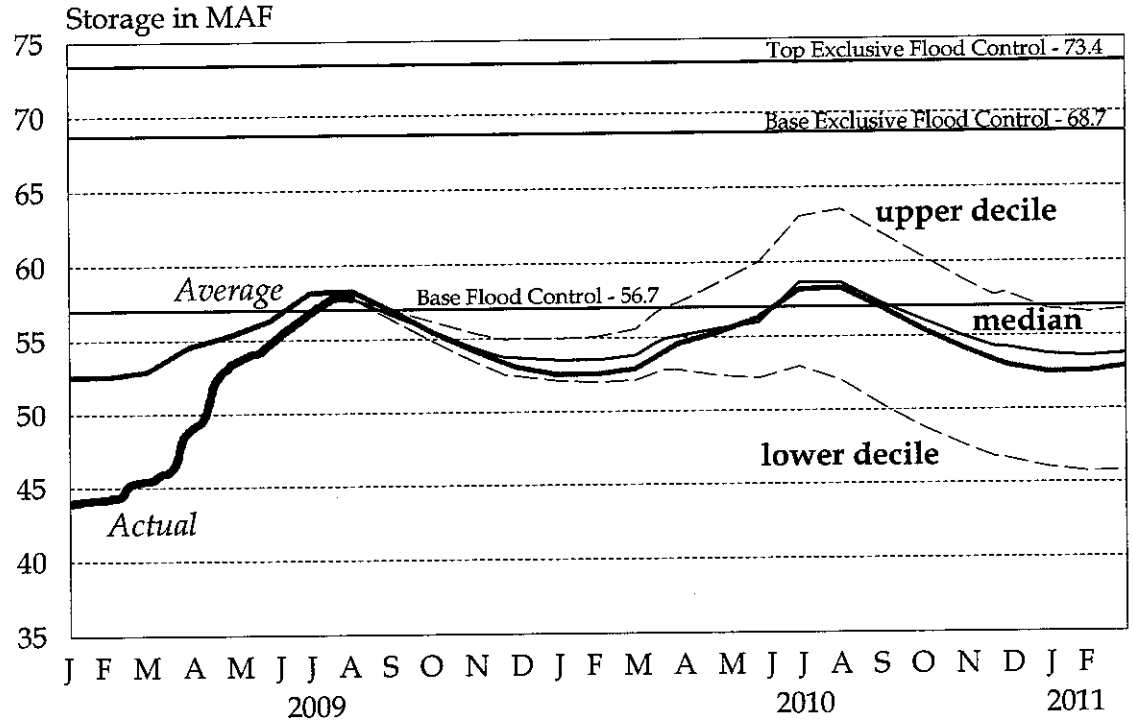
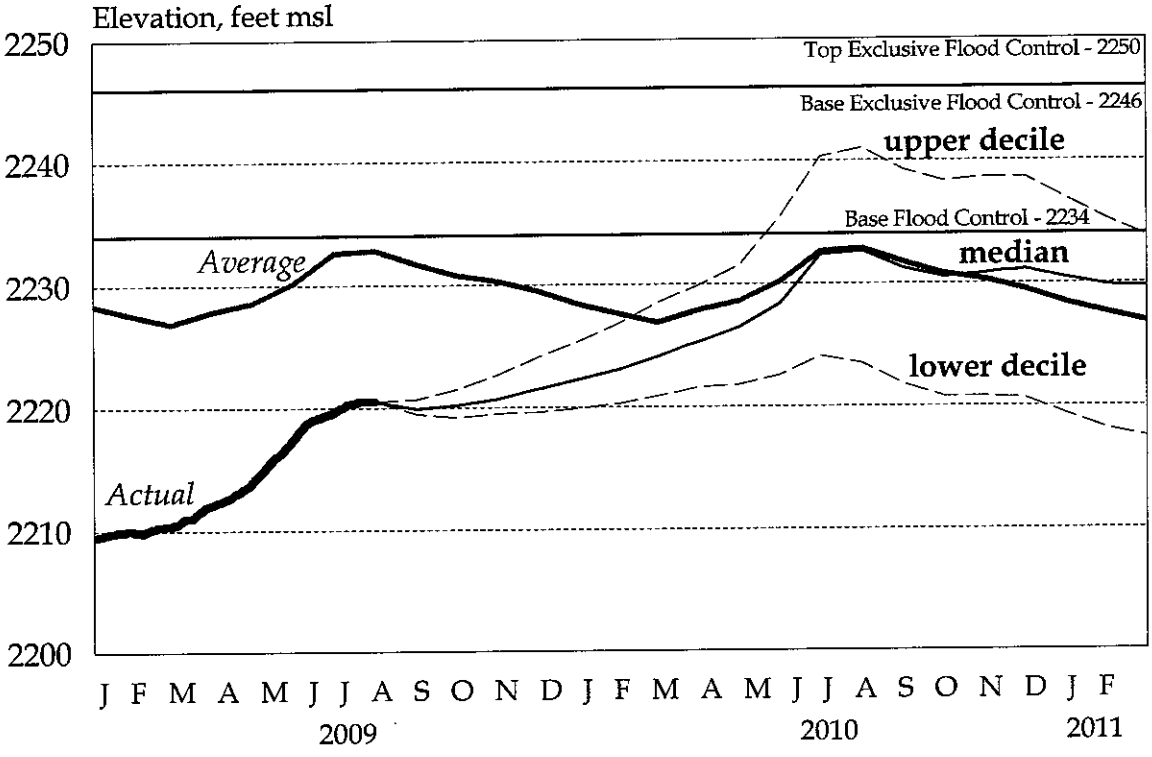
System Storage
2009-2010 Preliminary Draft AOP



Average: 1967-2008

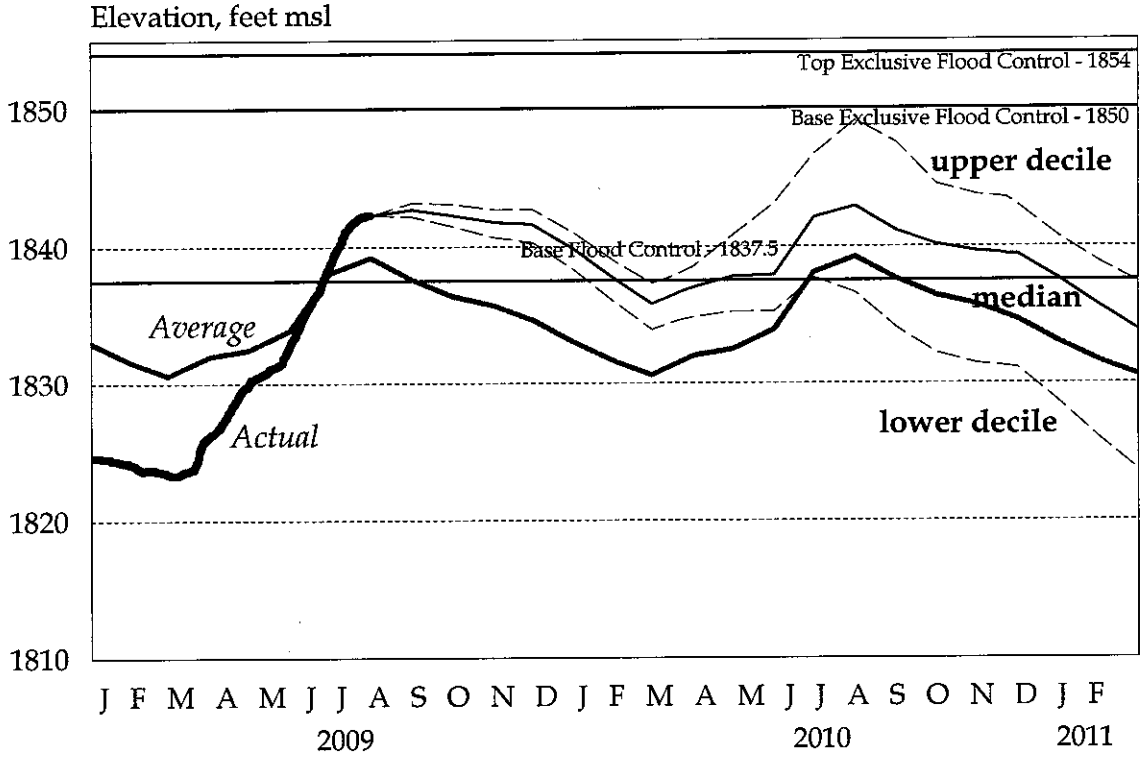
Fort Peck
2009-2010 Preliminary Draft AOP



Average: 1967-2008

Garrison

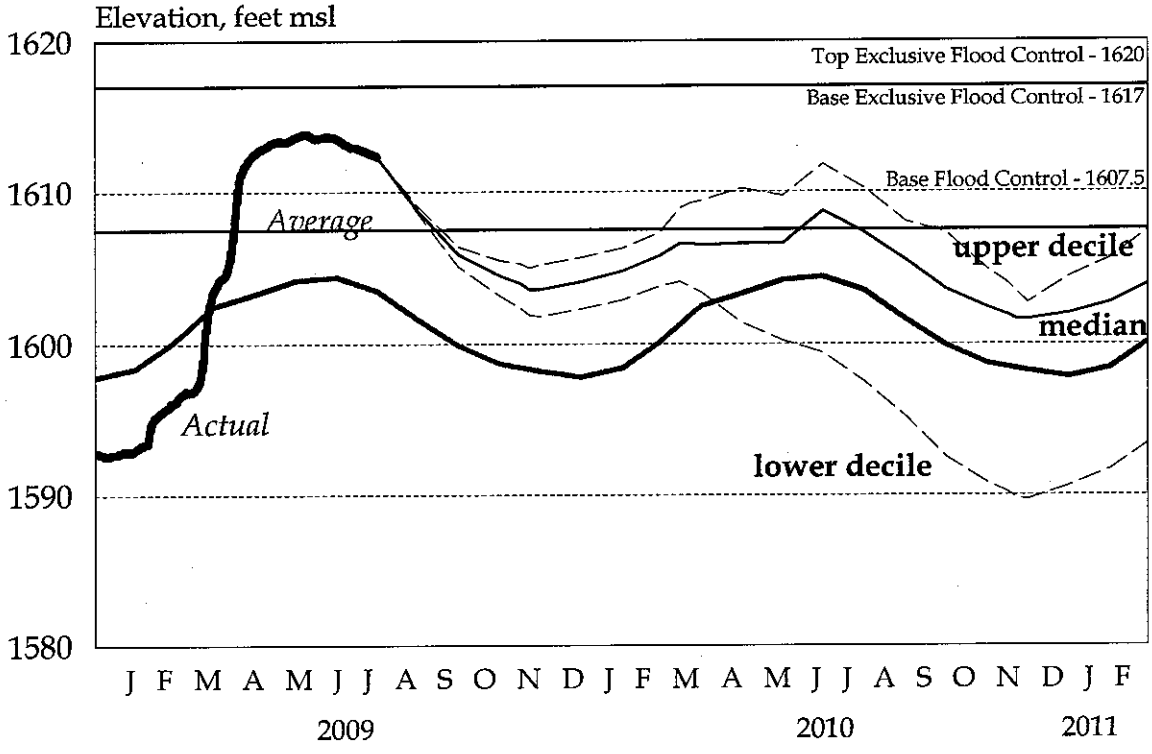
2009-2010 Preliminary Draft AOP



Average: 1967-2008

Oahe

2009-2010 Preliminary Draft AOP



Average: 1967-2008

Missouri River Downstream Flow Support Support for 2010 Navigation Season

Runoff Scenario	Annual Runoff Volume (MAF)	July 1 System Storage (MAF)	Flow Level Above or Below Full Service (in cfs)		Length of Shortening (Days)
			Spring	Fall	
Upper Decile	34.3	63.1	0	0	0
Median	24.4	58.6	0	0	0
Lower Decile	16.2	52.9	-2000	-3800	0

Missouri River Spring Pulses

Runoff Scenario	Annual Runoff Volume (MAF)	March 1 System Storage (MAF)	March Spring Pulse (kcfs)	May 1 System Storage (MAF)	May Spring Pulse (kcfs)
Upper Decile	34.3	55.6	+5	58.6	+0
Upper Quartile	30.3	55.6	+5	58.6	+20
Median	24.4	53.8	+5	55.6	+16
Lower Quartile	19.3	52.1	+5	52.7	+11.6
Lower Decile	16.2	52.1	+5	52.3	+11.5

Preliminary

2009-2010 DRAFT AOP - BASIC RUNOFF SIMULATION
Elevations & Storages are for Date Shown
Avg Discharge & Energy are Monthly Values
Date of Study: July 24, 2009

	31-Jul-09	31-Aug	2009 30-Sep	31-Oct	30-Nov	31-Dec	2010 31-Jan	28-Feb
FORT PECK -------								
ELEV FTMSL	2220.6	2219.9	2220.2	2220.7	2221.5	2222.3	2223.1	2224.1
DISCH KCFS	6.2	6.5	4.8	4.0	4.0	4.5	5.0	5.0
GARRISON --------								
ELEV FTMSL	1843.2	1842.7	1842.3	1841.8	1841.6	1839.8	1837.6	1835.8
DISCH KCFS	15.9	16.0	15.3	14.0	14.0	19.0	22.0	22.0
OAHE ----------								
ELEV FTMSL	1612.2	1608.7	1605.9	1604.5	1603.6	1604.1	1604.8	1605.8
DISCH KCFS	21.0	32.2	29.3	20.4	18.3	15.1	18.4	17.5
BIG BEND --------								
ELEV FTMSL	1420.4	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0
DISCH KCFS	19.7	32.2	28.9	20.0	18.0	14.9	18.4	17.5
FORT RANDALL ----								
ELEV FTMSL	1355.1	1355.2	1353.5	1345.0	1337.5	1339.3	1344.8	1350.0
DISCH KCFS	22.5	31.9	31.2	30.2	25.6	13.2	13.1	11.6
GAVINS POINT ----								
ELEV FTMSL	1206.7	1206.5	1207.5	1207.5	1207.5	1207.5	1207.5	1206.0
DISCH KCFS	24.5	33.2	32.6	32.0	27.7	14.7	14.7	14.7
SYSTEM ----------								
STORAGE 1000 AF	58019	56574	55496	54365	53701	53506	53515	53814
ENERGY GWh	4717	921	821	699	604	533	608	531
PEAK POWER MW		2341	2325	2301	2262	2267	2289	2297

2009-2010 DRAFT AOP - MEDIAN RUNOFF SIMULATION

	28-Feb-10	31-Mar	2010 30-Apr	31-May	30-Jun	31-Jul	31-Aug	30-Sep	31-Oct	30-Nov	31-Dec	2011 31-Jan	28-Feb
FORT PECK -------													
ELEV FTMSL	2224.1	2225.3	2226.5	2228.4	2232.3	2232.6	2231.2	2230.5	2230.8	2231.1	2230.4	2229.8	2229.7
DISCH KCFS	5.0	5.0	6.0	8.0	8.5	8.5	8.5	7.2	5.0	5.0	8.5	8.5	8.5
GARRISON --------													
ELEV FTMSL	1835.8	1837.0	1837.8	1837.9	1842.1	1842.9	1841.1	1840.1	1839.6	1839.4	1837.6	1835.6	1833.9
DISCH KCFS	22.0	14.0	16.0	26.5	25.0	25.0	25.0	20.8	15.0	15.0	21.0	24.0	24.0
OAHE ----------													
ELEV FTMSL	1605.8	1606.5	1606.6	1606.6	1608.5	1607.3	1605.5	1603.6	1602.4	1601.6	1602.0	1602.7	1603.9
DISCH KCFS	17.5	17.9	21.7	27.5	26.4	30.1	32.2	29.6	20.5	18.1	16.6	20.2	18.9
BIG BEND --------													
ELEV FTMSL	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0
DISCH KCFS	17.5	17.9	21.7	27.5	26.4	30.0	31.9	29.1	20.1	17.8	16.4	20.2	18.9
FORT RANDALL ----													
ELEV FTMSL	1350.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.0	1337.5	1339.3	1344.8	1350.0
DISCH KCFS	11.6	14.9	24.2	29.7	28.4	30.7	32.3	31.5	30.2	25.6	14.6	14.3	12.9
GAVINS POINT ----													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.5	1207.5	1207.5	1207.5	1207.5	1206.0
DISCH KCFS	14.7	17.9	26.7	31.8	31.0	31.6	33.2	32.6	32.0	27.8	15.7	15.7	15.7
SYSTEM ----------													
STORAGE 1000 AF	53814	55073	55554	55942	58659	58645	57199	56067	54948	54256	53758	53586	53765
ENERGY GWh	9222	551	688	947	889	986	1021	896	717	619	618	690	601
PEAK POWER MW		2305	2309	2310	2342	2345	2319	2309	2290	2252	2216	2237	2247

Preliminary

2009-2010 DRAFT AOP - LOWER BASIC RUNOFF SIMULATION
Elevations & Storages are for Date Shown
Avg Discharge & Energy are Monthly Values
Date of Study: July 24, 2009

	31-Jul-09	31-Aug	2009 30-Sep	31-Oct	30-Nov	31-Dec	2010 31-Jan	28-Feb
FORT PECK -------								
ELEV FTMSL	2220.6	2219.5	2219.2	2219.5	2219.6	2219.9	2220.3	2220.9
DISCH KCFS	6.2	6.5	5.1	4.0	4.0	4.0	4.0	4.0
GARRISON --------								
ELEV FTMSL	1843.2	1842.2	1841.5	1840.7	1840.3	1838.3	1835.9	1833.9
DISCH KCFS	15.9	16.0	14.0	13.0	13.0	17.0	20.0	20.0
OAHE ----------								
ELEV FTMSL	1612.2	1608.5	1605.1	1603.2	1601.8	1602.3	1602.9	1603.8
DISCH KCFS	21.0	32.8	30.0	21.0	18.9	13.3	16.6	16.0
BIG BEND --------								
ELEV FTMSL	1420.4	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0
DISCH KCFS	19.7	32.8	29.5	20.6	18.5	13.1	16.6	16.0
FORT RANDALL ----								
ELEV FTMSL	1355.1	1355.2	1353.5	1345.0	1337.5	1339.3	1344.8	1350.0
DISCH KCFS	22.5	32.3	31.6	30.6	26.0	11.3	11.2	9.9
GAVINS POINT ----								
ELEV FTMSL	1206.7	1206.5	1207.5	1207.5	1207.5	1207.5	1207.5	1206.0
DISCH KCFS	24.5	33.2	32.5	32.0	27.7	12.5	12.5	12.5
SYSTEM ----------								
STORAGE 1000 AF	58019	56247	54829	53401	52407	52072	51937	52065
ENERGY GWh	4526	932	823	697	602	466	536	470
PEAK POWER MW		2332	2312	2288	2245	2250	2270	2277

2009-2010 DRAFT AOP - LOWER QUARTILE RUNOFF SIMULATION

	28-Feb-10	31-Mar	2010 30-Apr	31-May	30-Jun	31-Jul	31-Aug	30-Sep	31-Oct	30-Nov	31-Dec	2011 31-Jan	28-Feb
FORT PECK -------													
ELEV FTMSL	2220.9	2221.7	2222.4	2224.3	2227.1	2226.6	2224.9	2223.8	2223.7	2223.5	2222.5	2221.6	2221.2
DISCH KCFS	4.0	5.0	5.5	6.0	8.5	8.5	8.5	7.3	5.5	5.5	8.0	8.0	8.0
GARRISON --------													
ELEV FTMSL	1833.9	1834.9	1835.1	1835.4	1838.5	1838.6	1836.3	1835.2	1834.4	1834.1	1831.9	1829.2	1826.9
DISCH KCFS	20.0	14.0	15.0	20.0	25.0	25.0	25.0	19.2	14.0	14.0	21.0	25.0	25.0
OAHE ----------													
ELEV FTMSL	1603.8	1603.8	1602.4	1600.6	1600.3	1598.8	1596.8	1594.5	1592.9	1592.0	1592.9	1594.6	1596.6
DISCH KCFS	16.0	20.4	24.2	29.3	28.3	30.8	31.2	28.7	19.5	16.7	14.1	17.3	16.0
BIG BEND --------													
ELEV FTMSL	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0
DISCH KCFS	16.0	20.4	24.2	29.3	28.3	30.7	30.8	28.2	19.0	16.3	13.9	17.3	16.0
FORT RANDALL ----													
ELEV FTMSL	1350.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.0	1337.5	1339.3	1344.8	1350.0
DISCH KCFS	9.9	15.8	25.7	30.2	30.2	30.8	30.5	29.9	28.6	23.4	11.5	11.3	10.0
GAVINS POINT ----													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.5	1207.5	1207.5	1207.5	1207.5	1206.0
DISCH KCFS	12.5	18.1	27.8	32.0	32.3	31.5	31.2	30.7	30.3	25.3	12.5	12.5	12.5
SYSTEM ----------													
STORAGE 1000 AF	52065	52941	52694	52622	54038	53547	51983	50711	49428	48597	48100	47953	48139
ENERGY GWh	8798	584	710	882	911	976	973	839	673	567	540	613	531
PEAK POWER MW		2279	2272	2266	2278	2270	2252	2239	2218	2178	2143	2166	2176

2009-2010 DRAFT AOP - LOWER DECILE RUNOFF SIMULATION

	28-Feb-10	31-Mar	2010 30-Apr	31-May	30-Jun	31-Jul	31-Aug	30-Sep	31-Oct	30-Nov	31-Dec	2011 31-Jan	28-Feb
FORT PECK -------													
ELEV FTMSL	2220.9	2221.6	2221.8	2222.6	2224.1	2223.5	2221.8	2220.8	2220.8	2220.6	2219.3	2218.1	2217.5
DISCH KCFS	4.0	5.0	6.5	8.0	8.0	8.0	8.0	7.1	5.0	5.0	8.0	8.0	8.0
GARRISON --------													
ELEV FTMSL	1833.9	1834.8	1835.2	1835.2	1837.7	1836.6	1834.0	1832.2	1831.4	1831.1	1828.6	1825.9	1823.7
DISCH KCFS	20.0	12.3	13.0	22.0	23.0	23.0	23.0	17.8	13.0	13.0	21.0	23.0	23.0
OAHE ----------													
ELEV FTMSL	1603.8	1603.4	1601.4	1600.2	1599.4	1597.5	1595.2	1592.5	1590.8	1589.7	1590.6	1591.7	1593.4
DISCH KCFS	16.0	20.7	24.5	28.1	28.7	30.0	30.6	28.0	18.8	16.2	14.4	17.4	16.2
BIG BEND --------													
ELEV FTMSL	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0
DISCH KCFS	16.0	20.7	24.5	28.1	28.7	29.9	30.2	27.5	18.4	15.8	14.1	17.4	16.2
FORT RANDALL ----													
ELEV FTMSL	1350.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.0	1337.5	1339.3	1344.8	1350.0
DISCH KCFS	9.9	15.9	25.8	28.9	30.4	29.9	29.6	29.0	27.8	22.7	11.5	11.4	10.1
GAVINS POINT ----													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.5	1207.5	1207.5	1207.5	1207.5	1206.0
DISCH KCFS	12.5	18.1	27.8	30.6	32.3	30.5	30.2	29.7	29.3	24.4	12.5	12.5	12.5
SYSTEM ----------													
STORAGE 1000 AF	52065	52770	52348	52142	52942	51983	50290	48799	47509	46660	46030	45705	45784
ENERGY GWh	8541	573	705	892	892	931	929	806	639	537	537	590	511
PEAK POWER MW		2276	2267	2261	2268	2254	2232	2216	2194	2153	2116	2136	2145

Preliminary

2009-2010 DRAFT AOP - UPPER BASIC RUNOFF
Elevations & Storages are for Date Shown
Avg Discharge & Energy are Monthly Values
Date of Study: July 24, 2009

	31-Jul-09	31-Aug	2009 30-Sep	31-Oct	30-Nov	31-Dec	2010 31-Jan	28-Feb
FORT PECK -------								
ELEV FTMSL	2220.6	2220.7	2221.5	2222.7	2224.1	2225.4	2226.9	2228.5
DISCH KCFS	6.2	6.5	5.1	4.0	4.0	4.0	4.0	4.0
GARRISON --------								
ELEV FTMSL	1843.2	1843.2	1843.1	1842.7	1842.7	1841.0	1838.9	1837.3
DISCH KCFS	15.9	16.0	15.1	15.0	15.0	19.0	21.5	21.5
OAHE ----------								
ELEV FTMSL	1612.2	1609.0	1606.4	1605.5	1605.2	1605.7	1606.3	1607.3
DISCH KCFS	21.0	31.5	28.6	19.8	17.5	15.2	18.5	17.4
BIG BEND --------								
ELEV FTMSL	1420.4	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0
DISCH KCFS	19.7	31.7	28.2	19.5	17.3	15.0	18.5	17.4
FORT RANDALL ----								
ELEV FTMSL	1355.1	1355.2	1353.5	1345.0	1337.5	1339.3	1344.8	1350.0
DISCH KCFS	22.5	31.5	30.8	29.7	25.1	13.4	13.3	11.7
GAVINS POINT ----								
ELEV FTMSL	1206.7	1206.5	1207.5	1207.5	1207.5	1207.5	1207.5	1206.0
DISCH KCFS	24.5	33.2	32.6	32.0	27.7	15.2	15.2	15.2
SYSTEM ----------								
STORAGE 1000 AF	58019	56945	56152	55340	55016	54969	55104	55564
ENERGY GWh	4680	911	812	699	603	533	601	521
PEAK POWER MW		2345	2337	2320	2286	2283	2305	2314

2009-2010 DRAFT AOP - UPPER QUARTILE RUNOFF SIMULATION

	28-Feb-09	31-Mar	2009 30-Apr	31-May	30-Jun	31-Jul	31-Aug	30-Sep	31-Oct	30-Nov	31-Dec	2010 31-Jan	28-Feb
FORT PECK -------													
ELEV FTMSL	2228.5	2229.4	2230.8	2233.8	2237.7	2238.3	2236.7	2236.0	2236.5	2236.7	2235.8	2234.6	2234.0
DISCH KCFS	4.0	7.0	7.0	8.0	12.0	12.0	12.0	9.1	6.0	6.0	10.0	11.0	11.0
GARRISON --------													
ELEV FTMSL	1837.3	1839.0	1840.9	1842.5	1845.9	1848.1	1846.7	1845.8	1844.8	1844.2	1842.0	1839.5	1837.5
DISCH KCFS	21.5	16.0	19.0	24.0	30.0	30.0	30.0	24.1	20.0	20.0	26.0	30.0	30.0
OAHE ----------													
ELEV FTMSL	1607.3	1608.9	1610.4	1610.3	1613.0	1612.6	1610.6	1608.1	1606.3	1604.1	1604.8	1605.9	1607.5
DISCH KCFS	17.4	17.4	18.8	27.9	29.2	32.0	39.6	37.6	29.7	32.0	20.5	24.3	22.0
BIG BEND --------													
ELEV FTMSL	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0
DISCH KCFS	17.4	17.4	18.8	27.9	29.2	31.9	39.3	37.3	29.4	31.9	20.3	24.3	22.0
FORT RANDALL ----													
ELEV FTMSL	1350.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.0	1337.5	1339.3	1344.8	1350.0
DISCH KCFS	11.7	14.8	23.6	30.7	31.4	32.9	40.0	40.4	39.8	40.0	18.7	18.5	16.0
GAVINS POINT ----													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.5	1207.5	1207.5	1207.5	1207.5	1206.0
DISCH KCFS	15.2	18.0	26.7	35.0	35.0	35.0	42.0	42.0	42.0	42.0	20.5	20.0	20.0
SYSTEM ----------													
STORAGE 1000 AF	55564	57192	58569	59696	62586	63366	61869	60491	59031	57767	57141	56758	56802
ENERGY GWh	11059	586	690	950	1038	1125	1262	1113	962	939	773	867	754
PEAK POWER MW		2327	2343	2356	2381	2381	2369	2359	2338	2293	2253	2272	2282

2009-2010 DRAFT AOP - UPPER DECILE RUNOFF SIMULATION

	28-Feb-10	31-Mar	2010 30-Apr	31-May	30-Jun	31-Jul	31-Aug	30-Sep	31-Oct	30-Nov	31-Dec	2011 31-Jan	28-Feb
FORT PECK -------													
ELEV FTMSL	2228.5	2229.9	2231.5	2235.4	2240.3	2241.0	2239.2	2238.3	2238.7	2238.6	2236.8	2235.1	2233.9
DISCH KCFS	4.0	7.0	7.0	8.0	13.5	13.5	13.5	10.1	7.5	7.5	13.5	13.5	13.5
GARRISON --------													
ELEV FTMSL	1837.3	1838.5	1840.8	1843.1	1846.7	1849.1	1847.5	1844.5	1843.7	1843.0	1840.7	1838.8	1837.4
DISCH KCFS	21.5	18.0	19.0	24.0	34.0	34.0	34.0	38.1	21.0	23.4	30.0	30.0	30.0
OAHE ----------													
ELEV FTMSL	1607.3	1609.4	1610.2	1609.7	1611.8	1610.2	1608.0	1607.3	1604.9	1602.7	1604.4	1605.6	1607.4
DISCH KCFS	17.4	18.7	22.7	31.4	40.5	43.2	43.9	42.2	34.2	36.7	20.5	24.0	22.0
BIG BEND --------													
ELEV FTMSL	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0
DISCH KCFS	17.4	18.7	22.7	31.4	40.5	43.1	43.6	41.9	33.9	36.6	20.3	24.0	22.0
FORT RANDALL ----													
ELEV FTMSL	1350.0	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.0	1337.5	1339.3	1344.8	1350.0
DISCH KCFS	11.7	16.7	29.8	34.9	42.8	44.2	44.5	45.2	44.6	44.9	18.8	18.3	16.3
GAVINS POINT ----													
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.5	1207.5	1207.5	1207.5	1207.5	1206.0
DISCH KCFS	15.2	20.2	33.5	40.0	47.0	47.0	47.0	47.0	47.0	47.0	20.8	20.0	20.0
SYSTEM ----------													
STORAGE 1000 AF	55564	57314	58639	60037	63061	63527	61883	60277	58740	57355	56815	56564	56737
ENERGY GWh	12324	639	789	1024	1272	1362	1367	1311	1056	1051	830	872	753
PEAK POWER MW		2328	2342	2360	2376	2370	2358	2355	2331	2285	2245	2269	2281