

# PEAK FLOW FORECASTS

## FLOW EXTREMES, NOT SUPPLY

Peak flow forecasts are fundamentally different than water supply volume forecasts. Although the watershed snowpack is a principal component in both analyses, peak flows are not a supply question at all. Rather, peak flows characterize runoff extremes by predicting maximum mean daily flow at a single point during the spring snowmelt season. This extreme is related to the water supply volume, but the relationship is not direct or constant from year to year. As such, peak flow forecasts contain much more uncertainty than water supply volume forecasts.

## REGULATED VS. NATURAL FLOWS

An even more fundamental limitation is that peak forecasts describe regulated (actual or observed) in-stream flow well into the future, something difficult to do considering the quantity and changing nature of diversions in the Colorado River and Great Basin watersheds. (Note: supply forecasts deal with hypothetical "natural" flow - that which would have resulted in the absence of regulation). The Colorado Basin River Forecast Center routinely forecasts regulated streamflow, but only for several days into the future. Further into the future the ability to forecast reservoir regulation becomes more limited.

## DIFFERENT USES AND USERS

Peak flow forecasts are used for different purposes than water supply volume forecasts. Users of these forecasts would include river recreationists, flood control agencies, emergency service directors, wildlife managers and anyone interested in the combined effect of watershed yield and human regulation on the actual (observed) in-stream maximum mean daily flows at a site.

## FLOOD FLOWS

The National Weather Service defines flood flow as the flow at which damage to structures begins to occur. Over-bank flow may occur but still be below the defined flood flow. Flood flows contained in this document change from year to year due to such channel processes as deposition and scouring. Therefore, the flood flows that follow should only be applied to the current runoff season. It should also be noted that they are instantaneous flows and not maximum mean daily flows.

## IMPORTANT NOTE:

**The latest forecasts can be accessed through the CBRFC homepage (<http://www.cbrfc.gov>) or by calling the appropriate Service Hydrologist (see page 8 and 9).**

# INTERPRETIVE NOTES

## PEAK FLOW DEFINED

The peak flow forecast represents the maximum mean daily flow (the highest average flow for an entire day during the runoff season) at a point during the April through July period, unless otherwise noted. It does not represent the instantaneous peak (the maximum flow at a single moment). In the case of smooth snowmelt regimes (hydrographs), it may be acceptable to approximate one with the other. In Arizona, the normal snowmelt period is from February to May. Occasionally, heavy rainfall events can produce higher peak flows than the snowmelt peak flows. For verification and calibration purposes, the maximum mean daily flow during the February through May period was used regardless of the runoff source. The Average Peak and Normal Time of Peak (defined as the average date of peak plus/minus one standard deviation which should include approximately 70% of the peaks) for a given gage are all derived from 1971 through 2000 data whereas the Historic Peak is derived from the period of record, including the most recent years, after reservoir regulation began.

## FORECAST PROBABILITIES

Peak flow forecasts are presented in terms of probabilities or, more specifically, exceedance probabilities. The forecast labeled “most probable” is actually the 50% exceedance level meaning there are equal chances of being below the value or above the value (i.e., 50 chances out of 100 of being exceeded). The other exceedance probabilities associate the likelihood of exceeding other levels. In general, a close bunching of the exceedance forecasts indicates low variability and that the user can have a high degree of confidence in the forecast information. Conversely, a large spread in the exceedance forecasts indicates high variability.

## MODELLING TECHNIQUES

The peak flow forecasts that follow have been derived using a combination of (1) physically-based conceptual models and (2) statistical regression models. The conceptual model is the National Weather Service River Forecasting System in the Ensemble Streamflow Prediction (ESP) mode. Since the conceptual model requires reservoir operation plans for up to five months into the future, ESP application is limited to basins where regulation is minimal (mostly in the headwater areas). The farther downstream a forecast point is, the more likely it is that a statistical regression was used between natural snowmelt runoff volume and the observed maximum mean daily flow to generate the forecast. Such an approach performs better when the correlation between regulated and unregulated flow is strong and is constant from year to year.

# UPPER COLORADO PEAK FLOW FORECASTS

Mean daily flows in cubic feet per second (cfs)

STATION NAME	Historic Peak	Average Peak	Flood* Flow	2005 Peak	2005 Date	Provisional 2006 Peak through 6/06/06 % indicates snowmelt peak has occurred	Normal time of peak
COLORADO - KREMMLING, NR	12,700	3,900	10,100	2,510	6/25	2690 cfsd on 5/22 (%)	5/15 - 6/27
EAGLE - GYPSUM, BLO	6,580	3,600	6,600	3,400	5/23	3920 cfsd on 5/23 (%)	6/1 - 6/21
ROARING FORK - GLENWOOD SPRINGS	11,200	6,150	16,800	5,720	6/24	5640 cfsd on 5/23 (%)	6/3 - 6/18
COLORADO - CAMEO, NR	38,000	17,500	23,500	16,800	5/25	16400 cfsd on 5/23 (%)	5/29 - 6/18
PLATEAU CK - CAMEO, NR	4,100	1,460	3,260	2,310	5/24	1250 cfsd on 5/23 (%)	5/9 - 6/11
EAST - ALMONT, NR	5,000	2,080	3,100	2,070	5/25	1830 cfsd on 5/27 (%)	5/28 - 6/17
NF GUNNISON - SOMERSET, NR	7,080	3,310	12,400	4,730	5/21	2350 cfsd on 5/23 (%)	5/11 - 6/2
SURFACE CK - CEDAREGE	640	210	1,400	685	5/24	150 cfsd on 5/23 (%)	5/3 - 6/8
UNCOMPAHGRE - COLONA	1,900	1,390	3,100	1,130	6/25	540 cfsd on 5/22 (%)	5/20 - 6/27
COLORADO - CO-UT STATELINE, NR	68,300	26,150	47,800	30,300	5/25	21300 cfsd on 5/24 (%)	5/22 - 6/16
DOLORES - DOLORES	6,950	2,980	8,700	4,890	5/23	1490 cfsd on 5/22 (%)	5/9 - 6/4
SAN MIGUEL - PLACERVILLE, NR	2,740	1,310	2,650	1,380	5/23	815 cfsd on 5/25	5/26 - 6/23
DOLORES - CISCO, NR (see note1 below)	12,900	6,050	N/A	9,030	5/26	1080 cfsd on 4/16 (%)	4/26 - 6/5
COLORADO - CISCO, NR	69,500	28,800	61,300	39,500	5/25	21400 cfsd on 5/24 (%)	5/20 - 6/15
GREEN - DANIEL, NR, WARREN BRIDGE, AT	5,620	2,975	N/A	2,850	6/25	2330 cfsd on 5/24	5/30 - 6/30
NEW FORK - BIG PINEY, NR	9,110	5,285	N/A	5,330	6/23	4710 cfsd 5/24	5/31 - 6/24
GREEN - LABARGE, NR	18,800	9,270	14,600	8,590	6/25	7280 cfsd on 5/24	5/30 - 6/24
BIG SANDY - FARSON, NR	1,690	820	1,300	926	6/22	700 cfsd on 5/23	5/28 - 6/23
GREEN - GREEN RVR WY, NR	15,400	7,110	15,500	6,510	6/03	4150 cfsd on 6/5	5/23 - 7/11
HAMS FORK - FRONTIER, NR, POLE CK, BLO	2,000	825	1,600	1,030	6/21	850 cfsd on 5/21	5/10 - 6/9
BLACKS FORK - LITTLE AMERICA, NR	6,970	2,440	5,500	5,500	5/19	640 cfsd on 5/4	5/2 - 6/27

N/A - NOT AVAILABLE (NOT A FLOOD FORECAST POINT OR NO FORECAST PROCEDURE EXISTS)

note1 - for releases below McPhee Reservoir call 970-565-7562

\* Flood flow is for current year only and is an instantaneous value

# UPPER COLORADO PEAK FLOW FORECASTS (continued)

Mean daily flows in cubic feet per second (cfs)

STATION NAME	Historic Peak	Average Peak	Flood* Flow	2005 Peak	2005 Date	Provisional 2006 Peak through 6/06/06 % indicates snowmelt peak has occurred	Normal time of peak
YAMPA - STEAMBOAT SPRINGS	5,870	3,240	4,500	3,000	6/23	3830 cfsd on 5/24 (%)	5/19 - 6/12
YAMPA - MAYBELL, NR	24,400	10,475	26,900	12,500	5/24	11000 cfsd on 5/24 (%)	5/13 - 6/10
LITTLE SNAKE - LILY, NR	13,400	4,745	19,400	3,830	5/24	3330 cfsd on 5/24 (%)	5/5 - 6/12
YAMPA - DEERLODGE PARK	32,300	13,955	17,500	15,200	5/24	13700 cfsd on 5/25 (%)	5/11 - 6/6
GREEN - JENSEN, NR (see note1 below)	38,500	17,600	23,600	19,500	5/26	18200 cfsd on 5/25 (%)	5/14 - 6/11
ROCK CK - UPR STILLWATER RES	2,080	1,350	N/A	1,325	5/26	1364 cfsd on 5/22 (%)	5/25 - 6/20
DUCHESNE - TABIONA, NR	2,320	765	4,040	1,900	5/26	1440 cfsd on 5/22	5/15 - 6/15
DUCHESNE - RANDLETT, NR	11,500	2,755	7,400	3,350	5/26	830 cfsd on 5/21	4/27 - 7/5
WHITE - MEEKER, NR	6,320	3,200	6,500	2,890	5/24	2890 cfsd on 5/23 (%)	5/21 - 6/14
GREEN - GREEN RIVER, UT (see note1 below)	47,200	22,560	48,500	34,900	5/29	21500 cfsd on 5/27 (%)	5/18 - 6/16
SAN RAFAEL - GREEN RIVER, NR	3,600	910	N/A	2,010	6/05	1520 cfsd on 5/24 (%)	5/17 - 7/16
MUDDY CK - EMERY, NR	515	205	N/A	456	6/03	330 cfsd on 5/20 (%)	5/19 - 6/18
DIRTY DEVIL - HANKSVILLE, NR, POISON SPGS **	1,310	445	N/A	N/A	N/A	NA	3/12 - 5/31
ESCALANTE - ESCALANTE, NR ***	227	72	N/A	N/A	N/A	53 cfsd on 4/30 (%)	3/24 - 6/2
CATARACT CANYON (estimated)	116,700	51,350	N/A	69,900	5/26	e43000 cfsd on 5/25 (%)	5/20 - 6/16
SAN JUAN - PAGOSA SPRINGS	4,640	2,485	6,760	4,420	5/23	1420 cfs on 5/21 (%)	5/15 - 6/12
ANIMAS - DURANGO	10,700	4,675	10,300	8,070	5/25	3140 cfs on 5/25 (%)	5/28 - 6/14
SAN JUAN - BLUFF, NR (see note2 below)	15,600	7,340	40,700	12,100	5/28	6770 cfsd on 6/9 (%)	5/21 - 7/4

N/A - NOT AVAILABLE (NOT A FLOOD FORECAST POINT OR NO FORECAST PROCEDURE EXISTS)

NOTE1 - Peak flow forecasts on the Green River below Flaming Gorge Reservoir are based on USBR planned regulation.

NOTE2 - Peak flow forecasts on the San Juan below Navajo Reservoir are based on USBR planned regulation.

\* Flood flow is for current year only and is an instantaneous value      \*\* Runoff period March - June

\*\*\* Runoff Period March - June does not include contribution from Boulder Creek

# LOWER COLORADO PEAK FLOW FORECASTS

Mean daily flows in cubic feet per second (cfs)

STATION NAME	Historic Peak	Average Peak	Flood* Flow	2005 Peak	2005 Date	Provisional 2006 Peak through 6/06/06 % indicates snowmelt peak has occurred	Normal time of peak
VIRGIN - LITTLEFIELD, NR	17,000	1,915	20,855	2,510	5/22	<b>2400 cfsd on 3/29 (%)</b>	3/15 - 5/6
VIRGIN - HURRICANE, NR	9,620	1,520	5,295	2,270	5/22	<b>2670 cfsd on 3/30 (%)</b>	3/14 - 5/9
SANTA CLARA - PINE VALLEY, NR	393	65	N/A	184	5/24	<b>181 cfsd on 3/30 (%)</b>	4/25 - 5/25
STATION NAME	Historic Peak	Average Peak	Flood* Flow				Normal time of peak
SALT - ROOSEVELT, NR	77,200	9,610	142,295	30,700	2/12	<b>458 cfsd on 4/9 (%)</b>	3/6 - 4/9
TONTO CK - ROOSEVELT, NR, GUN CK, ABV	32,200	4,090	53,100	19,100	2/12	<b>32 cfsd on 3/23 (%)</b>	3/3 - 4/4
OAK CREEK - SEDONA, NR	8,600	1,550	14,050	5,750	2/12	<b>39 cfsd on 3/20 (%)</b>	3/6 - 4/9
VERDE - HORSESHOE DAM, ABV, TANGLE CK	65,100	8,530	129,230	Gage Problems		<b>194 cfsd on 3/22 (%)</b>	3/6 - 4/9
AGUA FRIA - ROCK SPRINGS, NR	23,600	2,565	10,895	17,300	2/12	<b>9 cfsd on 3/14 (%)</b>	2/28 - 4/3

*N/A - NOT AVAILABLE (NOT A FLOOD FORECAST POINT OR NO FORECAST PROCEDURE EXISTS)*

*\* Flood flow is for current year only and is an instantaneous value*

# GREAT BASIN PEAK FLOW FORECASTS

Mean daily flows in cubic feet per second (cfs)

STATION NAME	Historic Peak	Average Peak	Flood* Flow	2005 Peak	2005 Date	Provisional 2006 Peak through 6/06/06 % indicates snowmelt peak has occurred	Normal time of peak
BEAR - UTAH-WYOMING STATELINE, NR	2,680	1,610	4,400	1,820	5/04	1500 cfsc on 5/21	5/22 - 6/14
LOGAN - LOGAN, NR, STATE DAM, ABV	1,870	985	1,560	1,230	5/25	1560 cfsc on 5/21 (%)	5/18 - 6/10
BLACKSMITH FORK - HYRUM, NR, UP&L DAM	1,530	490	850	980	4/28	580 cfsc on 4/16 (%)	4/24 - 5/20
WEBER - OAKLEY, NR	4,170	1,625	2,400	1,620	6/18	1400 cfsc on 5/27	5/24 - 6/16
CHALK CK - COALVILLE	1,420	600	1,900	720	5/21	390 cfsc on 5/20 (%)	5/5 - 5/31
PROVO - WOODLAND, NR	2,530	1,685	3,150	1,750	6/01	2100 cfsc on 5/27	5/11 - 6/6
LITTLE COTTONWOOD CK - SALT LAKE CITY, NR	762	470	700	451	6/24	400 cfsc on 6/5	5/23 - 6/20
BIG COTTONWOOD CK - SALT LAKE CITY, NR	980	430	700	607	6/22	450 cfsc on 5/20 (%)	5/18 - 6/9
MILL CK - SALT LAKE CITY, NR	153	65	180	80	5/21	70 cfsc on 5/21 (%)	5/18 - 6/10
PARLEYS CK - SALT LAKE CITY, NR	605	180	350	187	5/21	230 cfsc on 5/5 (%)	4/23 - 5/22
EMIGRATION CK - SALT LAKE CITY, NR	164	55	135	42	5/18	50 cfsc on 5/1 (%)	4/11 - 5/19
CITY CK - SALT LAKE CITY, NR	322	90	150	120	5/24	124 cfsc on 5/21 (%)	5/12 - 6/1
SEVIER - HATCH	1,740	495	1,200	1,740	6/03	520 cfsc on 5/19 (%)	5/6 - 6/2

N/A - NOT AVAILABLE (NOT A FLOOD FORECAST POINT OR NO FORECAST PROCEDURE EXISTS)

\* Flood flow is for current year only and is an instantaneous value



## FLOOD POTENTIAL INFORMATION

### **SERVICE HYDROLOGISTS**

*Colorado Basin River Forecast Center*

*June 2006*

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The graphic on the following page depicts the areas of responsibility of the various Service Hydrologists or Hydro Focal Points. The following list links these individuals and their corresponding areas of responsibility. **A Service Hydrologist/Hydro Focal Point is the National Weather Service hydrologic coordinator and spokesperson for a given hydrologic service area and is the person to contact for current flood potential, streamflows, snowpack information and updates to peak flow forecasts.** Following their phone number is a URL to their homepage.

1) Albuquerque, NM	Ed Polasko	505-244-9147x228	<a href="http://www.srh.noaa.gov/abq/">http://www.srh.noaa.gov/abq/</a>
2) Cheyenne, WY	Melissa Goering	307-772-2468x493	<a href="http://www.crh.noaa.gov/cys/">http://www.crh.noaa.gov/cys/</a>
3) Boulder, CO	Treste Huse	303-494-3210x493	<a href="http://www.crh.noaa.gov/den/">http://www.crh.noaa.gov/den/</a>
4) El Paso, TX	Tim Brice	505-589-4088x308	<a href="http://www.srh.noaa.gov/elp/">http://www.srh.noaa.gov/elp/</a>
5) Flagstaff, AZ	Tom Clemmons	928-556-9161x229	<a href="http://www.wrh.noaa.gov/fgz/">http://www.wrh.noaa.gov/fgz/</a>
6) Grand Junction, CO	Brian Avery	970-243-7007x493	<a href="http://www.crh.noaa.gov/gjt/">http://www.crh.noaa.gov/gjt/</a>
7) Las Vegas, NV	Barry Pierce	702-263-9750	<a href="http://www.wrh.noaa.gov/vef/">http://www.wrh.noaa.gov/vef/</a>
8) Phoenix, AZ	Tom Zickus	602-275-8881x228	<a href="http://www.wrh.noaa.gov/psr/">http://www.wrh.noaa.gov/psr/</a>
9) Pocatello, ID	Sherrie Hebert	208-233-0834	<a href="http://www.wrh.noaa.gov/pih/">http://www.wrh.noaa.gov/pih/</a>
10) Pueblo, CO	Larry Walrod	719-948-3838	<a href="http://www.crh.noaa.gov/pub/">http://www.crh.noaa.gov/pub/</a>
11) Riverton, WY	Jim Fahey	307-857-3898x493	<a href="http://www.crh.noaa.gov/riw/">http://www.crh.noaa.gov/riw/</a>
12) Salt Lake City, UT	Brian McInerney	801-524-5142x228	<a href="http://www.wrh.noaa.gov/slc/">http://www.wrh.noaa.gov/slc/</a>
13) Tucson, AZ	Mike Schaffner	520-670-5156x228	<a href="http://www.wrh.noaa.gov/twc/">http://www.wrh.noaa.gov/twc/</a>



**NATIONAL WEATHER SERVICE HYDROLOGIC SERVICE AREAS  
IN THE CBRFC AREA OF RESPONSIBILITY**

