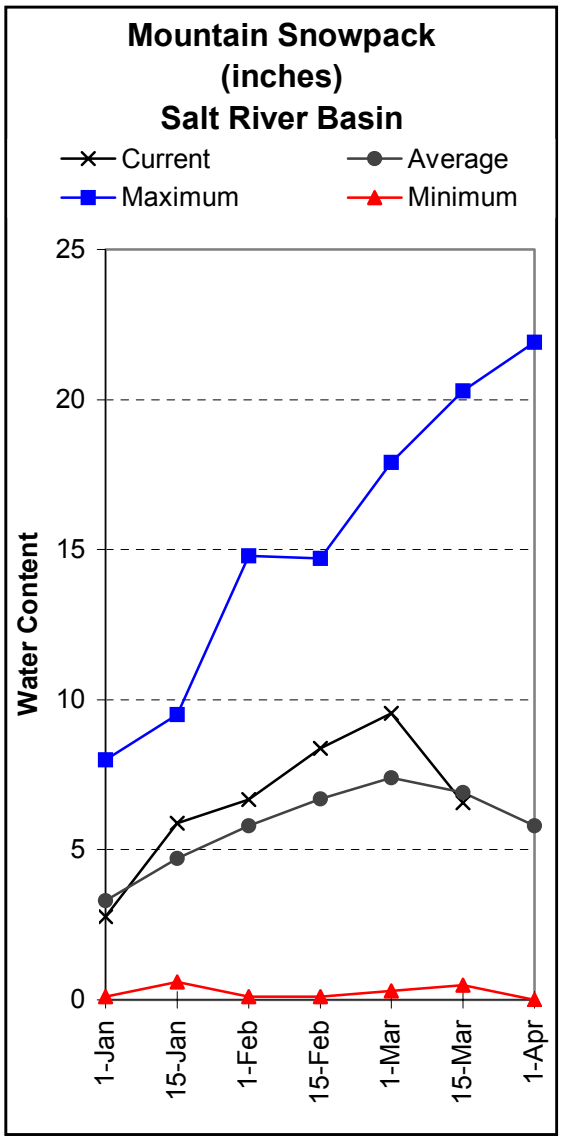
For more information regarding seasonal water supplies, please refer to the streamflow forecast tables found in the report.

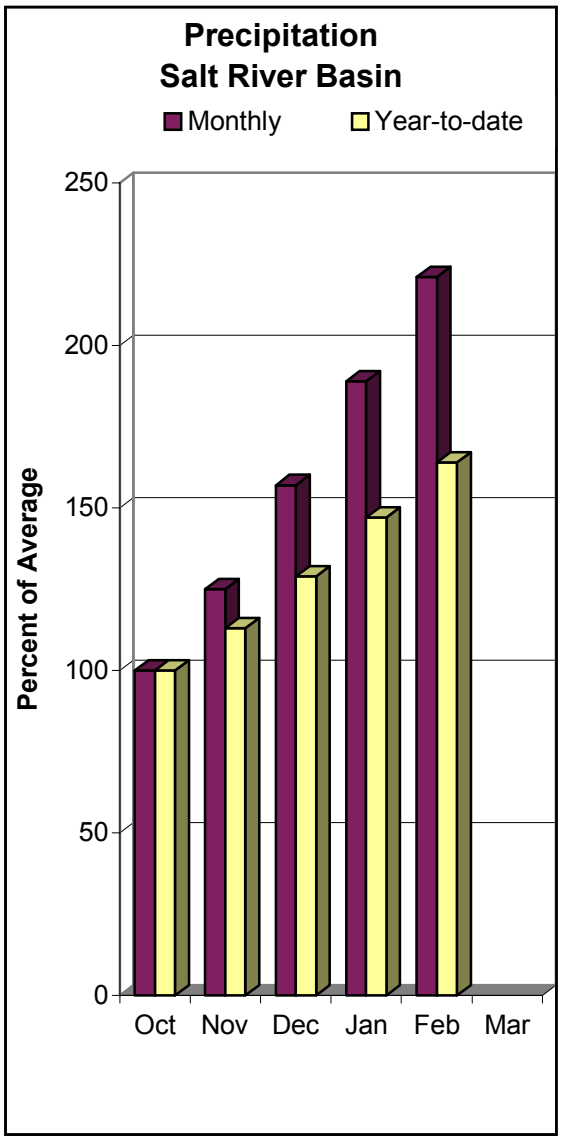


SALT RIVER BASIN as of March 15, 2005

Well above median streamflow levels are forecast for the basin. In the Salt River, near Roosevelt, the forecast calls for 133 % of median streamflow levels through MAY, while at Tonto Creek, the forecast calls for 163 % of median streamflow levels through MAY.

Additionally, snow survey measurements show the basin snowpack to be at 95 % of the 30-year average, while combined reservoir storage in the Salt River system stands at 1,817,326 acre-feet.





SALT RIVER BASIN
Streamflow Forecasts - March 15, 2005

Forecast Pt / Forecast Period	<=== Drier === 90% (1000AF)	70% (1000AF)	Future Conditions — Chance of Exceeding * — 50% (1000AF)	50% (% MED.)	=== Wetter ===> 30% (1000AF)	10% (1000AF)	30 Yr Med (1000AF)
Salt River nr Roosevelt							
MAR15-MAY	202	257	300	133	347	425	225
MARCH	101	121	134	102	147	167	131
Tonto Creek ab Gun Creek nr Roosevelt							
MAR15-MAY	9.8	18.6	27	163	38	58	16.6
MARCH	11.4	26	35	207	45	59	16.9

* 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 1971-2000 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.

SALT RIVER BASIN
Reservoir Storage (1000AF) Mid-March

Reservoir	Usable Capacity	********** Usable Storage ********* This Year	Last Year	Average
SALT RIVER MID-MONTH	2025.8	1817.3	883.9	1306.3

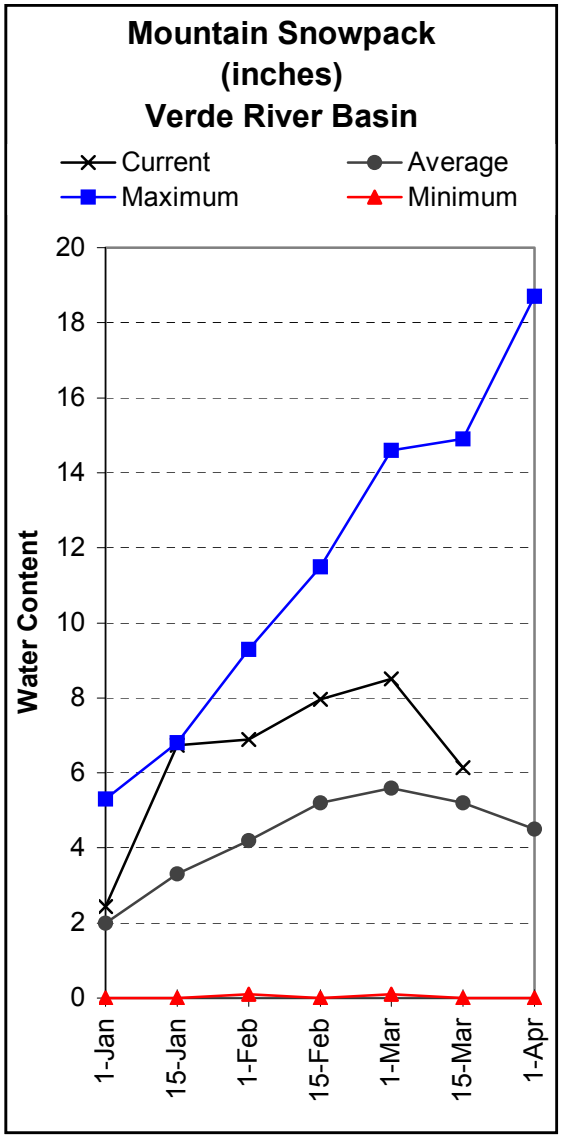
SALT RIVER BASIN
Watershed Snowpack Analysis - March 15, 2005

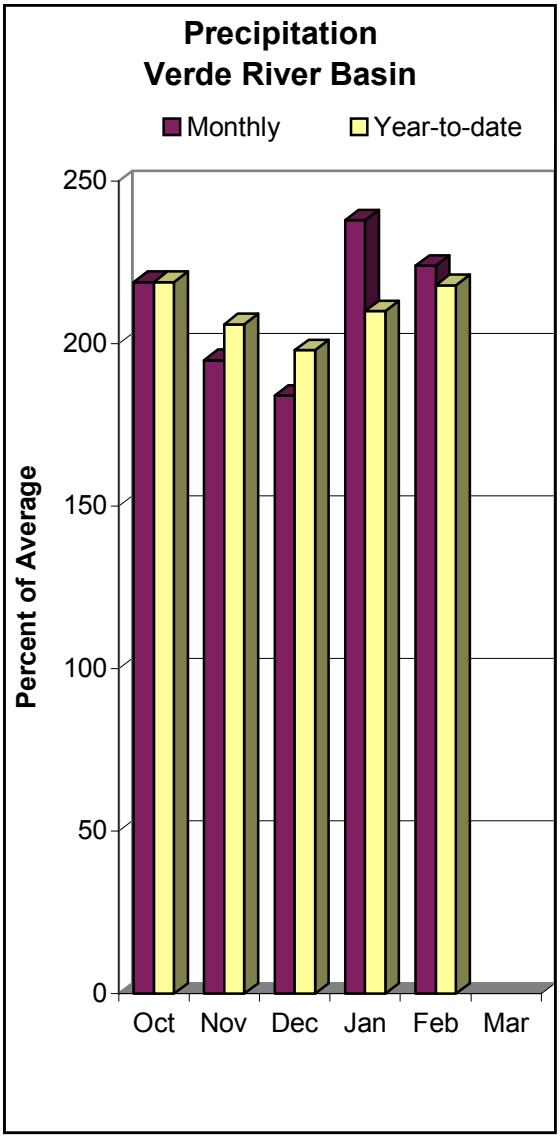
Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
SALT RIVER BASIN	8	131	95

VERDE RIVER BASIN as of March 15, 2005

Well above median streamflow levels are forecast for the basin. In the Verde River, at Horseshoe Dam, the forecast calls for 100 % of median streamflow levels through MAY.

Additionally, snow survey measurements show the basin snowpack to be at 118 % of the 30-year average, while combined reservoir storage in the Verde River system stands at 284,878 acre-feet.





VERDE RIVER BASIN
Streamflow Forecasts - March 15, 2005

Forecast Pt / Forecast Period	<=== Drier === 90% (1000AF)	70% (1000AF)	Future Conditions — Chance of Exceeding * — 50% (1000AF)	50% (% MED.)	=== Wetter ===> 30% (1000AF)	10% (1000AF)	30 Yr Med (1000AF)
Verde River abv Horseshoe Dam							
MAR15-MAY	47	75	100	100	130	184	100
MARCH	46	69	85	170	101	124	50

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VERDE RIVER BASIN
Reservoir Storage (1000AF) Mid-March

Reservoir	Usable Capacity	********** Usable Storage ********* This Year	Last Year	Average
VERDE RIVER MID-MONTH	287.4	284.9	128.5	187.9

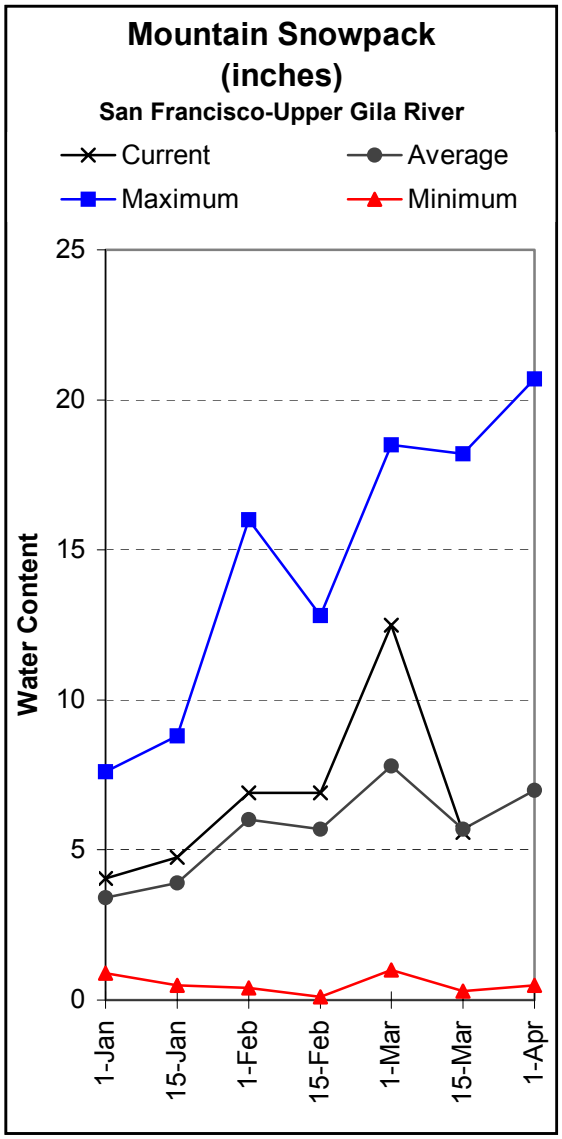
VERDE RIVER BASIN
Watershed Snowpack Analysis - March 15, 2005

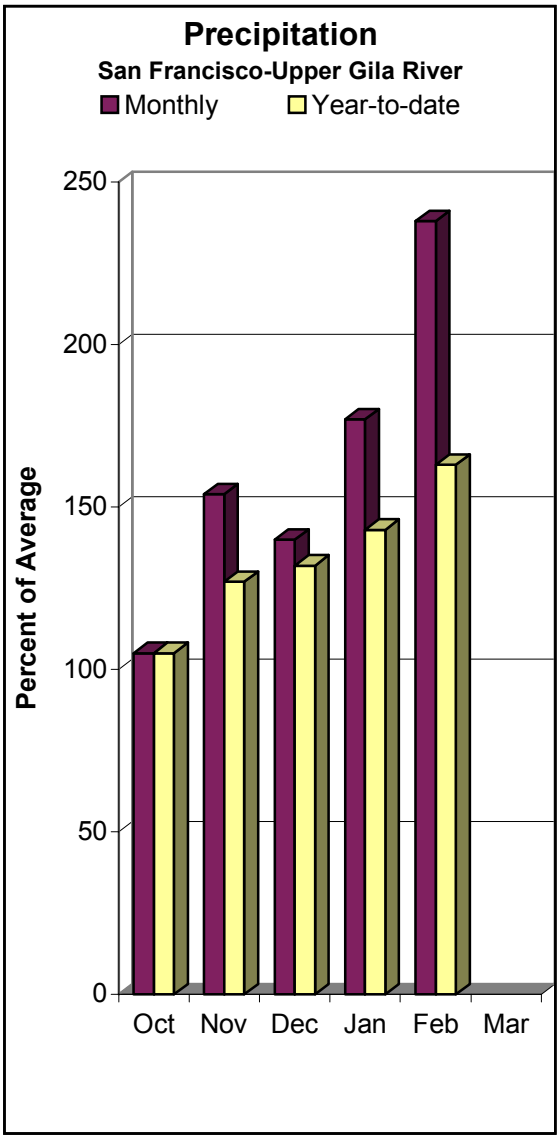
Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
VERDE RIVER BASIN	10	206	118
SAN FRANCISCO PEAKS	3	285	197

SAN FRANCISCO-UPPER GILA RIVER BASIN as of March 15, 2005

Well above median streamflow levels are forecast for the basin. In the San Francisco River, at Clifton, the forecast calls for 143 % of median streamflow levels through MAY, while in the Gila River, near Solomon, the forecast calls for 123 % of median streamflow levels through MAY. At San Carlos Reservoir, inflow to the lake is forecast at 135 % of median through MAY.

At San Carlos, reservoir storage stands at 429,186 acre-feet, while snow survey measurements show the basin snowpack to be at 98 % of the 30-year average.





SAN FRANCISCO - UPPER GILA RIVER BASIN
Streamflow Forecasts - March 15, 2005

Forecast Pt / Forecast Period	<=== Drier === 90% (1000AF)	70% (1000AF)	Future Conditions — Chance of Exceeding * — 50% (1000AF)	50% (% MED.)	=== Wetter ===> 30% (1000AF)	10% (1000AF)	30 Yr Med (1000AF)
Gila River at Gila							
MAR15-MAY	35	44	50	200	57	68	25
Gila River nr Virden							
MAR15-MAY	28	44	55	172	66	82	32
San Francisco River at Glenwood							
MAR15-MAY	13.2	18.6	23	187	28	37	12.3
San Francisco River at Clifton							
MAR15-MAY	14.2	31	43	143	55	72	30
Gila River nr Solomon							
MAR15-MAY	20	62	90	123	118	160	73
MARCH			108	204			53
San Carlos Reservoir inflow							
MAR15-MAY	22	47	65	135	83	108	48

* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.
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SAN FRANCISCO - UPPER GILA RIVER BASIN
Reservoir Storage (1000AF) Mid-March

Reservoir	Usable Capacity	********** Usable Storage ********* This Year	Last Year	Average
SAN CARLOS MID-MONTH	875.0	428.2	29.8	476.9
PAINTED ROCK DAM		NO REPORT		

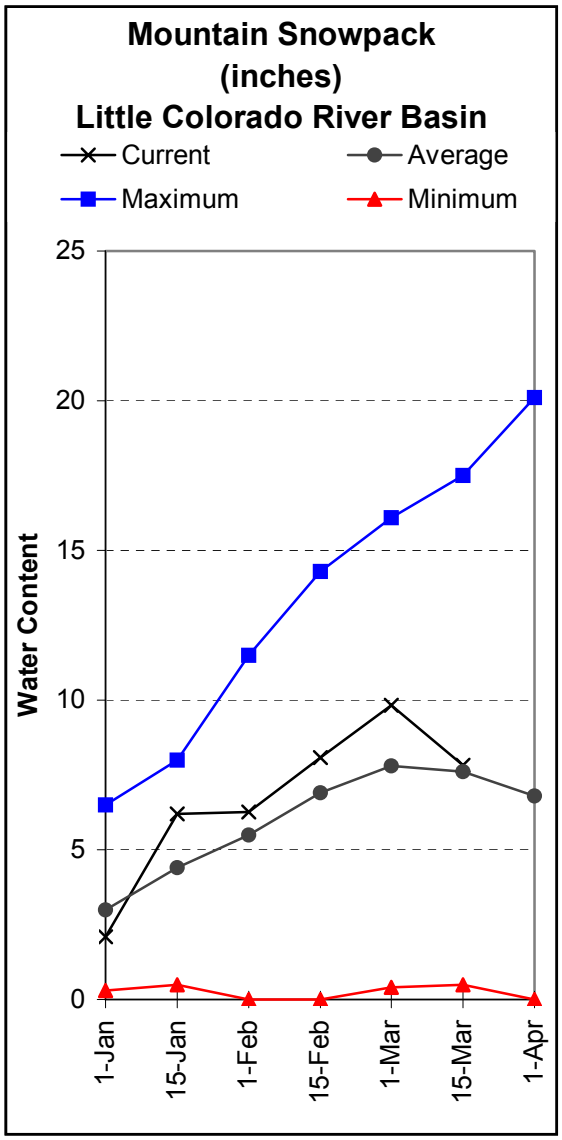
SAN FRANCISCO - UPPER GILA RIVER BASIN
Watershed Snowpack Analysis - March 15, 2005

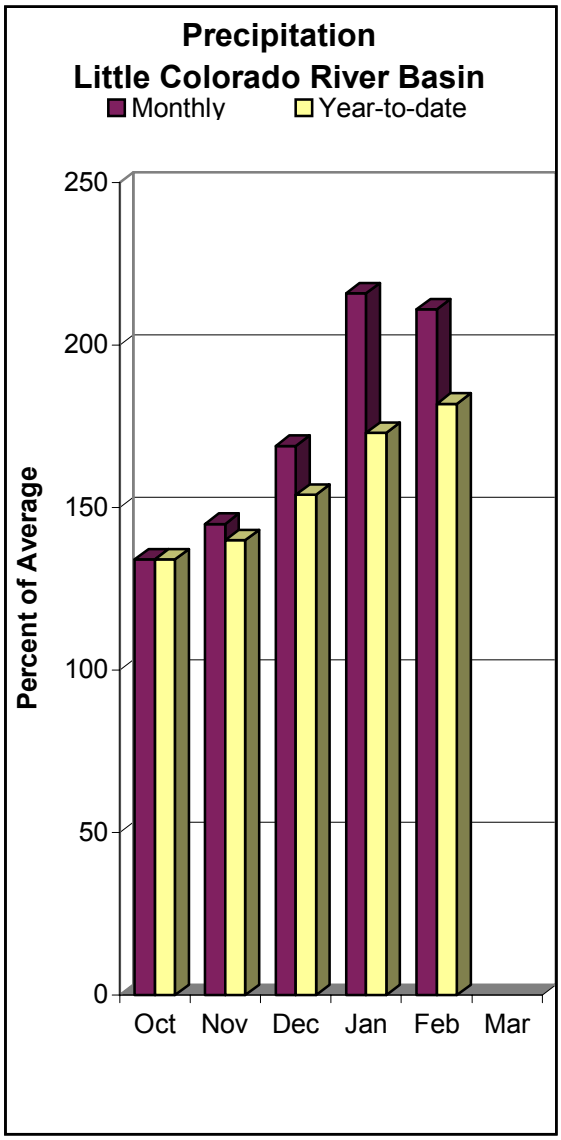
Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
SAN FRANCISCO - UPPER GILA R	9	126	98

LITTLE COLORADO RIVER BASIN as of March 15, 2005

Well above median streamflow levels are forecast for the basin. In the Little Colorado River, at Lyman Lake, the forecast calls for 246 % of median streamflow levels through JUNE, while at Woodruff, the forecast calls for 191 % of median streamflow levels through MAY.

Additionally, snowpack levels at the southern headwaters of the Little Colorado River and along the central Mogollon Rim were measured at 103 % and 104 % of the 30-year average, respectively.





LITTLE COLORADO RIVER BASIN
Streamflow Forecasts - March 15, 2005

Forecast Pt / Forecast Period	<=== Drier === 90% (1000AF)	70% (1000AF)	Future Conditions — Chance of Exceeding * — 50% (1000AF)	50% (% MED.)	=== Wetter ===> 30% (1000AF)	10% (1000AF)	30 Yr Med (1000AF)
Little Colorado River abv Lyman Lake							
MAR-JUN	8.25	12.20	15.50	246	19.34	26.10	6.30
Little Colorado River at Woodruff							
MAR-MAY	1.58	3.14	4.20	191	5.26	6.80	2.20
Blue Ridge Reservoir inflow							
MAR-MAY	13.3	17.1	20	156	23	28	12.8
Lake Mary inflow							
MAR-MAY	3.04	4.64	6.00	146	7.60	10.45	4.10

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(2) - The value is natural volume - actual volume may be affected by upstream water management.

LITTLE COLORADO RIVER BASIN
Reservoir Storage (1000AF) Mid-March

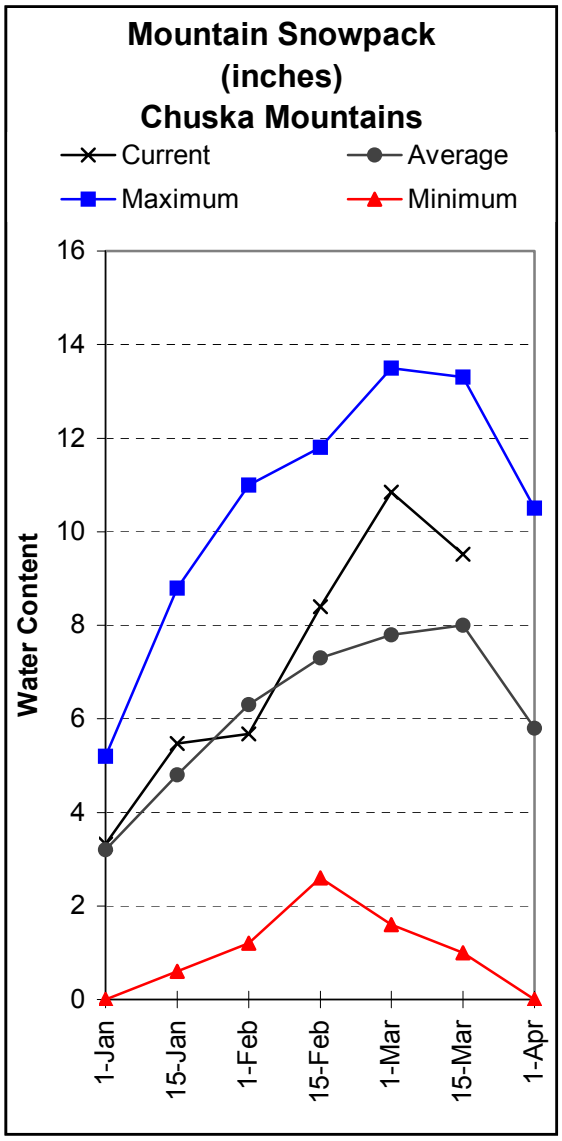
Reservoir	Usable Capacity	********** Usable Storage ********* This Year	Last Year	Average
LYMAN RESV MID-MONTH	30.0	5.4	2.6	16.2
SHOW LOW LAKE MID-MONTH	5.1	5.1	3.5	3.6

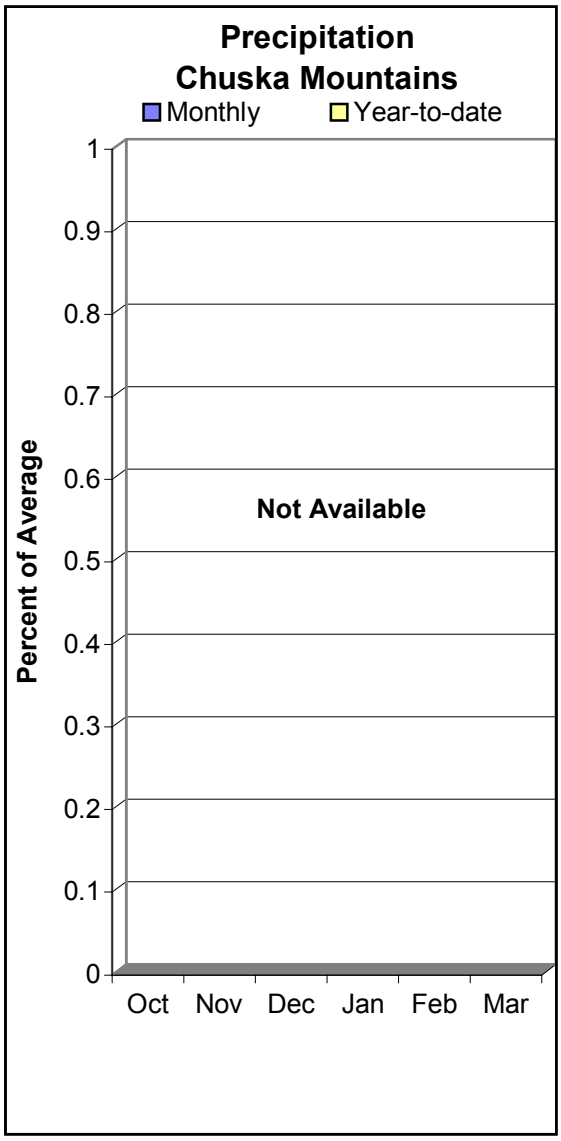
LITTLE COLORADO RIVER BASIN
Watershed Snowpack Analysis - March 15, 2005

Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
LITTLE COLORADO - SOUTHERN H	9	177	103
CENTRAL MOGOLLON RIM	4	222	104

CHUSKA MOUNTAINS as of March 15, 2005

Snow survey measurements conducted by staff of the Navajo Tribe show the Chuska snowpack to be 119 % of average, while well above average streamflow levels are forecast for Captain Tom Wash, Wheatfields Creek, and Bowl Canyon Creek through May.





CHUSKA MOUNTAINS
Streamflow Forecasts - March 15, 2005

Forecast Pt / Forecast Period	<=== Drier === 90% (1000AF)	70% (1000AF)	Future Conditions 50% (1000AF)	50% (% AVG.)	=== Wetter ===> 30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
Captain Tom Wash nr Two Gray Hills							
MAR-MAY	1.30	3.10	4.40	156	5.70	7.50	2.83
Wheatfields Creek nr Wheatfields							
MAR-MAY	1.20	3.10	4.40	152	5.70	7.60	2.90
Bowl Canyon Creek abv Assayi Lake							
MAR-MAY	0.50	1.15	1.60	160	2.04	2.74	1.00

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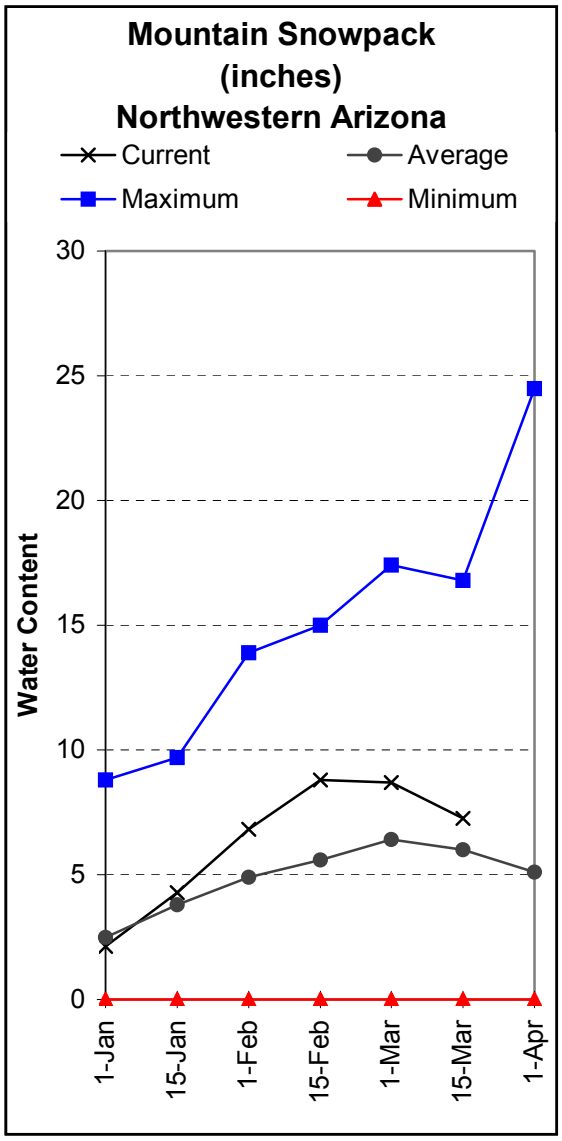
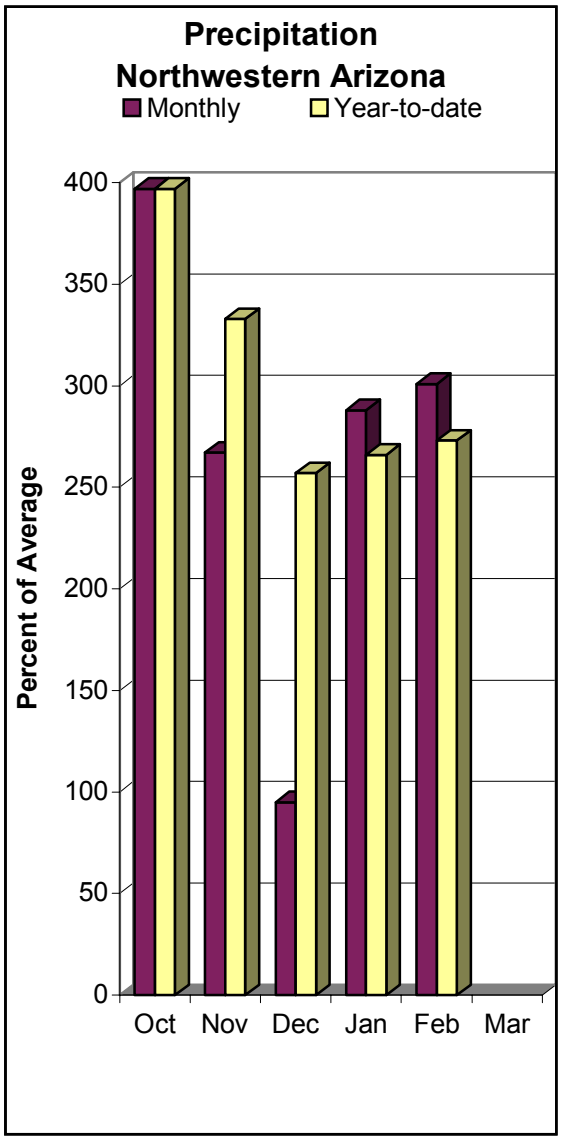
CHUSKA MOUNTAINS
Watershed Snowpack Analysis - March 15, 2005

Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
CHUSKA MOUNTAINS	7	131	119
DEFIANCE PLATEAU	2	31	37

NORTHWESTERN ARIZONA as of March 15, 2005

On the Colorado River, inflow to Lake Powell is forecast at 101 % of the 30-year average through JULY, while at the Grand Canyon, snow measurements conducted by staff of the National Park Service show the snowpack to be at 121 % of the 30-year average.





NORTHWESTERN ARIZONA
Streamflow Forecasts - March 15, 2005

Forecast Pt / Forecast Period	<=== Drier === 90% (1000AF)	70% (1000AF)	Future Conditions 50% (1000AF)	50% (% AVG.)	=== Wetter ===> 30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
Lake Powell inflow							
APR-JUL	5638	7044	8000	101	8954	10359	7930

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(2) - The value is natural volume - actual volume may be affected by upstream water management.

NORTHWESTERN ARIZONA
Reservoir Storage (1000AF) Mid-March

Reservoir	Usable Capacity	********** Usable Storage ********* This Year	Last Year	Average
LAKE HAVASU MID-MONTH	619.0	546.6	550.7	552.6
LAKE MOHAVE MID-MONTH	1810.0	1728.1	1701.5	1694.0
LAKE MEAD MID-MONTH	26159.0	16062.0	15371.0	22090.0
LAKE POWELL MID-MONTH	24322.0	8128.0	10340.0	18366.0

NORTHWESTERN ARIZONA
Watershed Snowpack Analysis - March 15, 2005

Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
GRAND CANYON	2	182	121

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

MARCH 15, 2005

SNOW COURSE	ELEV.	DATE	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE 71-00
ARBABS FOREST (AK)	7680	3/14	5	.4	1.0	1.3
BAKER BUTTE SNOTEL	7330	3/15	14	4.8	1.0	5.6
BAKER BUTTE #2	7700	3/15	42	16.9	8.7	13.7
BALDY SNOTEL	9220	3/15	34	10.8	6.9	8.1
BEAVER HEAD	8000	3/14	2	0.8	2.0	2.1
BEAVER HEAD SNOTEL	7990	3/15	14	6.1	4.0	2.6
BEAVER SPRING	9220	3/15	35	12.6	8.6	9.9
BRIGHT ANGEL	8400	3/16	37	15.0	8.4	11.3
BUCK SPRING	7400	3/14	0	.0	0.9	3.1
CHALENDER	7100	3/14	4	0.4	0.0	2.8
CHEESE SPRINGS	8600	3/14	16	6.0	4.8	5.8
CORONADO TRL SNOTEL	8400	3/15	-	2.4	0.5	2.2
CORONADO TRAIL	8400	3/14	1	0.7	0.0	2.3
FLUTED ROCK	7800	3/15	4	1.1	3.8	2.8
FORT APACHE	9160	3/14	32	9.6	6.7	8.1
FORT VALLEY	7350	3/14	9	2.4	0.0	1.9
FRY SNOTEL	7220	3/15	26	9.6	4.3	5.5
GRAND CANYON	7500	3/14	4	0.3	0.0	1.3
HANNAGAN MDWS SNOTEL	9020	3/15	49	11.6	10.1	12.3
HAPPY JACK	7630	3/15	18	5.9	3.1	4.4
HAPPY JACK SNOTEL	7630	3/15	28	9.3	4.2	6.3
HEBER SNOTEL	7640	3/15	-	.8	0.3	4.1
LAKE MARY	6970	3/15	5	0.8	0.5	1.4
MAVERICK FORK SNOTEL	9200	3/15	40	13.6	7.5	9.5
MORMON MTN SNOTEL	7500	3/15	23	8.6	5.8	6.4
MORMON MT. SUMMIT #2	8470	3/15	58	20.5	11.5	15.0
NEWMAN PARK	6750	3/14	5	0.9	0.9	1.2
NUTRIOSO	8500	3/14	0	.0	0.0	1.2
PROMONTORY SNOTEL	7900	3/15	39	15.1	6.9	12.9
SNOW BOWL #1 ALT.	10260	3/16	81	27.0	8.2	16.1
SNOW BOWL #2	11000	3/16	112	34.8	11.2	20.5
SNOWSLIDE CYN SNTL	9750	3/15	101	37.0	15.3	13.5
TSAILE CANYON #1	8160	3/15	14	6.2	6.5	6.2
TSAILE CANYON #3	8920	3/15	31	11.3	9.3	9.5
WHITE HORSE SNOTEL	7180	3/15	4	2.6	0.0	4.6
WILDCAT SNOTEL	7850	3/15	-	.0	2.6	3.7
WILLIAMS SKI RUN	7720	3/14	34	11.0	6.3	9.9
WORKMAN CREEK SNOTEL	6900	3/15	-	.0	0.7	4.2

Issued by

Bruce I. Knight
Chief
Natural Resources Conservation Service
U.S. Department of Agriculture

Released by

David L. McKay
State Conservationist
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Phoenix, Arizona

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