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.

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 Extended 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	2002 Peak	2002 Date	Provisional 2003 Peak through 6/06/03 % indicates snowmelt peak has occurred	Normal time of peak
COLORADO - KREMMLING, NR	12,700	3,900	8,300	885	6/30	**2500 cfs on 6/1 (%)**	5/15 - 6/27
EAGLE - GYPSUM, BLO	6,580	3,600	6,400	1,270	6/01	**5140 cfs on 6/1 (%)**	6/1 - 6/21
ROARING FORK - GLENWOOD SPRINGS	11,200	6,150	11,860	2,170	6/01	**6550 cfs on 6/2 (%)**	6/3 - 6/18
COLORADO - CAMEO, NR	38,000	17,500	28,550	4,020	6/02	**20300 cfs on 6/2 (%)**	5/29 - 6/18
PLATEAU CK - CAMEO, NR	4,100	1,460	5,100	120	4/03	**675 cfs on 5/23 (%)**	5/9 - 6/11
EAST - ALMONT, NR	5,000	2,080	2,870	680	6/01	**2410 cfs on 5/30 (%)**	5/28 - 6/17
NF GUNNISON - SOMERSET, NR	7,080	3,310	14,600	655	5/31	**3250 cfs on 5/28 (%)**	5/11 - 6/2
SURFACE CK - CEDAREDGE	640	210	1,980	50	5/07	**140 cfs on 5/18 (%)**	5/3 - 6/8
UNCOMPAHGRE - COLONA, NR	1,900	1,390	3,000	290	5/21	**1540 cfs on 5/30 (%)**	5/20 - 6/27
COLORADO - CO-UT STATELINE, NR	68,300	26,150	47,500	4,470	6/02	**24500 cfs on 6/2 (%)**	5/22 - 6/16
DOLORES - DOLORES	6,950	2,980	10,280	445	4/15	**1880 cfs on 5/28 (%)**	5/9 - 6/4
SAN MIGUEL - PLACERVILLE, NR	2,740	1,310	3,120	280	5/31	**1350 cfs on 5/30 (%)**	5/26 - 6/23
DOLORES - CISCO, NR (see note1 below)	12,900	6,050	N/A	400	4/03	**1320 cfs on 4/15 (%)**	4/26 - 6/5
COLORADO - CISCO, NR	69,500	28,800	60,500	4,580	6/03	**26200 cfs on 6/3 (%)**	5/20 - 6/15
GREEN - DANIEL, NR, WARREN BRIDGE, AT	5,620	2,975	N/A	2,000	6/03	**2900 cfs on 6/3 (%)**	5/30 - 6/30
NEW FORK - BIG PINEY, NR	9,110	5,285	N/A	2,200	6/03	**2200 cfs on 5/30 (%)**	5/31 - 6/24
GREEN - LABARGE, NR	18,800	9,270	11,100	4,300	6/04	**6000 cfs on 6/3 (%)**	5/30 - 6/24
BIG SANDY - FARSON, NR	1,690	820	1,400	470	6/09	**650 cfs on 5/26 (%)**	5/28 - 6/23
GREEN - GREEN RVR WY, NR	15,400	7,110	15,900	1,400	5/11	**N/A**	5/23 - 7/11
HAMS FORK - FRONTIER, NR, POLE CK, BLO	2,000	825	1,600	310	6/02	**350 cfs on 5/30 (%)**	5/10 - 6/9
BLACKS FORK - LITTLE AMERICA, NR	6,970	2,440	5,440	55	5/24	**100 cfs on 5/13 (%)**	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	2002 Peak	2002 Date	Provisional 2003 Peak through 6/06/03 % indicates snowmelt peak has occurred	Normal time of peak
YAMPA - STEAMBOAT SPRINGS	5,870	3,240	4,490	1,200	5/22	**4800 cfs on 6/2 (%)**	5/19 - 6/12
YAMPA - MAYBELL, NR	24,400	10,475	27,000	3,300	6/02	**14500 cfs on 6/3 (%)**	5/13 - 6/10
LITTLE SNAKE - LILY, NR	13,400	4,745	33,300	900	4/30	**4300 cfs on 6/2 (%)**	5/5 - 6/12
YAMPA - DEERLODGE PARK	32,300	13,955	17,000	3,400	6/03	**16000 cfs on 6/3 (%)**	5/11 - 6/6
GREEN - JENSEN, NR (see note1 below)	38,500	17,600	23,700	7,100	5/25	**19000 cfs on 6/4 (%)**	5/14 - 6/11
ROCK CK - UPR STILLWATER RES	2,080	1,350	N/A	680	5/20	**1200 cfs on 5/28 (%)**	5/25 - 6/20
DUCHESNE - TABIONA, NR	1,630	765	4,100	170	5/21	**300 cfs on 5/28 (%)**	5/15 - 6/15
DUCHESNE - RANDLETT, NR	7,000	2,755	7,400	110	6/03	**500 cfs on 5/30 (%)**	4/27 - 7/5
WHITE - MEEKER, NR	6,320	3,200	5,500	800	5/08	**3900 cfs on 6/2 (%)**	5/21 - 6/14
GREEN - GREEN RIVER, UT (see note1 below)	47,200	22,560	47,000	7,300	5/27	**21500 cfs on 6/5 *****	5/18 - 6/16
SAN RAFAEL - GREEN RIVER, NR	3,600	910	N/A	12	5/17	**120 cfs on 3/19 (%)**	5/17 - 7/16
MUDDY CK - EMERY, NR	515	205	N/A	60	5/20	**250 cfs on 6/2 (%)**	5/19 - 6/18
DIRTY DEVIL - HANKSVILLE, NR, POISON SPGS **	1,310	445	N/A	N/A	N/A	**40 cfs on 6/4 (%)**	3/12 - 5/31
ESCALANTE - ESCALANTE, NR **	227	72	N/A	N/A	N/A	**20 cfs on 3/20 (%)**	3/24 - 6/2
CATARACT CANYON (estimated)	116,700	51,350	N/A	10,000	5/27	**48000 cfs on 6/4 (%)**	5/20 - 6/16
SAN JUAN - PAGOSA SPRINGS	4,640	2,485	11,300	221	4/16	**2040 cfs on 5/29 (%)**	5/15 - 6/12
ANIMAS - DURANGO	10,700	4,675	8,350	777	5/21	**4160 cfs on 5/29 (%)**	5/28 - 6/14
SAN JUAN - BLUFF, NR (see note2 below)	15,200	7,340	40,900	847	5/24	**3540 cfs on 5/30 (%)**	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* *** Nearing peak

GREAT BASIN PEAK FLOW FORECASTS

Mean daily flows in cubic feet per second (cfs)

STATION NAME	Historic Peak	Average Peak	Flood* Flow	2002 Peak	2002 Date	Provisional 2003 Peak through 6/06/03 % indicates snowmelt peak has occurred	Normal time of peak
BEAR - UTAH-WYOMING STATELINE, NR	2,680	1,610	4,400	830	6/01	**1600 cfs on 5/30 (%)**	5/22 - 6/14
LOGAN - LOGAN, NR, STATE DAM, ABV	1,870	985	1,200	485	6/02	**715 cfs on 5/31**	5/18 - 6/10
BLACKSMITH FORK - HYRUM, NR, UP&L DAM	1,530	490	N/A	130	4/15	**180 cfs on 5/17 (%)**	4/24 - 5/20
WEBER - OAKLEY, NR	4,170	1,625	3,100	985	5/31	**1590 cfs on 5/28 (%)**	5/24 - 6/16
CHALK CK - COALVILLE	1,420	600	1,900	195	5/21	**N/A**	5/5 - 5/31
PROVO - WOODLAND, NR	2,530	1,685	3,000	1,270	5/20	**1990 cfs on 5/26 (%)**	5/11 - 6/6
PROVO - HAILSTONE, NR	3,560	2,150	N/A	2,260	5/21	**2680 cfs on 6/1**	5/14 - 6/7
LITTLE COTTONWOOD CK - SALT LAKE CITY, NR	762	470	700	475	5/31	**590 cfs on 5/31 (%)**	5/23 - 6/20
BIG COTTONWOOD CK - SALT LAKE CITY, NR	980	430	700	365	5/21	**470 cfs on 5/29 (%)**	5/18 - 6/9
MILL CK - SALT LAKE CITY, NR	153	65	150	30	6/02	**19 cfs on 5/30 (%)**	5/18 - 6/10
PARLEYS CK - SALT LAKE CITY, NR	605	180	300	75	4/03	**51 cfs on 5/17 (%)**	4/23 - 5/22
EMIGRATION CK - SALT LAKE CITY, NR	164	55	120	25	4/10	**4 cfs on 5/10 (%)**	4/11 - 5/19
CITY CK - SALT LAKE CITY, NR	322	90	150	40	5/24	**25 cfs on 5/26 (%)**	5/12 - 6/1
SEVIER - HATCH	1,430	495	1,200	55	4/16	**250 cfs on 5/26 (%)**	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*

F L O O D P O T E N T I A L I N F O R M A T I O N

SERVICE HYDROLOGISTS

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	505-243-0702	http://www.srh.noaa.gov/abq/
2) Cheyenne, WY	Ray Gomez	307-772-2468x493	http://www.crh.noaa.gov/cys/
3) Boulder, CO	Treste Huse	303-494-3210x493	http://www.crh.noaa.gov/den/
4) El Paso, TX	Tim Brice	505-589-4088x308	http://www.srh.noaa.gov/elp/
5) Flagstaff, AZ	Tom Clemmons	928-556-9161x249	http://www.wrh.noaa.gov/Flagstaff/
6) Grand Junction, CO	Brian Avery	970-243-7007x493	http://www.crh.noaa.gov/gjt/
7) Las Vegas, NV	Barry Pierce	702-263-9744x228	http://www.wrh.noaa.gov/Lasvegas/
8) Phoenix, AZ	Tom Zickus	602-275-8881x228	http://www.phx.noaa.gov/
9) Pocatello, ID	Bill Wojcik	208-233-0834	http://www.wrh.noaa.gov/Pocatello/
10) Pueblo, CO	Sherrie Hebert Larry Walrod	719-948-9429x895	http://www.crh.noaa.gov/pub/
11) Riverton, WY	Melissa Claghorn	307-857-3898	http://www.crh.noaa.gov/riw
12) Salt Lake City, UT	Brian McInerney	801-524-5142x333	http://www.wrh.noaa.gov/Saltlake/
13) Tucson, AZ	Mike Schaffner	520-670-5156x228	http://www.wrh.noaa.gov/Tucson/

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