

DHDETTMAN, AQUATIC BIOLOGIST

PHOTOGRAPHIC RECONNAISSANCE SURVEY OF
STREAM HABITATS IN THE BIG SUR RIVER,
MONTEREY COUNTY, CA

BETWEEN THE RIVER MOUTH AND A REFERENCE LOCATION
DOWNSTREAM OF THE ANDREW MOLERA STATE PARK DAYUSE PARKING
LOT

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4/29/2011

Prepared for the Center for Biological Diversity, San Francisco, CA

Introduction – Aquatic biologist, David H. Dettman, surveyed the lower Big Sur River from its mouth to a location just downstream of the Andrew Molera parking lot on April 29, 2011, between 09:00 and 16:15 hours.

Purpose & Method – The purpose of this reconnaissance survey was to photo document the variety of stream habitats in the reach at a relatively high streamflow, while walking slowly upstream. Previously, the California Department of Fish and Game (CDFG) had surveyed the reach, and characterized habitat units as low gradient riffle, scour pools, main channel pool, run, edge-water habitats and measured length of each unit. Following this work, and in conjunction with establishing transects for running hydraulic and habitat models, the CDFG selected and marked twelve sites for further sampling and study. (**Figure 1 Figure 2**) The CDFG marked each study site and sampling transect with numbered orange surveyor's flagging. As feasible, each numbered site was photographed from one of the sample transects in the site, ideally from the downstream end. Where not feasible, the study sites were photographed from another point in the site or just upstream. A global position for each photograph was determined by recording Waypoints as Latitude and Longitude using a handheld GPS unit (Garmin Etrex) that was usually accurate to ± 20 feet. In a few instances, accuracy of the GP was poor, as when under dense vegetation. For these sites, GP was determined by comparison CDFG data or comparison to land features on Google imagery.

Estimated Streamflow – Streamflow at the time of the reconnaissance was estimated at 146 cubic feet per second (cfs). As part of CDFG's PHABSIM study plan, the USGS established a new gaging station to record river stage height and develop a continuous record of discharge in the study area. This gage was established in October 2009 and is maintained and operated by the USGS under contract with the CDFG. A provisional continuous record of discharge has not yet been established for the gaging record; but the USGS has measured streamflow on ten occasions.¹ These data, together with synoptic measurements at the long-term gage at Big Sur (USGS Gage No. 11143000), were used to interpolate streamflow on April 29, 2011.² Details and notes for these calculations are shown in **ATTACHMENT 1**.

Photographic log – The photographic log is documented in the enclosed Photo 1 through Photo 35 of the river from the river mouth to the GP location at a large bedrock/boulder control on the river left bank, approximately ¼-mile downstream from the seasonal wooden bridge crossing at the day-use parking lot.³

Observations during Reconnaissance Survey – Observations and environmental characteristics of specific habitat units were recorded during the walk upstream and are listed in **Table 1**.

¹ Streamflow measurements for USGS Gage No 11143010, Big Sur River at Andrew Molera State Park, near Big Sur, CA are available at: http://waterdata.usgs.gov/ca/nwis/measurements?site_no=11143010&agency_cd=USGS

² Streamflow measurements for USGS Gage No 11143000, Big Sur River near Big Sur, CA are available at: http://waterdata.usgs.gov/ca/nwis/measurements/?site_no=11143000&agency_cd=USGS

³ GPS location for the bedrock/boulder is 36°17'15.07"N/121°50'46.75"W

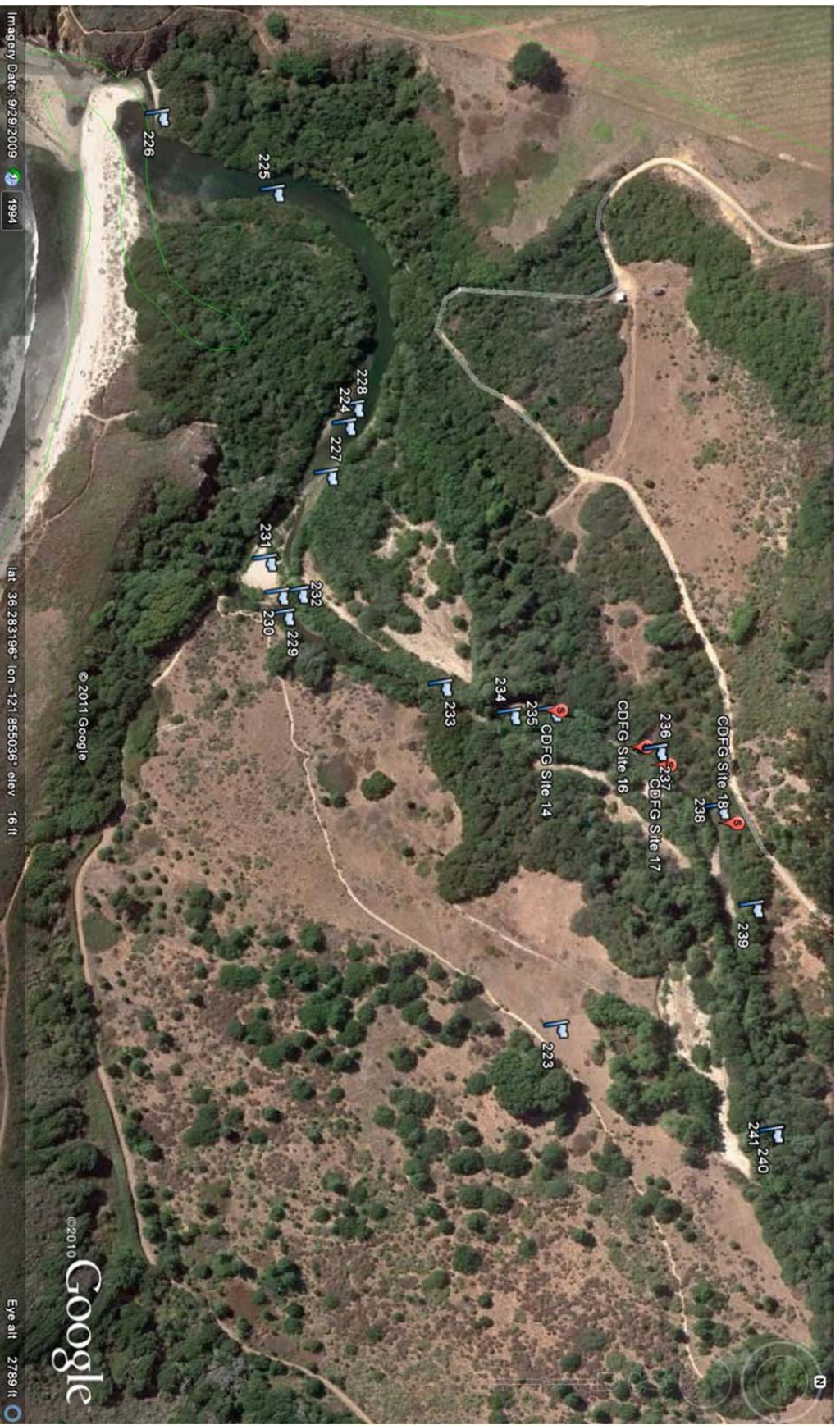


Figure 1: Waypoint and location of habitats photographed during a reconnaissance survey of the lower portion of the lower Andrew Molera reach in the Big Sur River, April 29, 2011. For reference, the location of study sites selected by the California Department of Fish and Game are shown as red-shaped tear drop symbols.

DHDetman, Aquatic Biologist

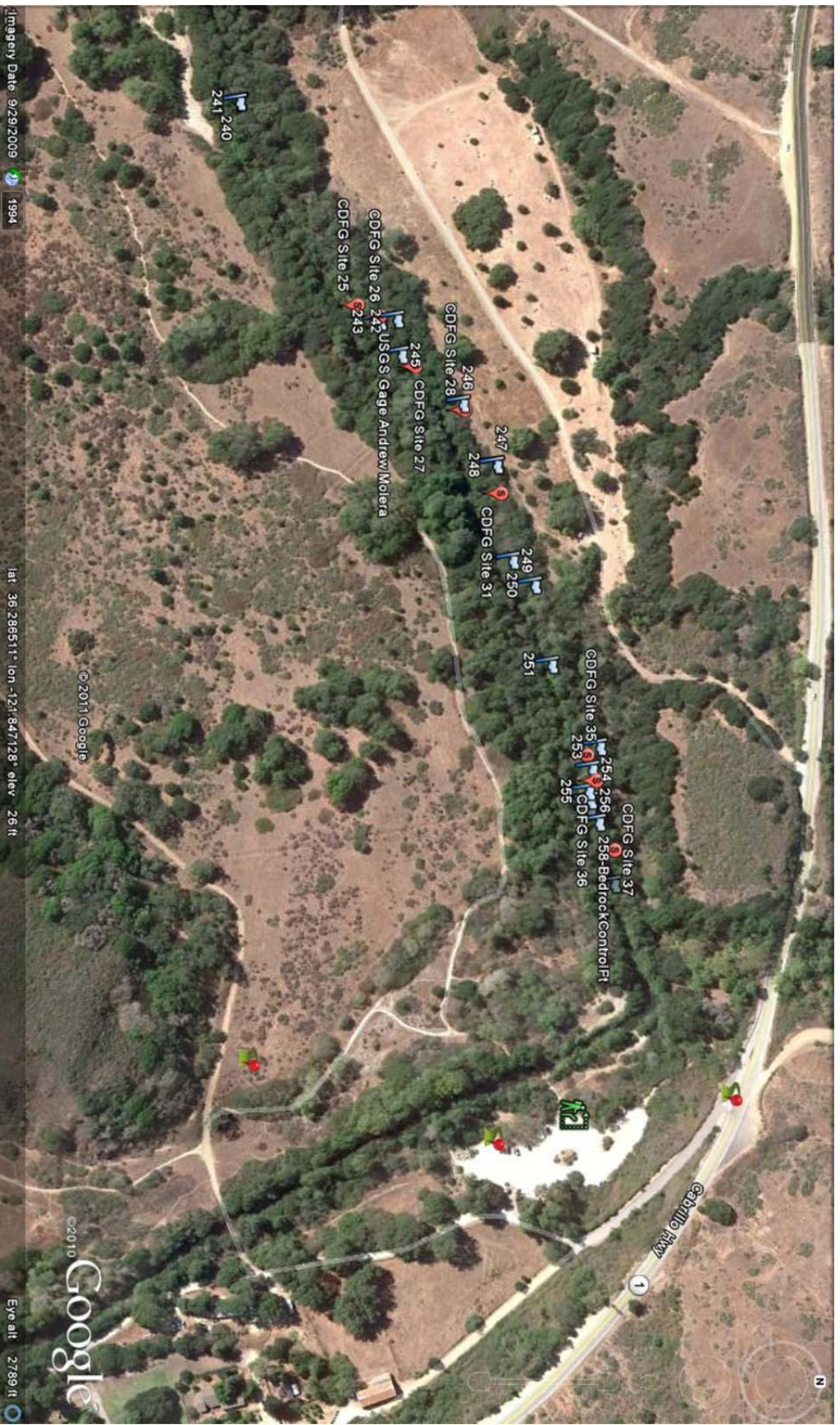


Figure 2: Waypoint and location of habitats photographed during a reconnaissance survey of the upper portion of the lower Andrew Molera reach in the Big Sur River, April 29, 2011. For reference, the location of study sites selected by the California Department of Fish and Game are shown as red-shaped tear drop symbols.

Table 1: Habitat units and types in the lower Big Sur River, Molera Reach identified by the California Department of Fish and Game cross-referenced with waypoints, photos and notes from reconnaissance survey by D. H. Dettman on April 29, 2011

CALIF. DEPT. FISH AND GAME SITES FOR PHABSIM STUDY PLAN				RECONNAISSANCE SURVEY BY DHDETTMAN, April 29, 2011			
CDFG SITE NUMBER	PHABSIM SITE	HABITAT UNIT - TYPE	LENGTH (ft)	WAYPOINT NOS.	PHOTO REFERENCES		NOTES FROM RECON SURVEY
					Time (PD)	No.	
		Lagoon Tidal Reach		224	10:10	6,7	Gravel bar on channel left shows recent tidal action
		Lagoon Tidal Reach		225	10:25	2,3	Edges channel with tidal marks; 5 mergansers and 1 green heron
		Lagoon Tidal Reach		226	10:30	1	western gulls
		Lagoon Tidal Reach		227	11:21	8	recorded across stream channel
		Lagoon Tidal Reach		228		8	Location of transect for depth measurements
9		LOW GRADIENT RIFFLE	39	229 -232		9-11	Location of complex riffle is just upstream of zone of tidal influence; depths measured along two transects; 229 to 230 and
10		SCOUR POOL	105		13:03		
11		SCOUR POOL	428	233	13:19	12	Long scour pool with high levels of sand in streambed
12		RUN	93	234	13:26	13	Large woody debris jam; excellent run/pool habitat with constricted flow and vegetation; river bank overflow/debris on
13		LOW GRADIENT RIFFLE	13				
14		RUN	162	235	13:33	14,15	
15		LOW GRADIENT RIFFLE	56				
16		GLIDE	44	236	13:44	16	
17		MAIN CHANNEL POOL	203	237	?	17	Site 16-17 with excellent conditions for spawning habitat
18		LOW GRADIENT RIFFLE	151	238	13:56	18	Sites 17-18 with possible longitudinal riffle setting up; possibly due to overbank flow from channel left entering stream
19		MAIN CHANNEL POOL	213	239	14:10	19-21	
20		SCOUR POOL	288				
21		SCOUR POOL	183	240	14:40	22,23	Fast, deep run/pool, excellent cover on both banks, undercut
22		LOW GRADIENT RIFFLE	69				
23		MAIN CHANNEL POOL	153	241	14:47		At head of deep run section, riffle with excellent habitat
24		SCOUR POOL	152				
25		RUN	63	242	14:55	24	
26		LOW GRADIENT RIFFLE	144	243	14:57	25	Excellent site for studying food production & rearing habitat
				244	15:05	26	USGS Gaging Station 11143100
27		EDGEWATER	147	245	15:12	27	
28		GLIDE	115	246	15:16	28	
29		RUN	43				
30		LOW GRADIENT RIFFLE	36				
31		SCOUR POOL	248	247-248	15:19	29	Dominant water depths 1.5 feet and surface velocity 2.5 - 3 ft/s
32		RUN	115	249			
33		LOW GRADIENT RIFFLE	40				
34		RUN	210	250-251			
35		LOW GRADIENT RIFFLE	68	253	15:33	30	
36		RUN	150	254	15:37	31	measurements; stable, but wide channel
				255	15:44	32	At site 36/Transect 1
				256	15:48	33	Wide, shallow good for critical riffle measurements
37		GLIDE	182	257	15:51	34	Bedrock, boulder control on channel/left; higher bank on north very steep, old alluvium, consolidated; rises 75-100 feet in 50 feet
				258		35	Bedrock, boulder channel/left
38		RUN	138				
39		LOW GRADIENT RIFFLE	42				
40		MAIN CHANNEL POOL	242				
41		LOW GRADIENT RIFFLE	78				



Photo 1: Waypoint 226; Big Sur Lagoon and Rivermouth; note large group of mixed-age western gulls in outflow channel



Photo 2: Big Sur Lagoon; Waypoint 225, view along southern edge; note heavy growth of tule and overhanging vegetation



Photo 3: Big Sur Lagoon; Waypoint 225, view along northern edge & headland; note heavy growth overhanging riparian vegetation



Photo 4: Common mergansers in tidal zone of Lagoon; several groups of avian predators were observed in the lower reach Andrew Molera State Park.



Photo 5: Common merganser pair in tidal zone; mergansers feed underwater in deep and shallow habitats searching for fish



Photo 6: Waypoint 224; Upper End of Tidal Zone; view looking downstream along channel left; note freshly washed sand, which is evidence of recent backwater in this zone



Photo 7: Waypoint 224; Upper End of Tidal Zone; view looking upstream towards complex riffle; note freshly washed sand on margin of stream bank



Photo 8: Waypoint 227; view looking downstream towards shallow riffle and Waypoint 228 (wading staff at downstream end of gravel bar on left)



Photo 9: Waypoints 229-232; CDFG Site No. 9; Complex Riffle, view looking downstream from Waypoint 229



Photo 10: Waypoints 229-230; CDFG Site 9; Complex Riffle; Transect River Left Channel, between Waypoints 229-230



Photo 11: Waypoints 231-232, Complex Riffle; Transect river right channel, looking across and upstream from Waypoint 231



Photo 12: Waypoint 233, CDFG Site 11, view looking downstream, note dense riparian canopy and cover along both banks



Photo 13: Waypoint 234; downstream of CDFG Site No. 14; view of logjam from river right bank looking downstream and across channel



Photo 14: Waypoint 235, CDFG Site 14, T1, view looking upstream



Photo 15: CDFG Site 14/T3, view looking downstream from T3 towards Waypoint 235



Photo 16: Waypoint 236; CDFG Site 16/T1; view looking upstream from Site16/T1 towards Site 17



Photo 17: CDFG Site 17, T3; view looking downstream, excellent location for spawning habitat



Photo 18: Waypoint 238: CDFG Site 18/T3; view looking downstream towards T2



Photo 19: Waypoint 239; CDFG Site 19; good spawning habitat & possible longitudinal critical riffle from pin marked LMR5 2-D on right bank, downstream towards Site 18 on left bank



Photo 20: Waypoint 239; CDFG Site 19; Flag at LMR5, 2-D; view from right bank along transect to left bank; stream width equaled 53.7 feet at time of survey, good to excellent spawning habitat



Photo 21: Waypoint 239; Substrate at Station 19 (LMR5 -2D); substrate predominantly gravel and small cobble, slightly embedded in loose sand



Photo 22: Waypoint 240; Habitats upstream of LMN5 with deep, fast water; stream width was 36 feet, with 3-4 foot depths, and surface water velocity 2-3 feet/s. Note common merganser hunting in deep water and dense canopy of riparian vegetation along north bank



Photo 23: Waypoint 240; Habitats along left bank; note dense woody debris, undercut bank and 2-foot water depth immediately next to bank



Photo 24: Waypoint 242; CDFG Site 25/T1&T2; view looking downstream to T2 flag on left bank



Photo 25: Waypoint 243; CDFG Site 26/T1; view looking upstream to T2/T3; excellent riffle for food production and probably excellent rearing habitat for young-of-the-year juvenile steelhead at lower flows



Photo 26: Waypoint 244; USGS Gage No. 11143010 at Andrew Molera State Park



Photo 27: Waypoint 245; CDFG Site 27/T1&T2; view looking downstream from location ~50 feet upstream from USGS gage



Photo 28: Waypoint 246; CDFG Site 28/T1; view looking upstream from T1 on left bank



Photo 29: Waypoint 247; CDFG Site 31/T1; view looking upstream from middle of T1



Photo 30: Waypoints 252 & 253; CDFG Site 35/T1; view looking upstream



Photo 31: Waypoint 254; CDFG Site 36/T1; view looking up from mid-stream



Photo 32: Waypoint 255; CDFG Site 36/T1; view looking across Transect T1 from right bank to left bank



Photo 33: Waypoint 256; CDFG Site 36/T3; view looking downstream, note wide, shallow stream channel in this section



Photo 34: Waypoint 257; CDFG Site 37/T1; view looking upstream; note bedrock/boulder control on river left (photo right); stream channel is constricted at this location due to exposed bedrock on both banks, the first location upstream of the river mouth where bedrock was observed on both banks



Photo 35: Waypoint 258; CDFG Site 37; bedrock boulder on left bank approximately 40 feet upstream of CDFG Site 37/T1; END of Photo Sequence for survey on April 29, 2011 @ Latitude/Longitude = 36°17'15.07"N/121°50'46.75"W

ATTACHMENT 1: Calculations for estimated streamflow at USGS Gage No. 11143010 on April 29, 2011 @ 12:30

①
STREAMFLOW ESTIMATE LOWER REACH FOR 5/7/2011
CRITICAL RIPPLE ANALYSIS: 4/29/2011

CROSS SITE No. 9
TOTAL Ripple Crest Length = (48.0 - 1.0) + (89.3 - 3.0) = 47 + 86.3 = 133.3

LEPT CHANNELED
RIPPLE CHARACTER

TIME: 12:30 PM

STREAMFLOW ESTIMATE:

① USGS 11143000 Q = 125 cfs @ GH 5.03 @ 12:30 PM

DATA / DAY OF MEASUREMENTS: 4/14 & 5/4

② USGS 11143000 Q = 212 cfs @ GH 5.37 @ 11:54 4/14
Q = 109 cfs @ GH 4.95 @ 15:16 5/4
Q = 210 cfs @ GH 5.36 @ 14:25 4/14
Q = 110 cfs @ GH 5.49 @ 12:30 5/4

③ USGS 11143100 Q = 245 cfs @ GH 5.65 @ 14:25 4/14
Q = 129 cfs @ GH 5.16 @ 12:23 5/4

④ Proportional Flow Comparison

			AT SIMULTANEOUS TIME
4/14	$\frac{Q_{43100}}{Q_{43000}} = \frac{245}{212} = 1.16$	$\frac{Q_{43100}}{Q_{43000}} = \frac{245}{210} = 1.1667$	
5/4	$\frac{Q_{43100}}{Q_{43000}} = \frac{129}{109} = 1.18$	$\frac{Q_{43100}}{Q_{43000}} = \frac{129}{110} = 1.1727$	

⑤ Estimated Q on 4/29 $Q_{43100} = Q_{43000} * 1.17$ Avg $\frac{Q_{43100}}{Q_{43000}} = 1.1697$
 $= 125 * 1.17 = 146 \text{ cfs}$ @ 12:30 on 4/29

Provisional All Data from USGS Website 05/07/2011 @ 09:30 AM

David H. Dettman

Digitally signed by David H. Dettman
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