

There are 9 missing days out of 26 total days on the Mississippi at Cairo.

3 days simply had no measurements, but 6 had main flow measurements with no overflow measured.

Most of the 17 remaining days have total measurements that were never divided into main and overflow.

Task is further complicated because some Qm's were made near I-57 while others were made near Hwy 60, (potentially very different overflows).

I extracted the main channel and overflow portions of each of 14 total measurements using WinRiver's subsectioning routines.

Comparing the four US-60 main-flow Qm's (5/9-12) vs the six I-57 main-flow Qm's immediately before and after them (5/4-5/16) showed that:

1. the US-60 channel was around 17% larger in area than the I-57 main channel area
2. the US-60 average velocities were around 19% smaller than the I-57 main channel area

This leads me to believe that the measuring sections are reasonably comparable for the purpose of estimating overflow.

Missing overflows will be interpolated between measured or subsectioned overflow Qm's, ignoring location.

The overflow contribution to the total Q is relatively small (<20% in most cases), so errors resulting from the method will be minimized in the total Q.

As a check, I plotted the (Wyckliffe minus OhioCairo) results to back my way into the MissCairo values. Results were not ideal, for the following reasons:

1. Unsteady conditions: each of the components were likely measured many hours apart during changing flow conditions
2. Unsteady conditions: large periodic fluctuations in flow rates have been discovered downstream and could also exist here
3. Typical measurement errors are compounded by difficult measuring conditions, large overflow areas, and the combining of multiple measurements.

Mississippi River at Cairo Estimates:

				Measured Qm: (Gray: no Qm; Yellow: partial Qm)						
Party	Loc	rated	Date	Time	Main Channel		Overflow		Total	
					(I-57)	(US-60)	(I-57)	(US-60)	(I-57)	(US-60)
			4/26							
			4/27							
			4/28							
ESS/JRM ar	57	FAIR	4/29	1515	660,000		176,000		836,000	
ESS/JRM	57	FAIR	4/30	1716					836,000	
ESS/JRM	57	FAIR	5/1	1047					811,000	
KKJ/CR	57	UNSP	5/2	0900	637,000		177,000		815,000	
KKJ/CR	60	UNSP	5/3	0835		694,000		not meas		
RA/CR	57	FAIR	5/4	0933					833,000	
RA/CR	57	FAIR	5/5	1354					758,000	
RA/CR	57	FAIR	5/6	1101					689,000	
			5/7							
KKJ/CR	60	UNSP	5/8	1340		537,000		not meas		
CBR/KMH	60	POOR	5/9	1702					582,000	
CBR/KMH	60	POOR	5/10	1332					559,000	
CBR/KMH	60	FAIR	5/11	1200					526,000	
CBR/KMH	60	FAIR	5/12	1217					546,000	
			5/13							
BB/ESS	57	POOR	5/14	1604					519,000	
BB/CR	57	FAIR	5/15	1604					509,000	
BB/CR	57	FAIR	5/16	0918					507,000	
BB/CR	57	FAIR	5/17	1507					507,000	
REB/GEG	57	POOR	5/18	1430	464,000		not meas			
			5/19							
ESS/TL	57	FAIR	5/20	1045					483,000	
REB/GEG	57	GOOD	5/21	0936	465,000		not meas			
REB/GEG	57	GOOD	5/22	0845	467,000		not meas			
REB/GEG	57	UNSP	5/23	0900	469,000		not meas			
REB/GEG	60	GOOD	5/24	0830				-		491,000
			5/25							
			5/26							
			5/27							

Subsectioned Qm:			
Main Channel		Overflow	
I-57	US-60	I-57	US-60
646,000		190,000	
625,000		186,000	
645,000		189,000	
603,000		154,000	
555,000		134,000	
	523,000		59,000
	493,000		66,000
	468,000		58,000
	477,000		69,000
447,000		72,000	
443,000		65,400	
443,000		64,200	
455,000		51,300	
455,000		28,200	

Estimates		
Overflow	Interpolation	Total
Estimate		From est. overflow
183,000	5/2 - 5/4	877,000
84,000	5/6 - 5/9	621,000
43,600	5/17 - 5/20	507,600
21,200	5/20 - 5/24	486,200
14,100	5/20 - 5/24	481,100
7,050	5/20 - 5/24	476,050

Chart Icons:



Check estimates using Mississippi @ Wyckliffe and Ohio @ Cairo:

	Mississippi below Inflow		+	Birds Point Inflow		=	Miss betwn inflow and confl		-	Ohio Cairo		=	Miss Cairo		
4/28/2011							1536	1,830,000							4/28/2011
4/29/2011										1115	972,000				4/29/2011
4/30/2011							1054	1,830,000		1500	959,000		871,000		4/30/2011
5/1/2011							1235	1,870,000		1016	1,060,000		810,000		5/1/2011
5/2/2011							1451	1,870,000		930	1,110,000		760,000		5/2/2011
5/3/2011	1145	1,650,000		1628	404,000			2,054,000		930	1,270,000		784,000		5/3/2011
5/4/2011	1414	1,610,000		1130	386,000			1,996,000		1205	1,290,000		706,000		5/4/2011
5/5/2011	1008	1,700,000		1740	365,000			2,065,000		1200	1,310,000		755,000		5/5/2011
5/6/2011	1325	1,580,000		1200	367,000			1,947,000		1155	1,350,000		597,000		5/6/2011
5/7/2011				1030	380,000										5/7/2011
5/8/2011				1800	347,000					1730	1,350,000				5/8/2011
5/9/2011				1205	307,000					1455	1,270,000				5/9/2011
5/10/2011				1050	271,000										5/10/2011
5/11/2011				1805	281,000					1700	1,270,000				5/11/2011
5/12/2011				0925	254,000					1045	1,220,000				5/12/2011
5/13/2011				1240	221,000										5/13/2011
5/14/2011	1744	1,390,000		0935	198,000			1,588,000		1657	1,170,000		418,000		5/14/2011
5/15/2011				1700	159,000					1655	1,080,000				5/15/2011
5/16/2011	1227	1,340,000		1505	128,000			1,468,000		1006	1,040,000		428,000		5/16/2011
5/17/2011				1225	101,000					1552	952,000				5/17/2011
5/18/2011				1800	71,200					1620	864,000				5/18/2011
5/19/2011				1125	61,100										5/19/2011
5/20/2011	1104	1,240,000		1635	27,900			1,267,900		912	758,000		509,900		5/20/2011
5/21/2011	1348	1,170,000		1755	15,800			1,185,800		1130	703,000		482,800		5/21/2011
5/22/2011	1259	1,100,000		1640	?					1000	638,000				5/22/2011
5/23/2011	1331	1,100,000		?						1025	621,000				5/23/2011
5/24/2011				1025	3,550					1000	591,000				5/24/2011