

Forecast Application

Kevin Werner

NWS Colorado Basin River Forecast Center

**AGU Annual Meeting
December 7, 2011**





Outline

- River Forecast Center overview
- Forecast application work



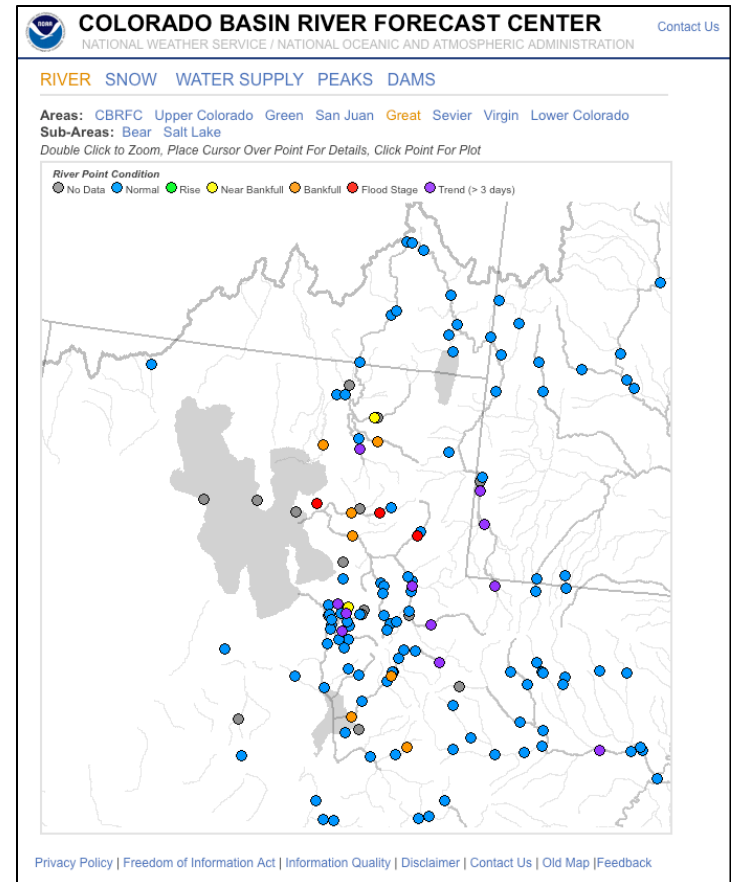
Colorado Basin River Forecast Center



The Colorado Basin River Forecast Center (CBRFC) generates streamflow forecasts across the Colorado and Utah. The latest forecasts, data, and more are available online:

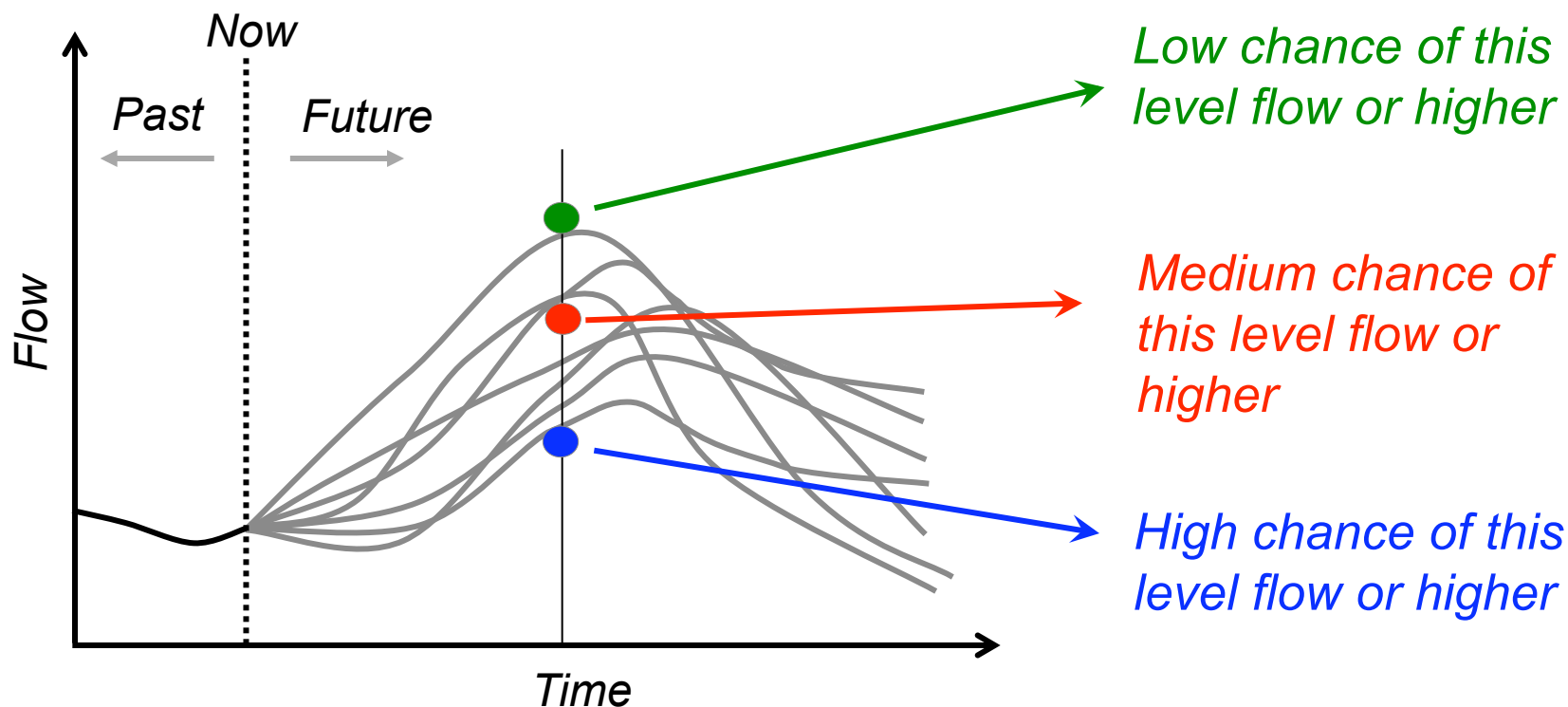
- **Daily streamflow forecasts**
- **Long lead peak flow forecasts**
- **Water supply forecasts**
- **Webinar briefings**
- **Email updates**
- **And More....**

www.cbrfc.noaa.gov



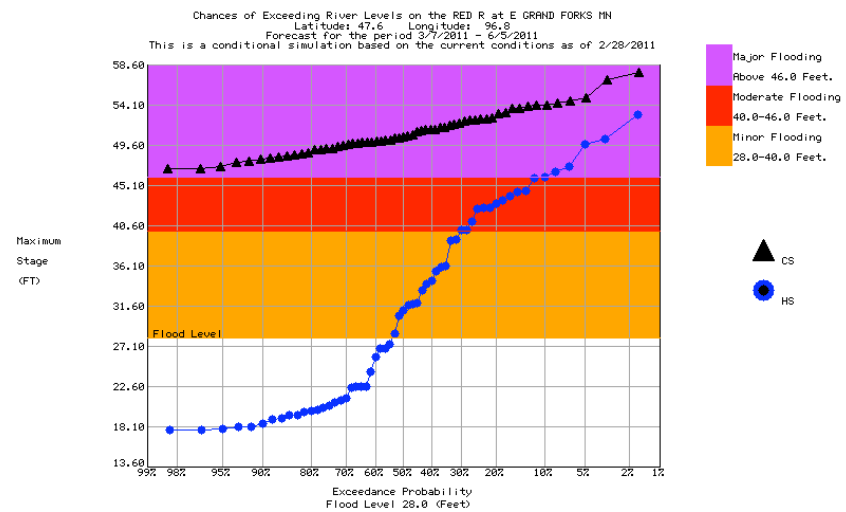
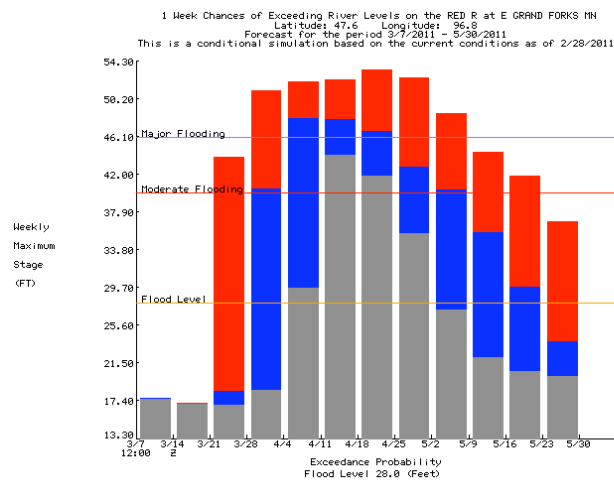
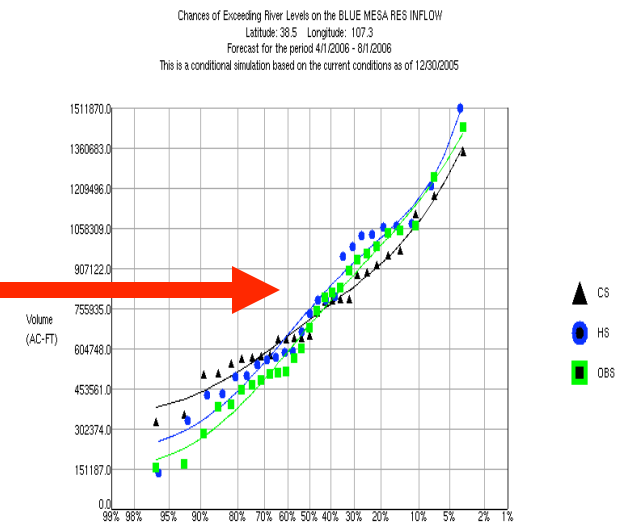
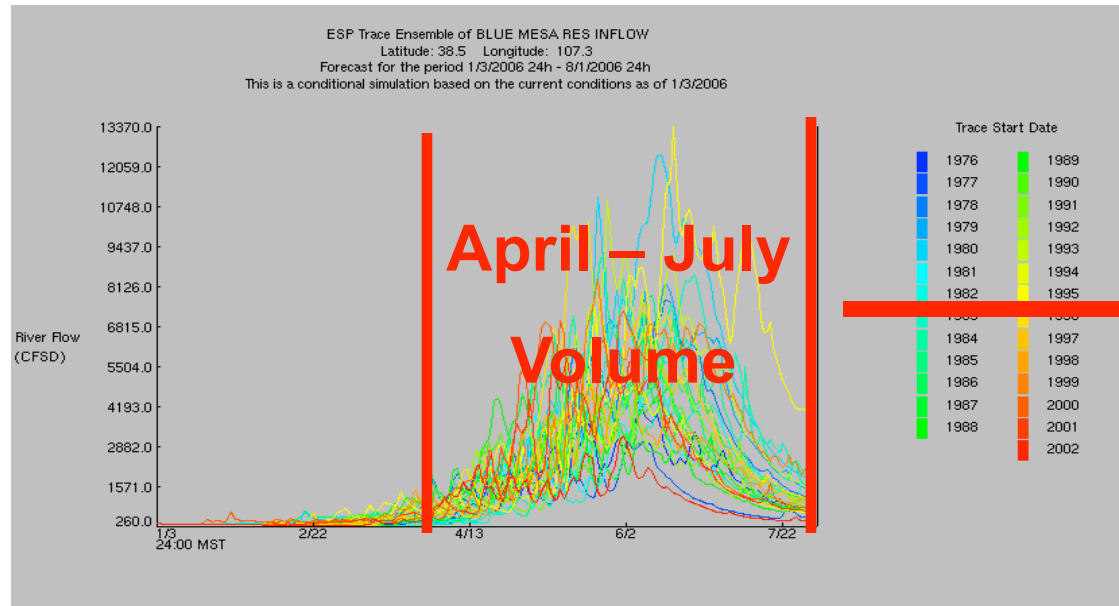


Ensemble Streamflow Prediction (ESP)





ESP Analysis





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[Ensemble Plot](#)

[Forecast Evolution Plot](#)

[Forecast Ranking Table](#)

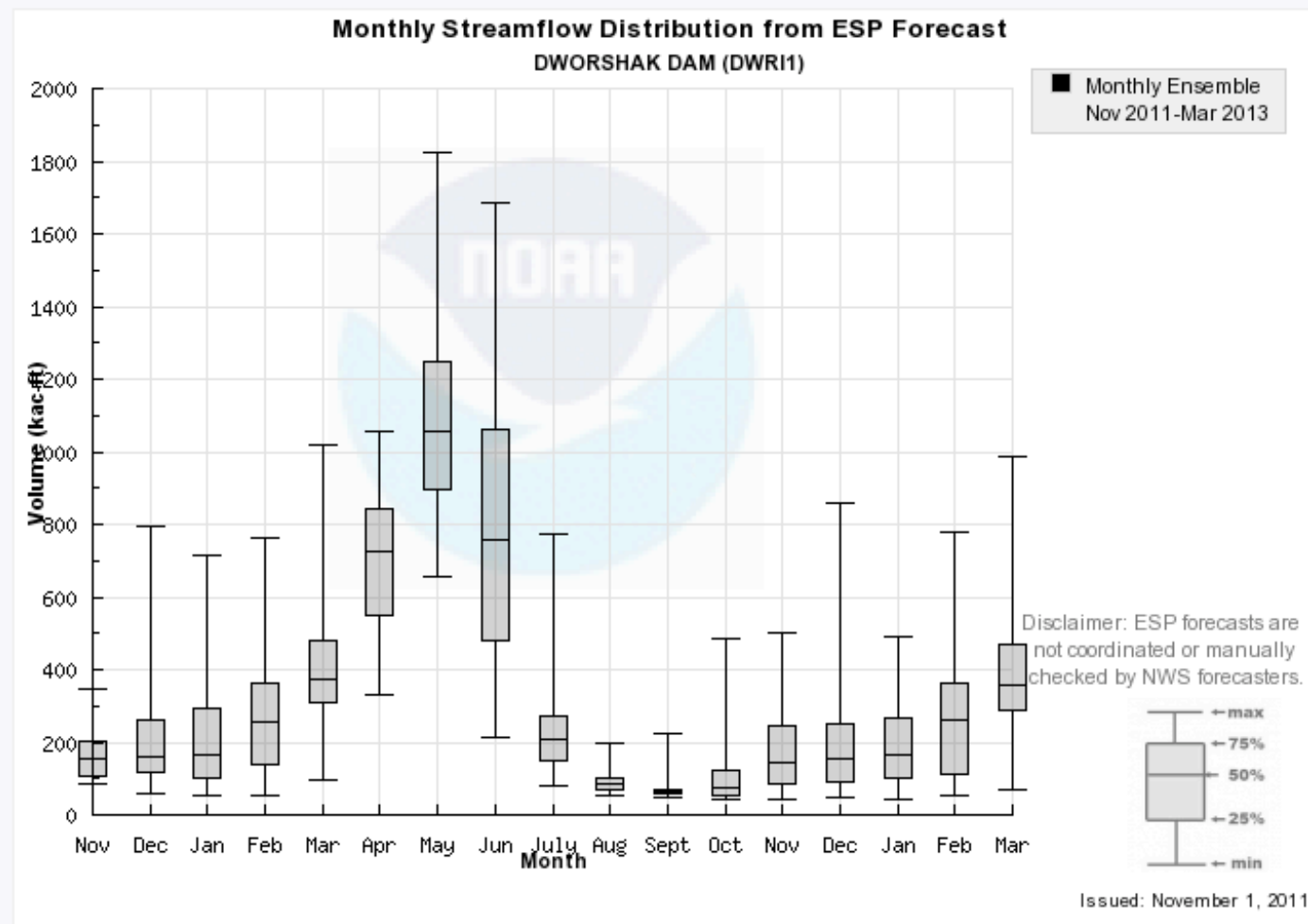
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Ensemble Plot

Nf Clearwater River at Dworshak Dam, Idaho (DWRI1 / NWRFC)



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Graph Options

Forecasts

Current Forecast ?

November 1, 2011

☐ Forcing Year ?

☐ ENSO Biased Forecast ?

Archives

☐ Average Runoff ?

☐ Historical Observations ?

Season Options

Seasonal Constraints ?

Sept 12 to Mar 13

☒ Monthly ?

☐ Accumulation ?

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Source: wateroutlook.nwrfc.noaa.gov



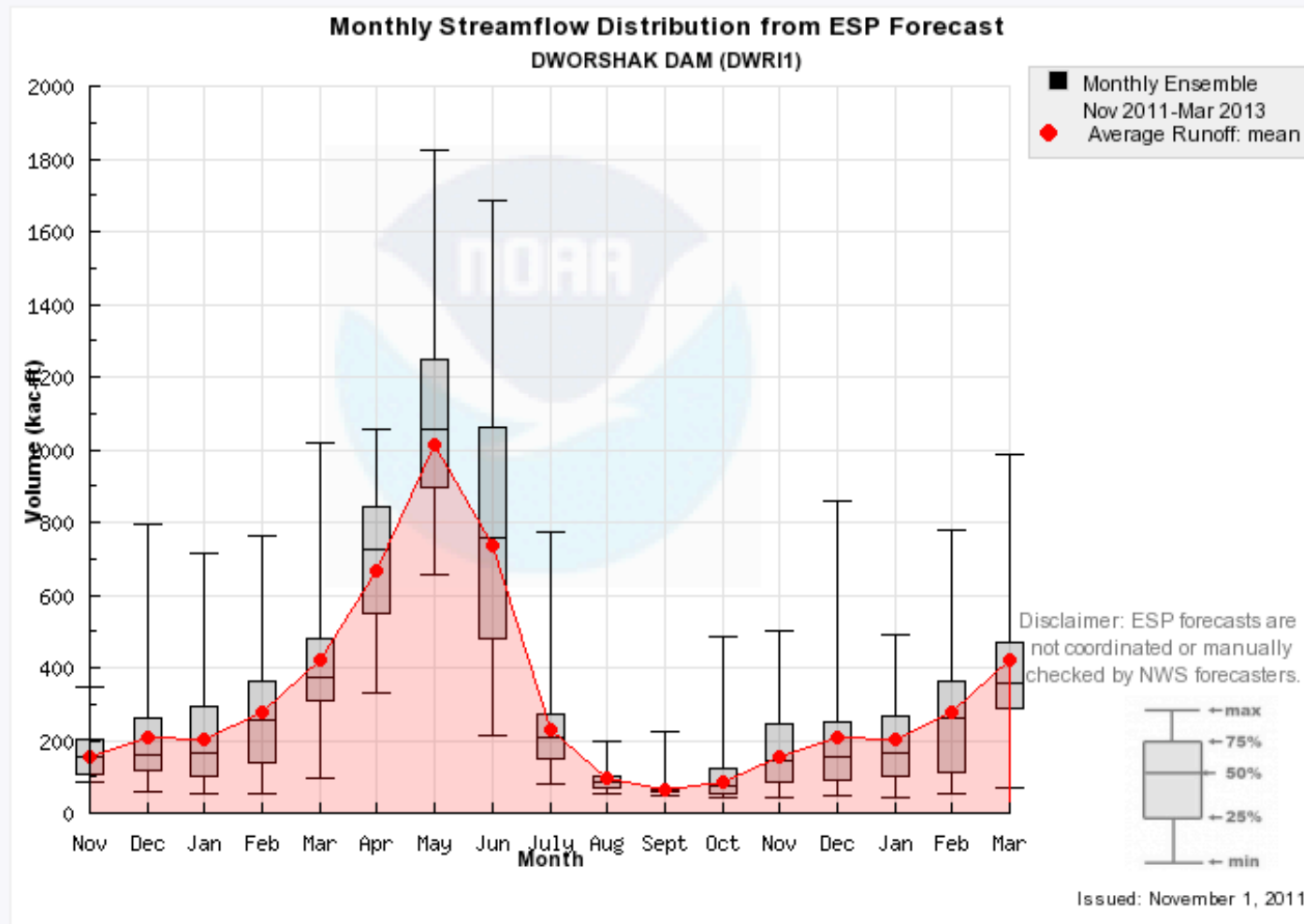
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[Home](#)[Maps](#)[Points](#)[Help](#)[Summary](#)[Ensemble Plot](#)[Forecast Evolution Plot](#)[Forecast Ranking Table](#)[Climate Variability](#)[Forecast Verification](#)[Data Checkout](#)

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[Home](#)

[Maps](#)

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[Help](#)

[Summary](#)

[Ensemble Plot](#)

[Forecast Evolution Plot](#)

[Forecast Ranking Table](#)

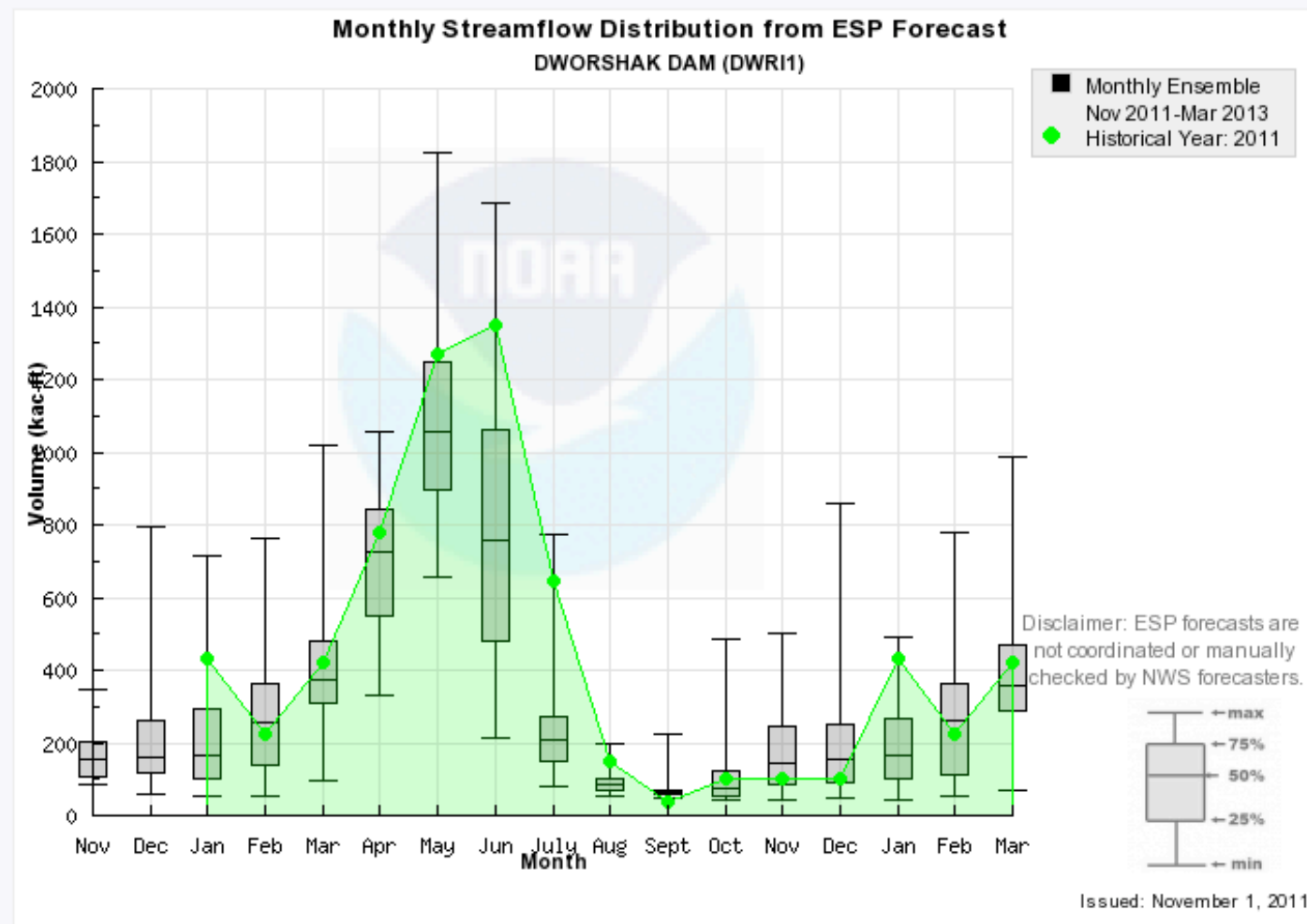
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2011

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Home

Maps

Points

Help

Summary

Ensemble Plot

Forecast Evolution Plot

Forecast Ranking Table

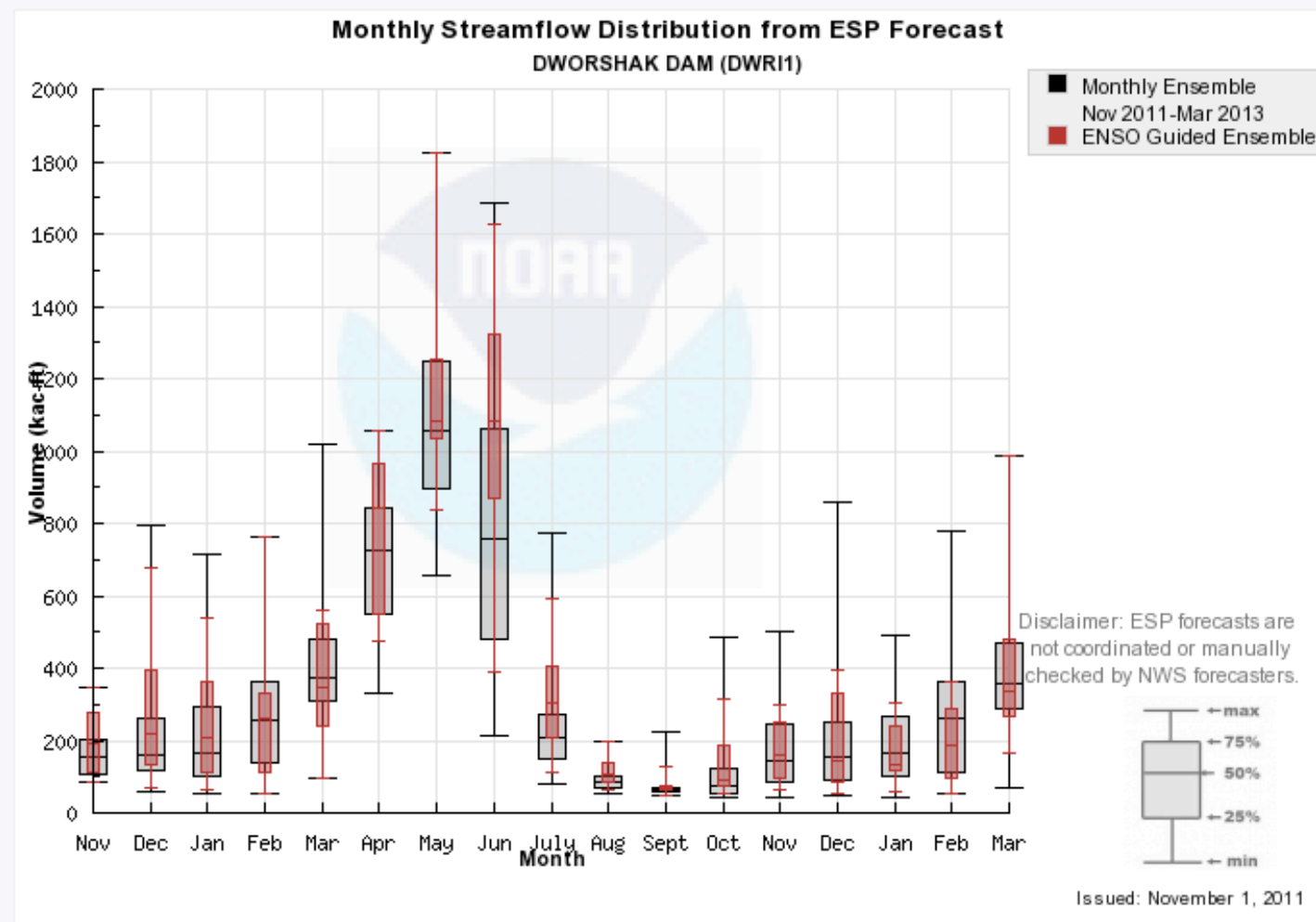
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Graph Options

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November 1, 2011

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All

Archives

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☐ Historical Observations ?

Season Options

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Nov 11 to Mar 13

☒ Monthly ?

☐ Accumulation ?



ESP Output

ESP output increasingly available for stakeholders

- AHPS pages
- Wateroutlook pages
- Experimental RFC websites
- “Raw” ESP output used by some water management agencies to optimize operations

RFC ESP
Forecasts

Results of Dillon ESP Simulations																
Date of Traces: 4/7/08																
Note: When elevations correspond to a specific date, the elevation occurs at the end of that date.																
From May 26 - September 3.																
Trace	Elev < 9002 Date	Elev > 9002 Date	# Days < 9002	Elev = 9011 Date	Elev = 9017 Date	Elev = 9017 May 26	Elev = 9017 June 30	Peak Comp. Inflow cfs	Peak Outflow cfs	Peak Outflow Date	Days <450 out	Days 450-699	Days 700-1199	Days 1200-1399	Days 1400-1599	Days ≥1600 out
1976	n/a	n/a	0	5/2	6/8	9006.60	9017.99	2266	6/6	1747	6/13	0	71	19	7	4
1977	n/a	n/a	0	5/24	6/4	9011.70	9017.23	1990	6/6	1432	6/9	0	83	11	4	3
1978	5/10	5/23	14	6/12	6/18	9002.70	9018.20	2539	6/15	1591	6/24	0	76	16	4	5
1979	5/12	5/20	9	6/6	6/13	9004.30	9018.60	2735	6/15	2173	6/18	0	69	12	2	18
1980	n/a	n/a	0	6/9	6/16	9004.40	9017.94	2226	6/12	1321	6/22	0	79	17	5	0
1981	n/a	n/a	0	6/2	6/8	9006.80	9017.82	2857	6/9	2219	6/13	0	66	21	6	8
1982	5/14	5/28	15	6/17	6/25	9001.10	9018.73	2033	6/18	1702	7/2	0	79	13	3	6
1983	5/10	6/9	31	6/20	6/23	8999.00	9019.29	3384	6/24	2781	6/28	0	55	25	2	19
1984	5/7	5/20	14	5/31	6/8	9006.10	9018.55	2549	6/15	2311	6/17	0	55	20	4	22
1985	n/a	n/a	0	6/2	6/8	9006.30	9017.83	2877	6/9	1935	6/12	0	71	16	4	10
1986	n/a	n/a	0	6/5	6/13	9005.70	9017.90	2349	6/9	1515	6/19	0	75	17	6	3
1987	n/a	n/a	0	5/25	6/8	9011.10	9017.88	2107	6/8	1331	6/16	0	76	19	6	0
1988	5/11	5/16	6	6/8	6/15	9003.80	9018.15	2357	6/9	1875	6/21	0	76	13	3	9
1989	n/a	n/a	0	5/29	6/9	9008.80	9017.70	1912	5/30	1331	6/22	0	76	19	6	0
1990	5/13	5/23	11	6/7	6/12	9002.80	9018.17	2926	6/10	1971	6/16	0	71	15	3	12
1991	5/8	5/19	12	6/3	6/10	9005.40	9018.10	2395	6/12	1969	6/15	0	71	15	3	12
1992	n/a	n/a	0	5/18	5/27	9016.20	9017.81	1875	5/21	1361	6/14	0	60	32	9	0
1993	5/11	5/15	5	6/3	6/12	9005.10	9018.40	2789	6/18	2404	6/19	0	69	10	7	15
1994	n/a	n/a	0	6/2	6/8	9006.50	9017.62	2241	6/7	1442	6/16	0	77	14	7	3
1995	5/8	6/10	34	4/8	6/21	9000.00	9019.96	3843	7/9	3613	7/10	0	48	18	3	32
1996	n/a	n/a	0	5/24	6/3	9012.60	9017.91	2273	5/25	1840	6/11	0	68	16	5	12
1997	5/13	5/16	4	6/5	6/12	9004.30	9018.52	2535	6/19	2311	6/23	0	69	11	4	17
1998	n/a	n/a	0	6/2	6/13	9005.40	9017.89	2122	6/3	1054	6/24	0	72	29	0	0
1999	5/12	5/23	12	6/5	6/12	9003.70	9019.05	2854	6/21	2559	6/22	0	56	19	2	24
2000	n/a	n/a	0	5/22	5/28	9014.60	9017.46	2736	5/31	2334	6/2	0	72	14	3	12
2001	n/a	n/a	0	5/25	6/1	9011.40	9017.64	2292	6/3	1759	6/5	0	70	17	3	11
2002	n/a	n/a	0	5/31	6/8	9006.20	9017.24	2465	6/1	1169	6/13	0	87	14	0	0
2003	5/11	5/21	11	5/30	6/3	9005.10	9018.26	3180	5/31	2139	6/19	0	62	13	6	20
2004	n/a	n/a	0	5/27	6/6	9010.40	9017.52	1836	6/8	1311	6/11	0	85	13	3	0
2005	5/12	5/20	9	5/29	6/8	9007.80	9017.89	2074	5/24	1679	6/21	0	72	18	4	7
Min	5/7	5/15	0	4/8	5/27	8999.00	9017.23	1836	5/21	1054	6/2	0	48	10	0	0
Max	5/14	6/10	34	6/20	6/25	9016.20	9019.96	3843	7/9	3613	7/10	0	87	32	9	32
Avg	5/10	5/23	6	5/31	6/9	9006.53	9018.11	2487	6/9	1873	6/17	0	71	17	4	9
90% Ex	8-May	16-May	0	5/23	6/2	9002.54	9017.51	1983	5/29	1320	6/10	0	56	12	2	0
70% Ex	10-May	19-May	0	5/29	6/8	9004.37	9017.83	2236	6/5	1493	6/13	0	69	14	3	3
50% Ex	11-May	20-May	0	6/2	6/8	9005.90	9017.93	2376	6/9	1799	6/17	0	71	16	4	9
30% Ex	12-May	23-May	10	6/9	6/12	9007.10	9018.22	2736	6/12	2149	6/21	0	76	18	5	12
10% Ex	13-May	5-Jun	14	6/9	6/18	9011.79	9018.76	2951	6/19	2420	6/24	0	79	21	7	20
Assumed RT off until June 1 and April "normal" operating plan thereafter. Took HT from April "normal" plan.																
Assumed Fernandez' suggestion and then held the 470 release.																
Raffable flows approx 450 - 1800 cfs. Optimum for commercial approx 700 - 1400 cfs.																
Good stream fishing approx 450 cfs and below. Marginal fishing 450 - 700 cfs.																

Reservoir
Management



Forecast Application

Previous research and personal experience show forecasts are seldom used

When used, forecasts use is motivated more by risk perception than forecast skill or applicability





Feedback, Questions, Concerns always welcome....



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