APPENDIXES

APPENDIX A. Event and Management Time Line for lower Hat Creek (LHC), California.

1917	Eruption of Mt. Lassen which "devastated" the anadromous fish runs in LHC.
1921	Hat #1 and #2 Power Houses completed.
1925	Impoundment of Lake Britton.
1944	Shasta Dam completed permanently eliminating the anadromous fish runs to Hat Creek.
Mid-century	Hatchery fish stocked in LHC.
1967	Lower Hat Creek Wild Trout Management Program signed.
1968(summer)	Fish barrier built at the downstream end of LHC.
1968(Oct.)	Removal of non-game fish in LHC by rotenone treatment.
1968(Nov.)	CDFG planted a "few hundred native stock Pit River rainbow trout and approximately 50,000 brown trout in LHC".
1971	State adoption of the comprehensive *Wild Trout Program* due in part to the obvious success at LHC.
1975	CDFG published a *Hat Creek Management Plan*.
1976	CDFG began trout population estimation in LHC by electrofishing, repeated in 1983, 1988, 1991, 1993.
1978	Cattle were completely removed from the west bank of LHC and portions of the immediate east bank were fenced.

APPENDIX A. Event and Management Time Line for Lower Hat Creek (LHC), California (continued).

1979	Fishing regulations tightened: artificial lures, no live bait, were now required, barbless hooks only, and fish under 18 inches could not be kept.
1983	Seasonal stream between Baum Lake and Hat #2 Power House overflowed "depositing tons of eroded soil in the old Hat Creek channel".
1984	California Trout commissioned a *Hat Creek Habitat Investigation*.
1986	Boulders clusters and cedar and juniper treetops placed in the lower riffle section of LHC.
1989	Streambank restoration at Hat #2 Powerhouse riffle.

APPENDIX B. Study Unit Channel Morphology and Location Description.

#2	Straight reach	Started 50 m downstream from end of rock shoring on left bank, downstream from the Hat 2 powerhouse riffle and downstream from power lines crossing on left bank. Kondolf benchmark #2 (Kondolf et al. 1994).
#6	Bend	Started 10 m upstream of small slough (intermittent creek) on right bank. Kondolf benchmark #3.
#15	Bend	Ends 37.2 m upstream on right edge water from power pole on right bank at old Carbon Bridge site. Started on the upstream end of the bend above Carbon Bridge. Between Kondolf benchmarks #6 and 7.
#25	Bend	First bend downstream from Carbon Bridge where tall diatomite bank started. Kondolf benchmark #10.
#29	Straight reach	Began 125 meters upstream of the upstream point of Wood Duck Island. Between Kondolf benchmarks #10 and 11.
#32	Bend	Inside channel at Wood Duck Island. Ended 10 m upstream from beaver dam on Wood Duck Island, the study unit's right bank. Kondolf benchmark #11.
#36	Straight reach	Meadow/marsh on right bank, Kondolf bench mark was approximately two meters downstream of transect #3 on LB.
#46	Straight reach	Began 100 m upstream from the upstream side of the Highway 299 bridge on the left bank. Between Kondolf benchmarks #14 and 15.
#50	Straight reach	Began 100 m downstream from the upstream side of Highway 299 bridge at Hat Creek County Park. Kondolf benchmark #15.
#60	Straight reach	Transect #11 on the right bank was at Kondolf benchmark #16 and left bank was in overhanging alder tree, transect #7 right bank was at a clump of nine oak trees, transect #1 was at small alder tree on right bank.

Appendix C. Cross-sectional depth is provided for each unit of the glide section of lower Hat Creek Depth is reported in meters, LB=left bank, LEW=left edge water, RB=right bank, and REW=right edgewater.

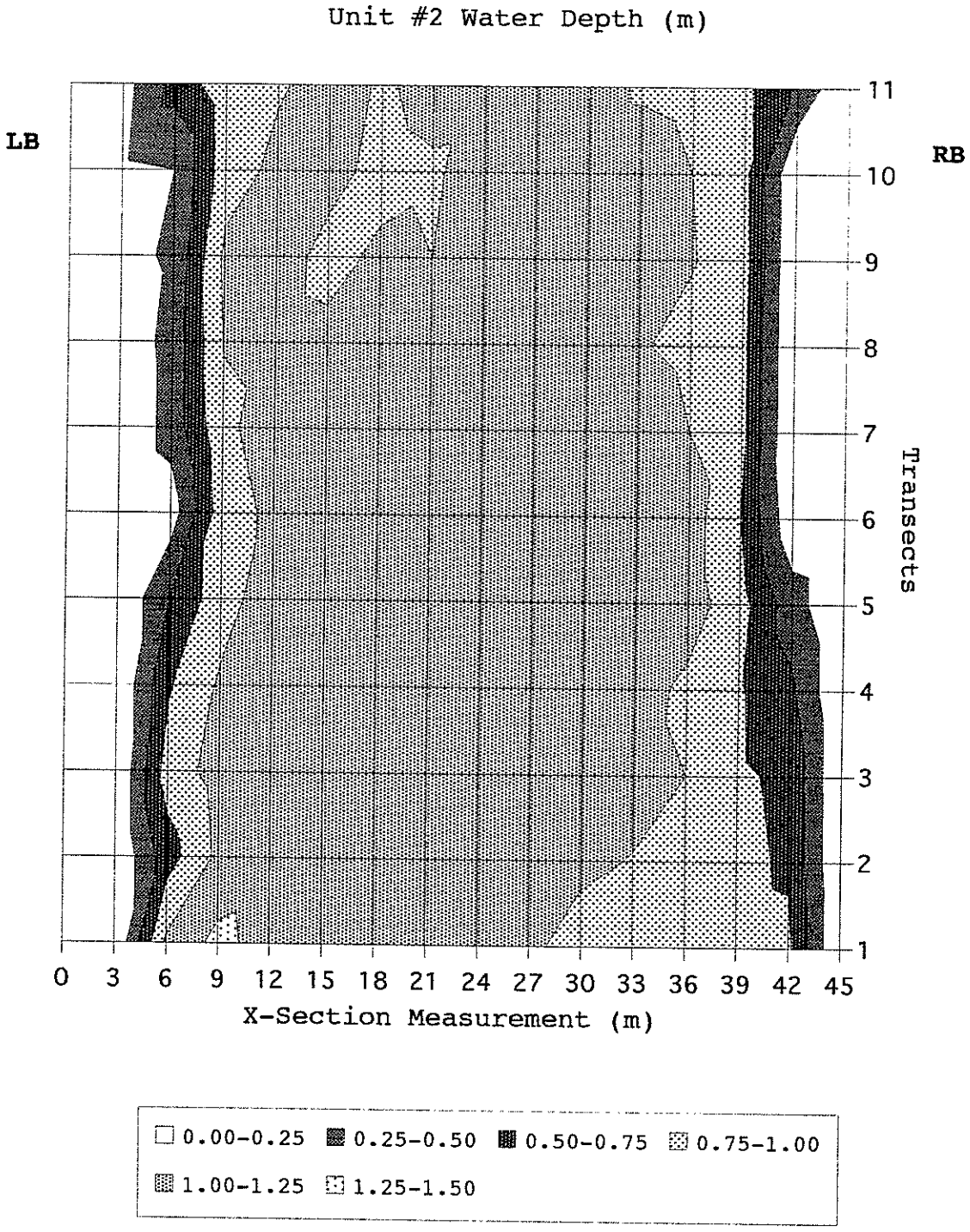
		Cross-section Increment (m)																		
UNIT	DATE	LB	LEW	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	RB	REW
1	8/22/94	0.28	0.00	0.49	0.97	0.92	1.00	1.01	1.01	0.73	0.61	0.61	0.62	0.57	0.53	0.55				0.42	0.42
2	7/5/94				1.55	1.30	1.26	1.22	1.20	1.22	1.17	1.13	0.92	0.92	0.98	0.88	0.81				
3	7/5/94	0.00	0.00	0.00	0.61	0.93	1.10	1.08	1.02	1.06	1.08	1.10	1.12	1.06	0.97	0.84	0.20				
4	8/22/94	0.46	0.00	0.18	0.85	0.97	0.83	0.85	0.79	0.81	0.84	0.95	0.89	0.88	0.90	0.90	0.78			0.00	0.78
5	8/22/94	0.80	0.00	0.96	1.03	1.00	1.09	0.97	1.00	0.92	0.83	0.82	0.92	1.00	0.50	0.20				0.25	0.25
6	8/25/94	0.81	0.00	0.00	0.00	0.77	0.96	0.99	0.89	0.91	0.94	1.01	1.01	0.71	0.94	0.91	0.70			0.08	0.00
7	7/12/94			0.00	0.16	0.32	0.59	0.94	1.14	1.14	1.20	1.30	1.35	1.46	0.50						
8	8/22/94	0.92	0.00	0.05	0.20	0.20	0.28	1.12	1.20	1.21	1.26	1.28	1.37	1.33	1.19	0.48				0.48	0.00
9	7/12/94			0.36	0.59	0.74	0.98	1.07	1.05	1.07	1.09	1.11	1.01	1.10	1.03	0.81	0.12				
10	8/22/94	0.20	0.00	0.45	1.06	1.12	1.37	1.34	1.17	1.18	1.14	1.12	0.82	0.40						0.19	0.00
11	8/22/94	0.20	0.00	0.42	1.03	1.19	1.32	1.32	1.38	1.25	1.05	0.62	0.16	0.25						0.00	0.00
12	8/22/94	0.61	0.61	0.61	1.40	1.65	0.60	1.53	1.11	0.50	0.31									0.25	0.00
13	8/22/94	0.00	0.00	0.55	1.40	1.38	1.37	1.28	0.95	0.80	0.65	0.32	0.25							0.46	0.00
14	8/22/94	0.10	0.10	0.35	0.47	0.85	1.10	1.08	1.10	1.29	1.32	0.98	0.60							0.00	0.00
15	8/24/94	0.72	0.00	0.76	0.93	1.07	0.95	0.99	1.09	1.14	0.84	1.09	1.08	1.07	0.88	0.30				0.30	0.17
15off	7/11/94			0.61	0.93	1.04	1.01	1.05	1.18	1.10	1.11	1.19	1.17	1.13	0.15						
15.7	7/11/94			0.41	0.78	1.07	1.06	1.20	1.22	1.30	1.33	1.40	1.23	0.07							
16	8/24/94	0.00	0.00	0.37	0.89	1.01	1.10	1.04	0.90	0.94	1.07	1.04	0.98	0.81	0.59	0.64	0.43			0.00	0.00
17	8/22/94	0.00	0.00	0.27	0.54	1.00	0.98	1.04	1.04	1.08	1.09	0.94	1.04	0.85	0.25	0.25				0.25	0.25
18	8/22/94	0.09	0.00	0.24	0.35	0.60	0.98	1.00	0.78	0.63	0.71	0.71	0.75	0.82	0.87	0.98	1.02	1.01		0.52	0.52
19	8/22/94	0.00	0.00	0.45	0.53	0.97	1.00	1.02	0.75	0.59	0.40	0.43	0.70	1.17	1.16	1.23	1.09	1.01	0.85	0.00	0.00
20	8/22/94	0.15	0.15	0.28	0.46	0.49	1.07	1.12	1.08	0.84	0.60	0.48	0.97	1.32	1.30	1.36	1.33	1.03		0.20	0.20
21	7/6/94	0.00	0.00	0.00	0.69	0.75	1.08	1.10	1.26	1.30	1.32	1.13	1.29	1.11	1.09	0.98	0.78			0.00	0.00
22	8/22/94	0.50	0.50	0.58	0.62	0.86	1.02	1.15	1.25	1.06	1.06	1.00	1.01	1.03						1.00	1.00
23	8/23/94	0.33	0.00	0.36	0.75	0.69	0.82	0.96	0.80	0.73	0.82	0.80	0.78	0.81	0.82	0.91	0.73	0.50		0.12	0.12
24	8/22/94	0.00	0.00	0.72	0.73	0.83	0.80	0.68	0.99	0.76	0.84	0.77	0.71	0.78	0.73	0.88	0.37			0.50	0.00

Appendix C. Cross-sectional depth is provided for each unit of the glide section of lower Hat Creek Depth is reported in meters, LB=left bank, LEW=left edge water, RB=right bank, and REW=right edgewater (continued).

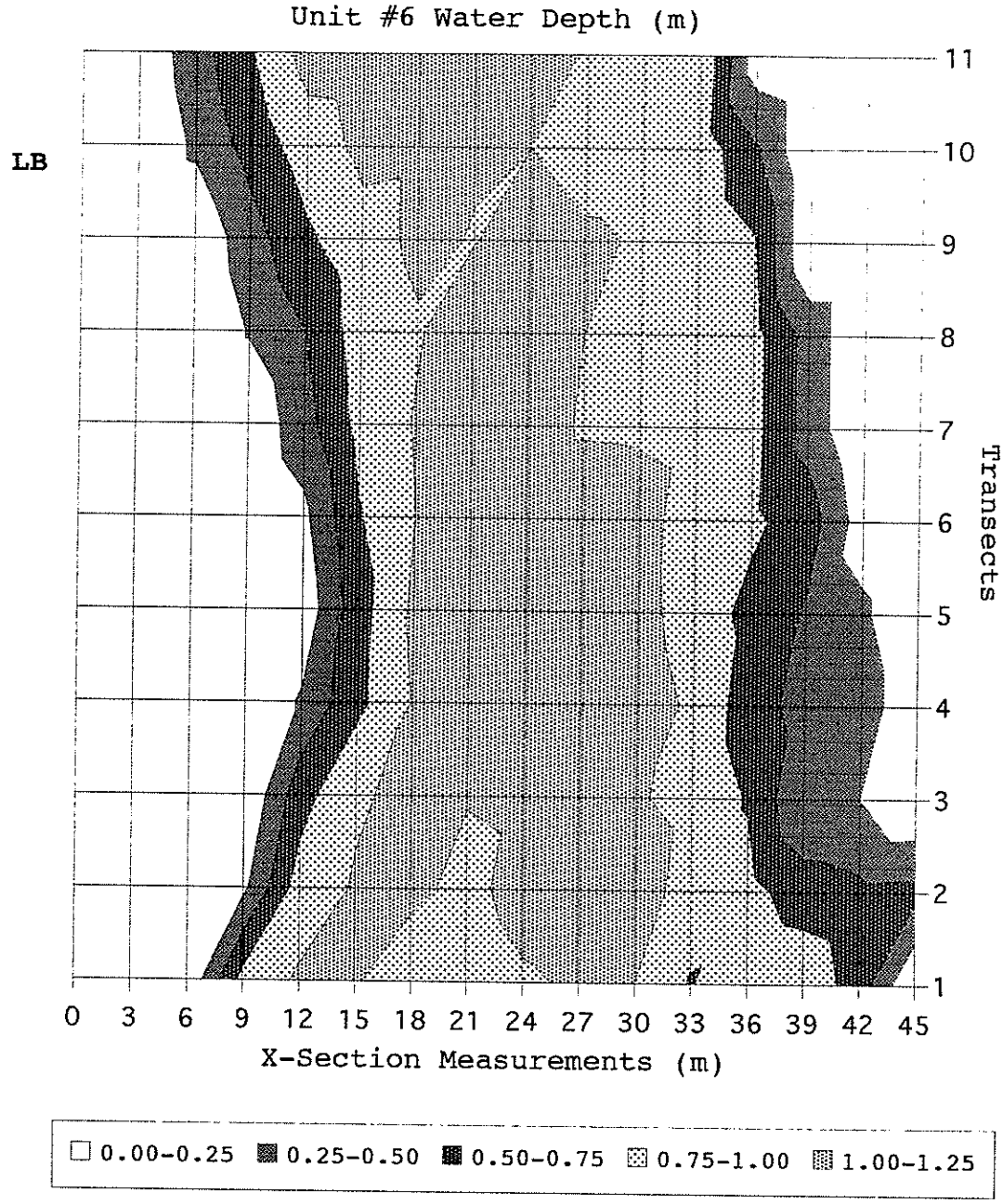
		Cross-section Increment (m)																		
UNIT	DATE	LB	LEW	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	RB	REW
25	7/6/94			0.43	0.88	1.11	1.12	0.89	0.89	1.02	0.96	1.11	0.88	0.61	0.95	0.98	0.87	0.52			
26	7/6/94			0.00	1.05	1.37	1.26	1.29	1.26	0.78	0.88	0.75	0.62	0.67	0.60						
27	8/22/94	0.00	0.00	0.51	0.86	1.02	1.12	1.22	1.20	1.05	0.75	0.37	0.44	0.52						0.50	0.50
28	8/23/94	0.14	0.14	0.25	0.80	1.06	1.11	1.14	1.21	1.28	1.22	1.12	0.89	0.34						0.60	0.00
29	8/26/94	0.17	0.17	0.71	0.98	1.14	1.14	1.07	0.89	0.84	0.76	0.61	0.74	0.40	0.42	0.34	0.12	0.11		0.43	0.00
30	8/27/94	0.21	0.21	0.82	1.12	1.13	1.06	1.04	0.92	0.86	0.79	0.83	0.77	0.37						0.17	0.00
31	8/22/94	0.28	0.28	0.71	0.92	1.02	1.09	0.98	0.92	0.95	0.38	0.67	0.47	0.57	0.22	0.12				0.43	0.00
31A	8/24/94	1.11	0.40	0.13	1.11	0.92	0.80	0.76	0.49	0.59	0.51	0.57								0.06	0.06
31B	8/24/94	0.03	0.03	0.30	0.36	0.77	1.00	1.09	1.16	1.19	1.15	0.70								0.20	0.20
31C	8/24/94	0.20	0.20	0.32	0.42	0.55	0.71	0.75	0.84	1.10	0.96									0.79	0.79
32	8/24/94	0.24	0.24	0.36	0.66	0.82	1.22	0.96	0.46											0.89	0.00
33	8/25/94	0.09	0.09	0.35	0.59	0.82	1.26	1.45	1.53											0.07	0.00
33.25	8/22/94			0.38	0.88	0.63	0.92	0.97	0.95	0.56	0.46	0.74	0.60	0.90	0.91	0.82	0.75				
34	8/22/94	0.96	0.00	0.25	0.36	1.15	1.04	1.20	1.17	1.28	1.21	1.03	1.22	1.06						0.71	0.00
35	8/23/94	0.15	0.15	0.42	0.15	0.93	1.03	0.76	0.91	1.10	1.13	0.91	0.93	0.65						1.20	2.20
36	8/22/94	0.40	0.00	0.50	1.05	0.94	0.77	1.10	1.22	1.10	1.35	1.12								0.98	0.00
37	7/5/94			0.00	0.54	1.00	1.12	1.10	1.17	1.17	1.16	1.19	1.10	0.84						0.69	0.69
38	8/22/94	0.00	0.00	0.70	0.93	0.84	1.02	0.99	1.02	1.10	1.07	1.00	0.72							0.35	0.35
39	8/23/94	0.85	0.00	0.30	0.76	0.90	1.10	1.16	1.28	1.23	1.23	0.95								0.30	0.30
40	8/22/94	0.48	0.48	1.00	1.03	0.80	0.88	0.97	1.13	0.92	0.95	0.50								0.00	0.00
41	8/23/94	0.10	0.10	0.23	0.68	0.75	0.83	1.30	1.20	1.23	1.22	1.10	0.92	0.80						0.65	0.00
42	8/22/94	0.44	0.44	0.60	0.63	0.55	0.58	0.76	0.82	0.80	0.80	0.81	0.71	0.73	0.70	0.68	0.62	0.73	0.81	0.00	0.00
43	8/23/94	0.10	0.10	0.15	0.71	1.04	1.18	1.30	1.22	0.94	0.45	0.89	0.73	0.73	0.66	0.80	0.92	0.98	0.30	0.83	0.00
44	8/22/94	1.10	0.00	0.96	1.08	1.07	1.03	0.90	0.98	0.97	0.88	0.83	0.75	0.90	0.65					0.52	0.00
45	8/23/94	0.85	0.00	0.85	0.70	0.80	0.73	0.97	0.99	1.00	1.02	0.98	1.04	0.80						0.40	0.40
46	7/5/94			0.00	0.53	0.99	1.17	1.14	1.14	1.11	0.89	1.05	1.07	1.04	0.85						

Appendix C. Cross-sectional depth is provided for each unit of the glide section of lower Hat Creek Depth is reported in meters, LB=left bank, LEW=left edge water, RB=right bank, and REW=right edgewater (continued).

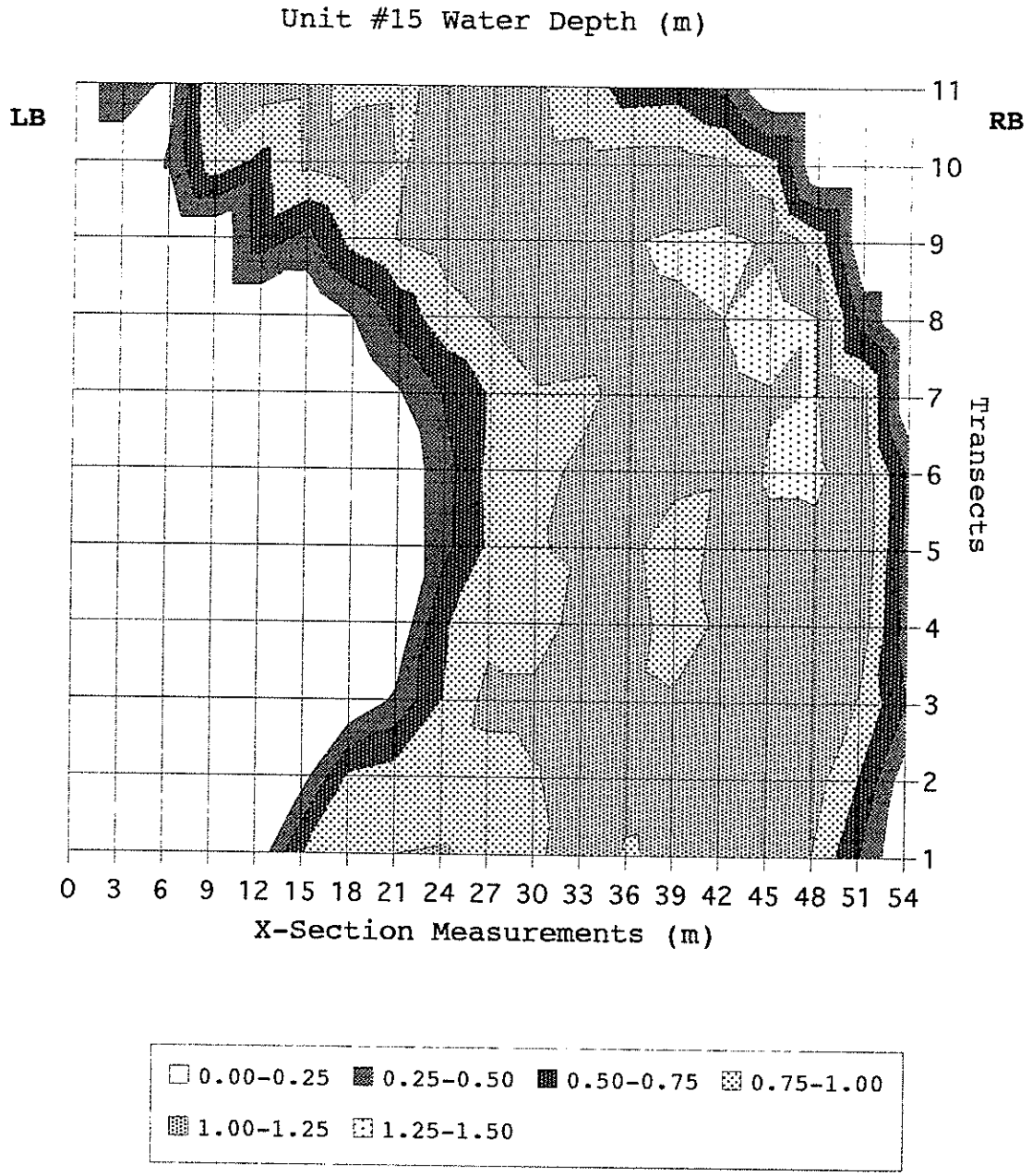
		Cross-section Increment (m)																	
UNIT	DATE	LB	LEW	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	RB	REW
47	7/5/94			0.00	1.15	1.63	1.30	1.34	1.34	1.17	0.73	1.10	1.11	0.98						1.07	1.07
48	8/23/94	0.00	0.00	1.17	0.97	1.11	1.16	1.15	1.11	1.05	0.76									0.00	0.20
49	7/7/94			1.00	1.08	1.05	1.11	1.23	1.08	0.88	0.45										
50	7/8/94			0.63	0.88	0.81	0.83	1.22	1.25	1.29	1.29	1.30	0.67	0.42						0.00	0.00
51	7/7/94			0.56	0.69	0.88	0.91	1.01	1.18	1.22	1.26	1.34	1.19	1.18	0.52						
52	7/8/94	0.73	0.73	1.23	1.19	1.08	1.11	0.85	0.90	0.89	0.71	0.57	0.50	0.45	0.52	0.44	0.84	0.75		0.34	0.34
53	7/11/94	0.48	0.48	0.60	1.16	1.28	1.30	1.26	1.01	0.90	0.77	0.69	0.88	1.07	0.34						
54	8/23/94	0.40	0.00	0.22	0.51	1.00	1.26	1.23	1.32	1.22	1.26	1.20								1.06	0.00
55	8/23/94	0.00	0.00	0.26	1.03	1.52	1.45	1.32	1.16	0.95										0.90	0.00
56	8/23/94	0.20	0.20	0.33	1.04	1.39	1.38	1.33	1.42	1.44	1.40									1.15	0.00
57	8/23/94	0.10	0.10	0.36	0.50	0.73	0.96	1.20	1.15	1.22	0.98	0.92								1.14	0.00
58	8/23/94	0.10	0.00	0.55	0.90	1.05	1.05	0.95	0.96	0.93	1.00	1.00	0.96	0.97	0.40					0.51	0.51
59	7/11/94			0.80	0.73	0.77	0.71	0.89	0.64	1.19	1.09	1.02	0.93	0.59						0.36	0.36
60	8/24/94	0.56	0.00	0.78	0.71	0.23	0.32	0.84	0.80	0.91	0.81	0.83	0.77	0.76	0.38					0.02	0.02
61	8/24/94	0.00	0.00	0.24	0.26	0.23	0.15	0.17	0.41	0.97	1.04	0.91	1.05	0.98	0.93	0.91	0.96			0.95	0.00



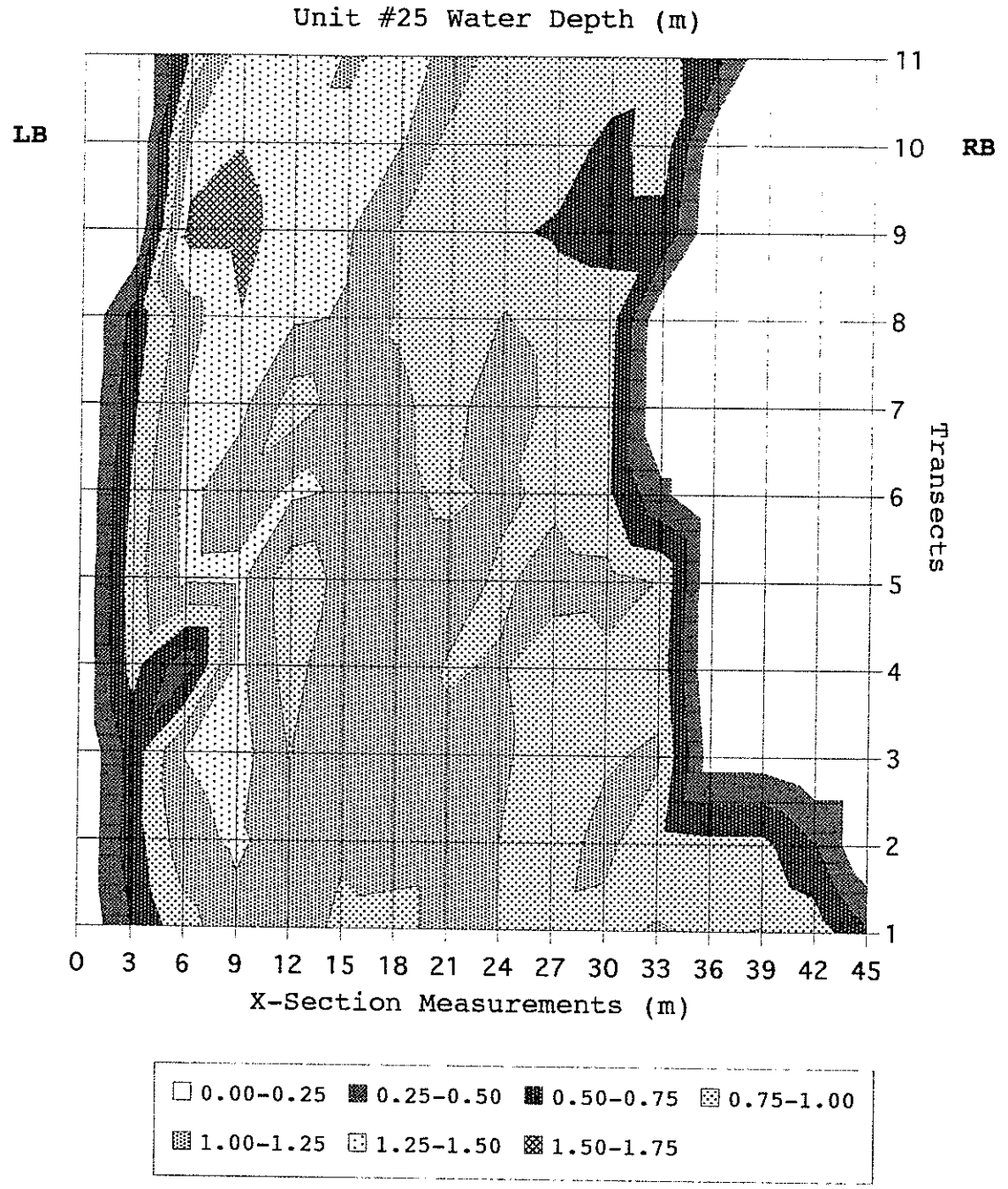
Appendix D. Study unit #2 water depth profile. Water depth measured at each corner of the study unit grid. Measurements are reported in meters.



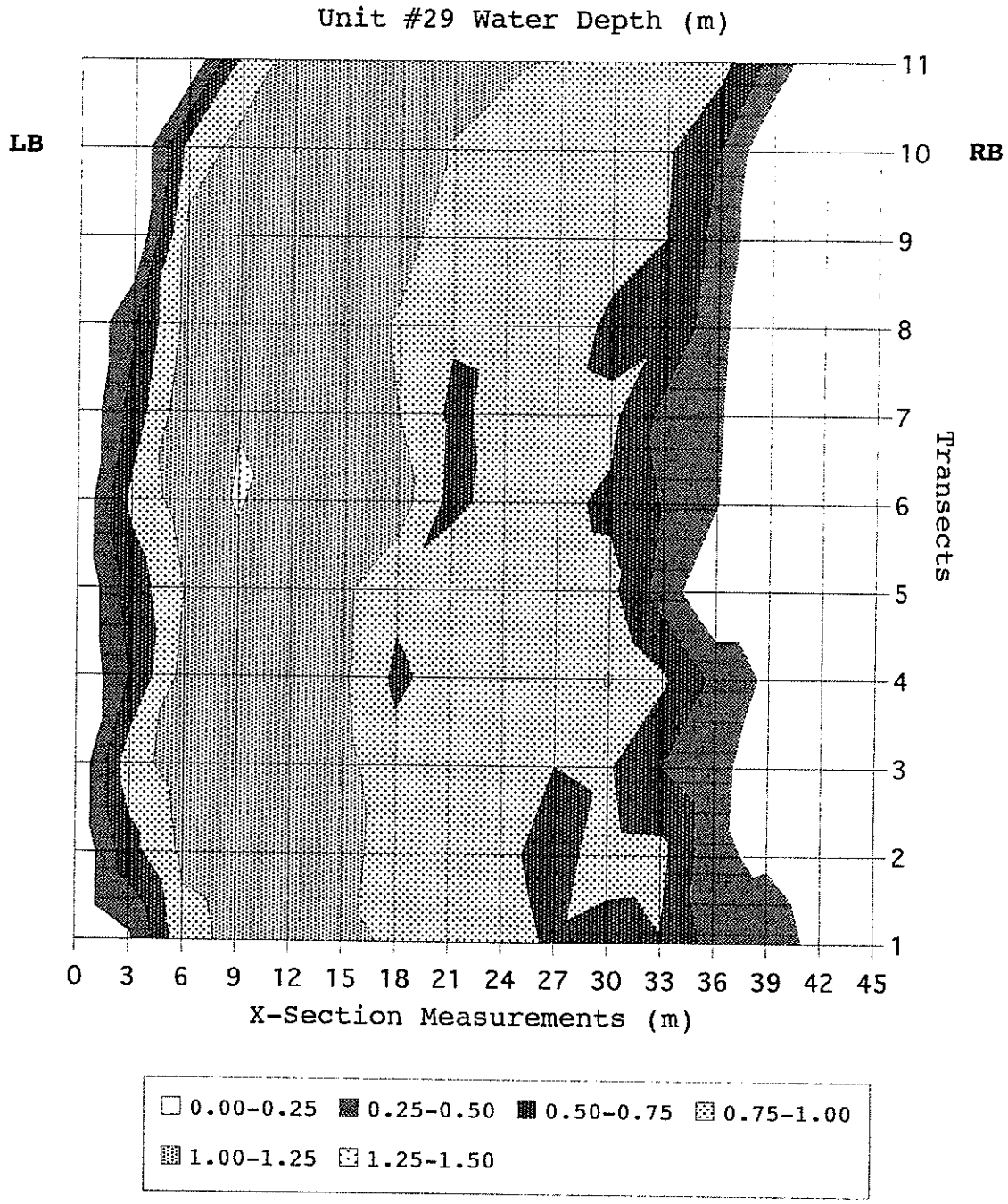
Appendix D. Study unit #6 water depth profile. Water depth measured at each corner of the study unit grid. Measurements are reported in meters (continued).



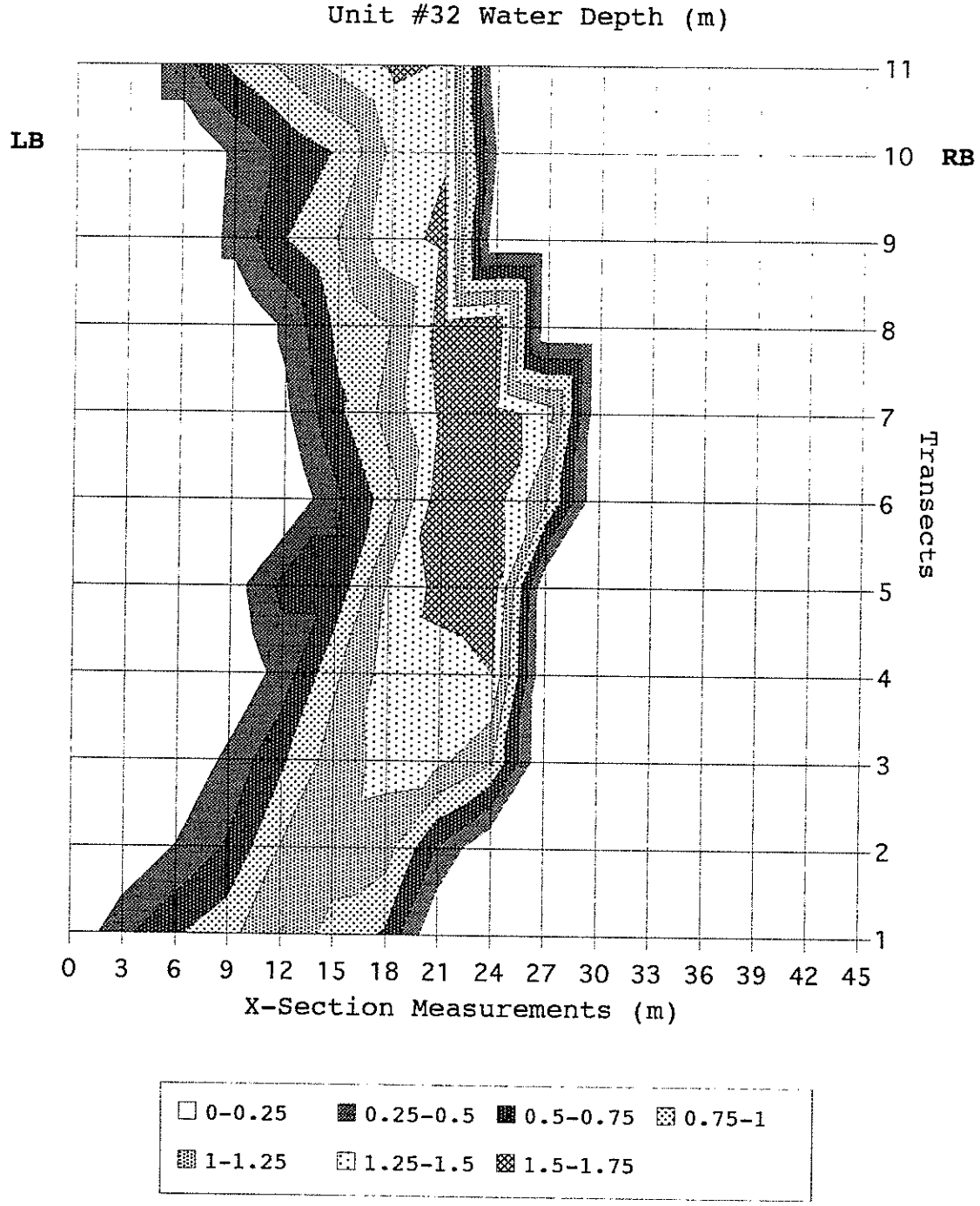
Appendix D. Study unit #15 water depth profile. Water depth measured at each corner of the study unit grid. Measurements are reported in meters (continued).



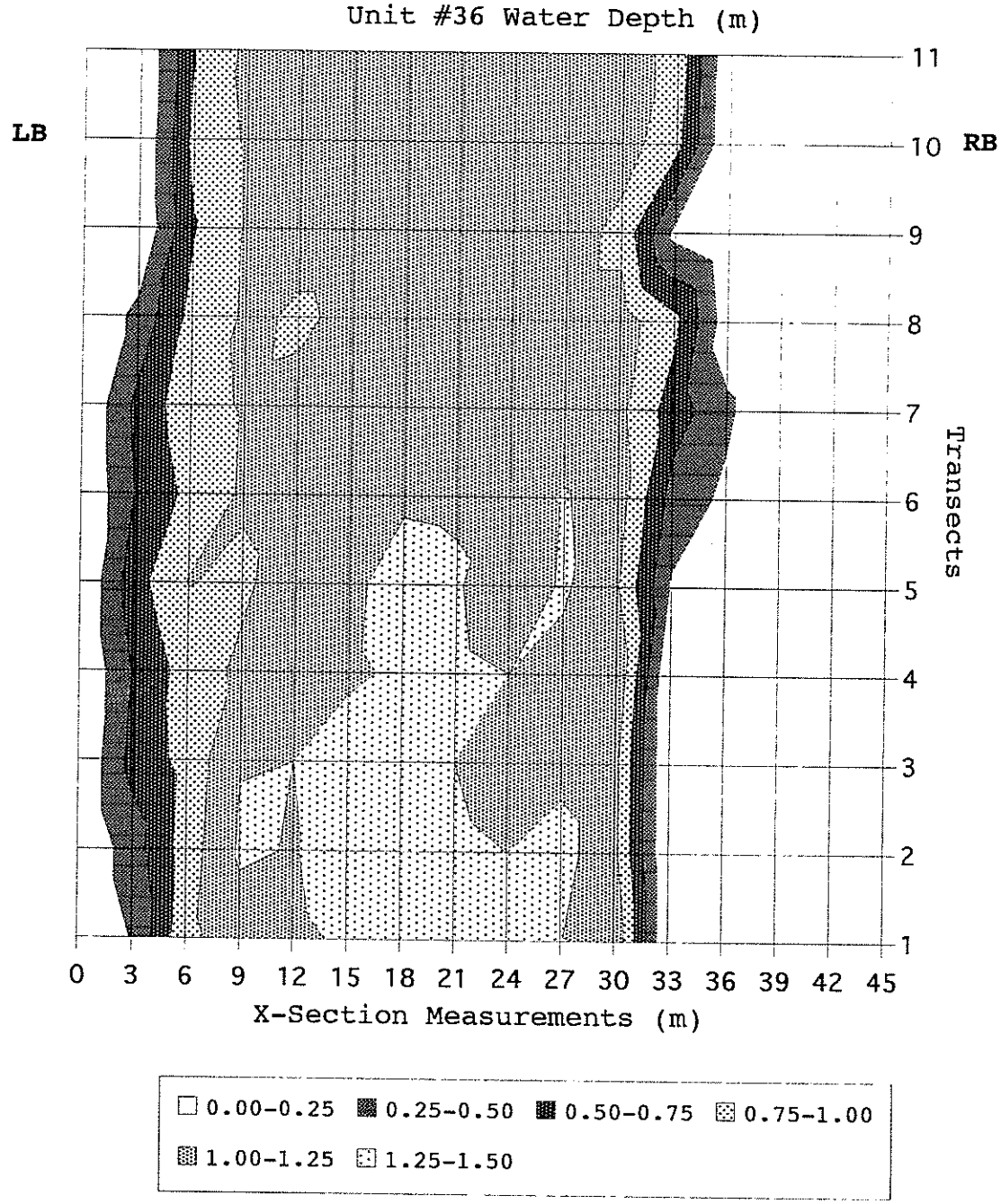
Appendix D. Study unit #25 water depth profile. Water depth measured at each corner of the study unit grid. Measurements are reported in meters (continued).



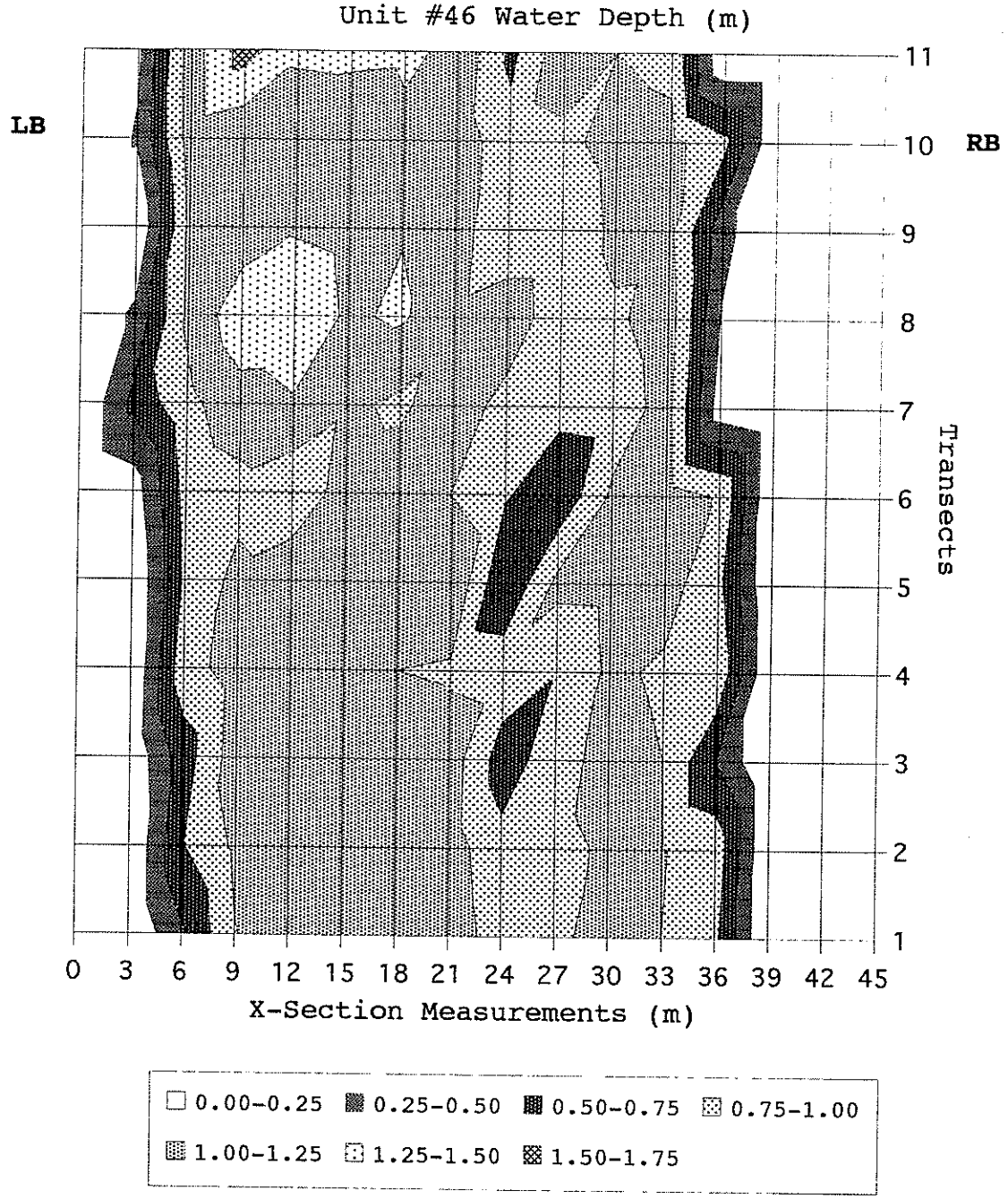
Appendix D. Study unit #29 water depth profile. Water depth measured at each corner of the study unit grid. Measurements are reported in meters (continued).



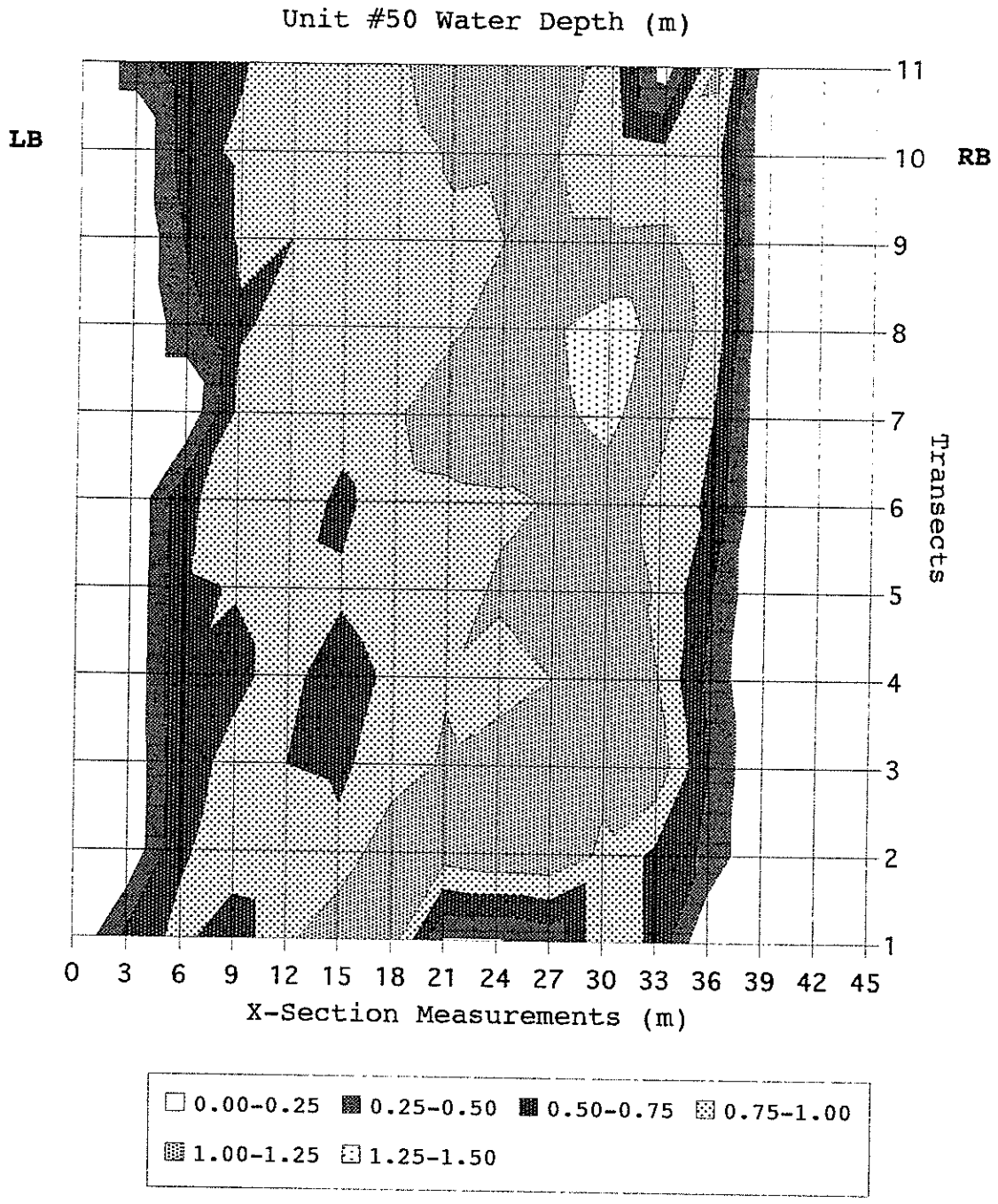
Appendix D. Study unit #32 water depth profile. Water depth measured at each corner of the study unit grid. Measurements are reported in meters (continued).



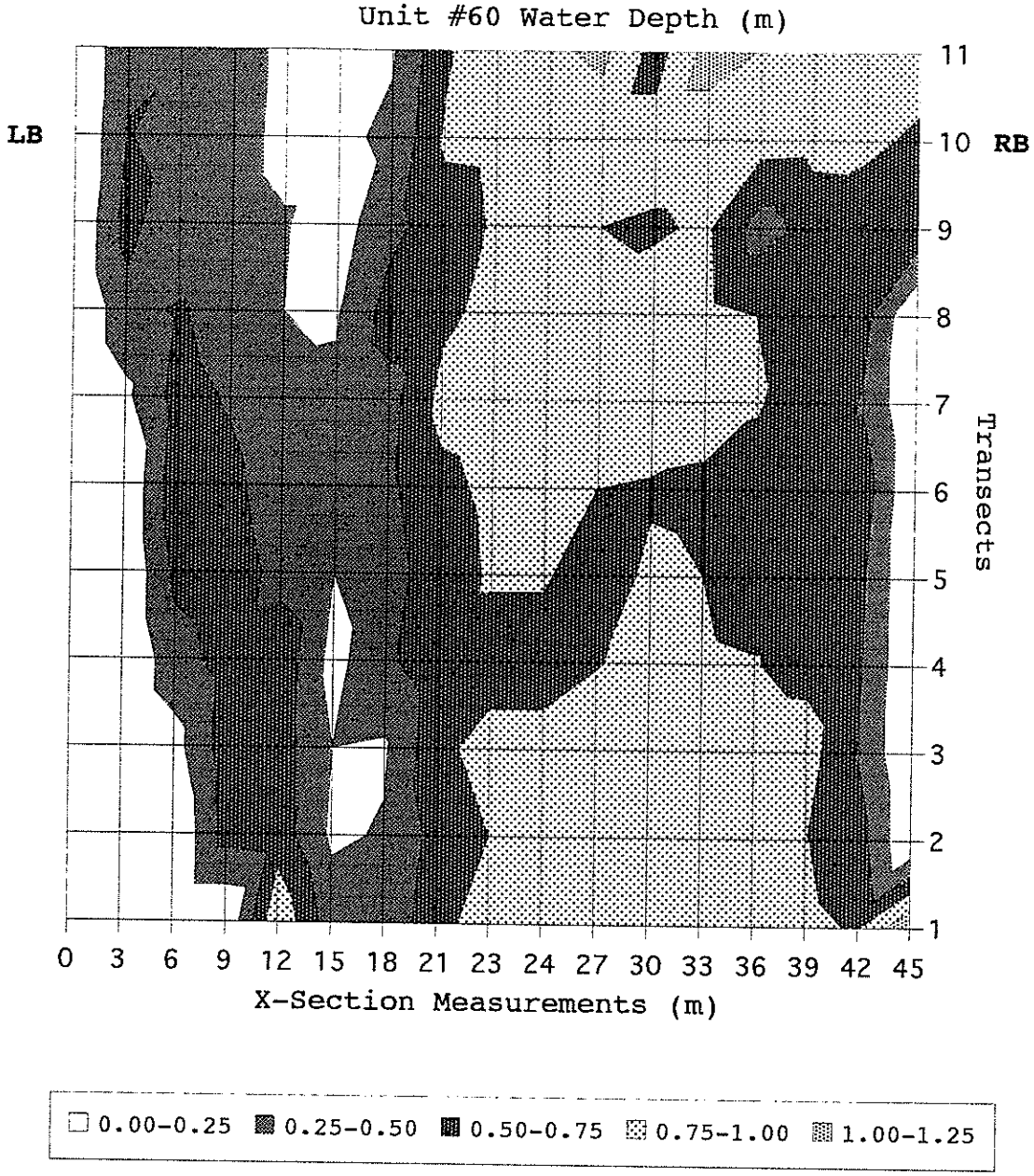
Appendix D. Study unit #36 water depth profile. Water depth measured at each corner of the study unit grid. Measurements are reported in meters (continued).



Appendix D. Study unit #46 water depth profile. Water depth measured at each corner of the study unit grid. Measurements are reported in meters (continued).



Appendix D. Study unit #50 water depth profile. Water depth measured at each corner of the study unit grid. Measurements are reported in meters (continued).



Appendix D. Study unit #60 water depth profile. Water depth measured at each corner of the study unit grid. Measurements are reported in meters (continued).

Appendix E. Water velocity measurements of selected transects. Transects for the start and end of each study unit are included. LB=left bank, LEW=left edge water, RB=right bank, REW=right edge water. Three positions in the water column were measured at each three meter increment on the transect.

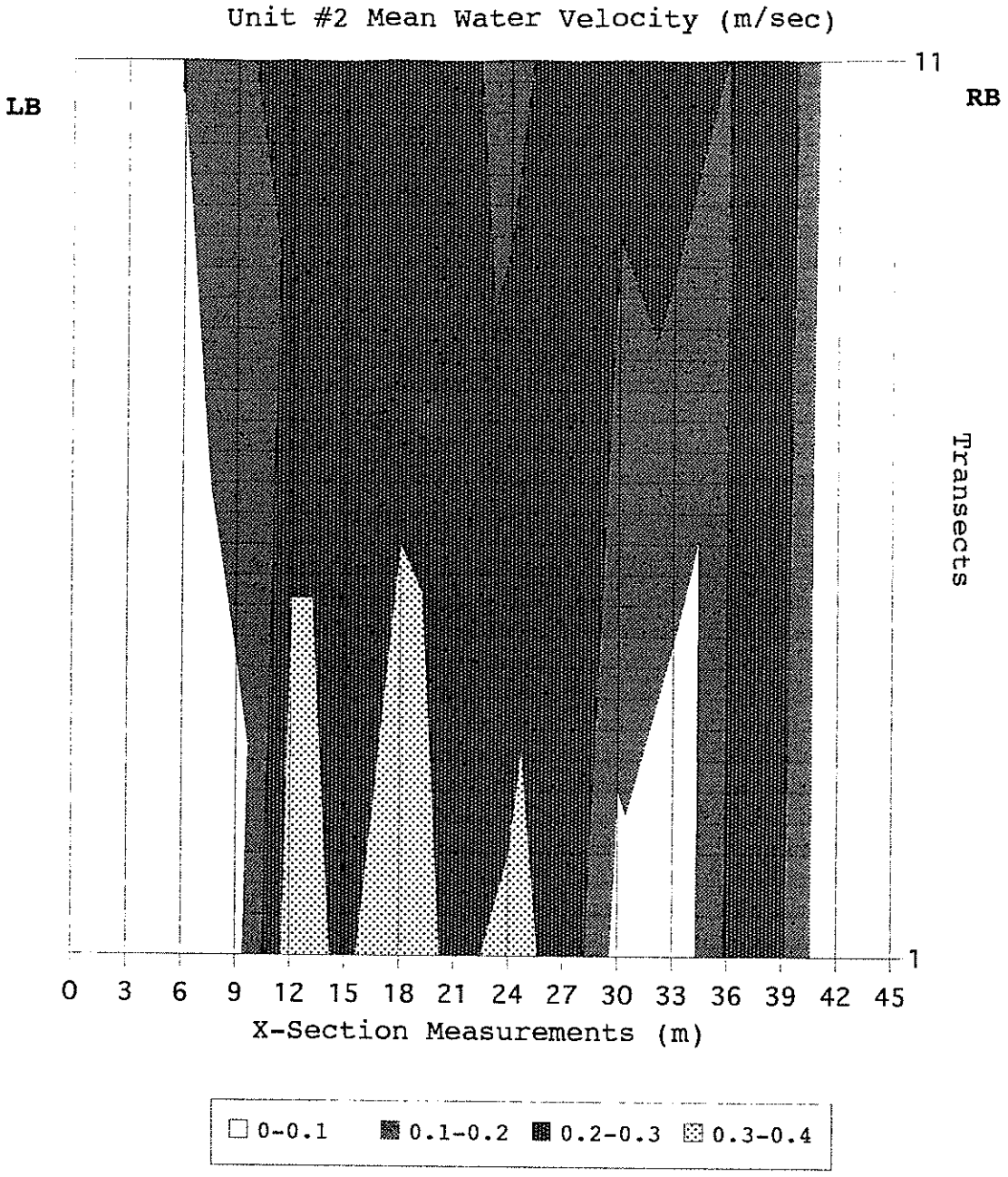
Unit		Cross-sectional increment (m)																				
No.	Position	LB	3	6	9	10.5	12	13.5	15	18	21	24	27	30	33	36	39	42	45	48	51	54	RB
2	surface			0.20	0.37		1.57		1.46	1.42	1.24	1.49	1.15	0.55	0.48	0.63	0.68	0.22					
	mid			0.07	0.19		1.12		0.94	1.15	0.93	1.04	0.94	0.23	0.05	0.68	0.70	0.00					
	sub.			0.09	0.03		0.12		0.10	0.44	0.19	0.60	0.09	0.08	0.00	0.21	0.65	0.00					
3	surface			0.45	0.88		1.24		1.40	1.10	1.24	1.25	1.31	1.27	1.10	1.16	0.83	0.02					
	mid			0.34	0.60		0.78		0.78	0.79	0.74	0.55	0.80	0.76	0.85	0.65	0.87	0.02					
	sub.			0.17	0.44		0.46		0.07	0.10	0.08	0.24	0.21	0.40	0.24	0.24	0.09	0.02					
6	surface	0.51			1.09		1.31		1.46	1.25	1.39	1.71	1.38	1.31	0.73	0.62	0.81	0.33					
	mid	0.44			1.05		0.88		1.34	1.14	1.39	0.13	1.3	0.51	0.59	0.57	0.65	0.32					0.47
	sub.	0.18			0.07		0.07		0.08	0.39	0.81	0	0.77	0.38	0.34	0.28	0.04	0.35					
6.6	surface						0.08		0.95	1.17	1.29	1.52	1.34	1.57	1.02	1.2	0.53	0					
	mid						0		0.91	1.08	0.83	1.34	1.05	1.07	0.94	1.02	0.85	0					
	sub.						0.03		0.14	0.71	0	0.63	0.08	0.52	0.53	0.63	0.43	0.07					
7	surface		0	0.08	0.45		1.04		1.31	1.67	1.59	1.62	1.31	1.36	1.13	0.12							
	mid		0	0.08	0.04		0.27		0.93	1.61	1.17	1.41	1.01	1.08	0.69	0.12							
	sub.e		0	0.08	0		0		0.51	1.12	0.07	0.46	0.39	0.16	0.09	0.12							
9	surface		0.06	0.80	0.63		0.33		0.61	1.03	1.29	1.25	1.01	1.41	1.74	1.65	0.89	0.00					
	mid		0.06	0.75	0.66		0.08		0.10	0.96	0.64	0.78	0.47	1.13	1.08	1.51	0.75	0.00					
	sub.		0.06	0.03	0.08		0.00		0.00	0.33	0.24	0.03	0.16	0.00	0.65	0.81	0.03	0.00					
11	surface		0.88	1.35	1.51		1.67		1.53	1.50	1.26	0.97	1.10	0.35	0.00								
	mid		0.76	1.23	0.97		1.33		1.39	1.27	0.57	0.05	0.38	0.00	0.00								
	sub.		0.46	0.08	0.12		0.11		0.58	0.47	0.00	0.00	0.11	0.00	0.00								
14.8	surface		0.60	1.14	1.25		1.31		1.33	1.41	1.33	1.27	1.34	1.29	1.12	0.00							
	mid		0.06	0.91	0.69		1.09		0.85	1.15	0.98	0.76	1.06	0.99	0.83	0.00							
	sub.		0.06	0.08	0.41		0.20		0.10	0.06	0.08	0.17	0.27	0.29	0.16	0.00							
15	surface	0.74							0.91	1.27	1.23	1.31	1.28	1.26	1.36	1.15	0.94	0.76	0.83	0.89	0.56		
	mid	0.51							0.97	0.87	1.09	1.04	1.18	1.08	1.17	0.83	0.61	0.46	0.73	0.45	0.56		0.25
	sub.	0.47							0.63	0.43	0.64	0.44	0.34	0.47	0.13	0.00	0.14	0.24	0.09	0.11	0.52		
15.7	surface											0.72	1.19	1.48	1.31	1.29	1.33	0.99	1.16	1.35	1.38	0.62	
	mid											0.07	0.98	1.47	0.83	0.49	1.21	0.85	0.86	1.26	1.22	0.62	
	sub.											0.07	0.90	1.09	0.37	0.06	0.12	0.33	0.30	0.77	0.62	0.62	
16	surface		0.58	1.02	1.70		1.62		1.84	1.86	1.82	1.57	1.99	1.64	1.83	1.69	1.17	0.64					
	mid		0.67	0.83	1.57		1.19		1.63	1.41	1.48	1.32	1.32	1.28	1.69	1.68	1.03	0.52					
	sub.		0.26	0.26	0.08		0.06		0.12	0.16	0.05	0.25	0.05	0.30	0.09	0.63	0.71	0.38					

Appendix E. Water velocity measurements of selected transects. Transects for the start and end of each study unit are included. LB=left bank, LEW=left edge water, RB=right bank, REW=right edge water. Three positions in the water column were measured at each three meter increment on the transect (continued).

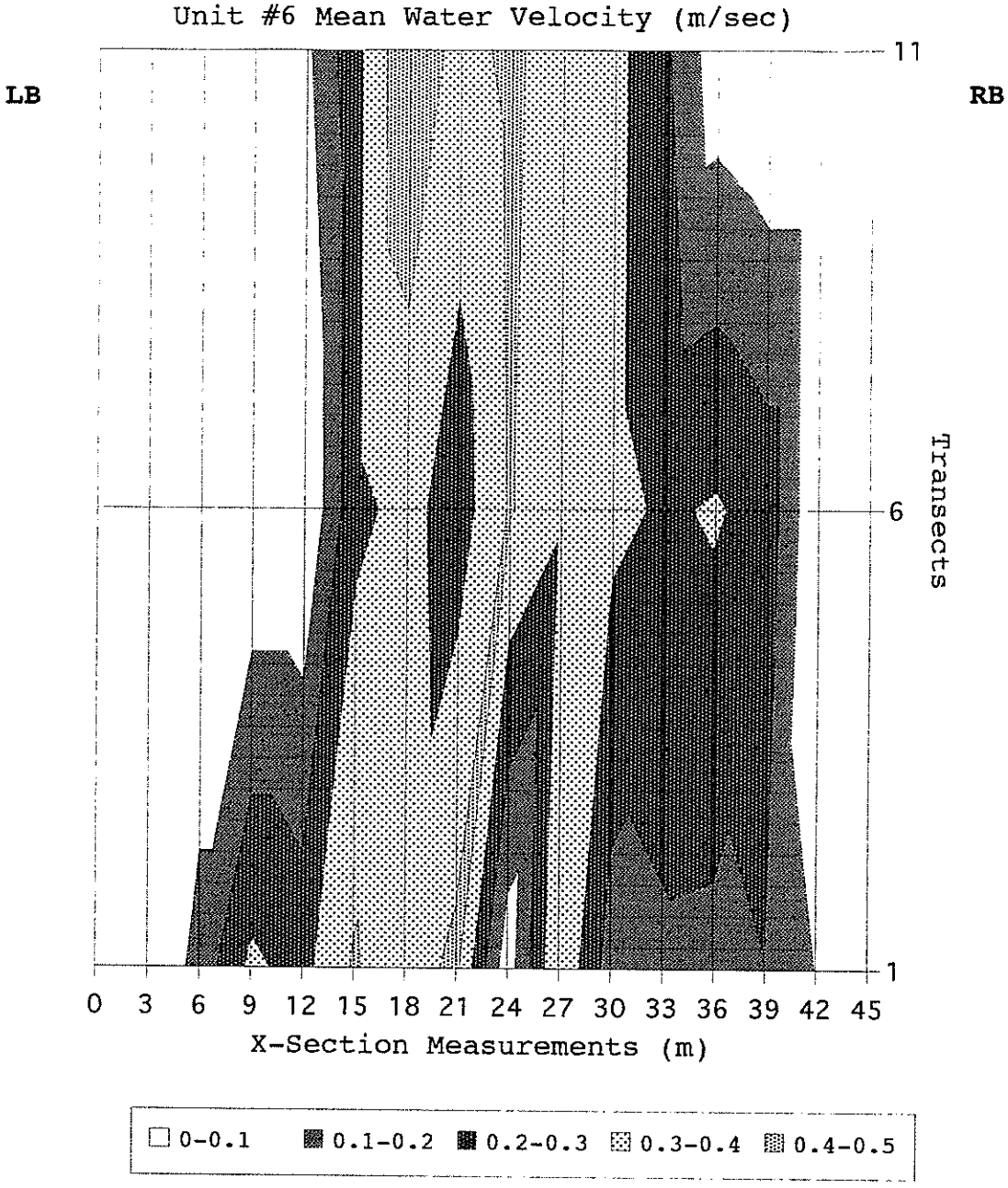
Unit		Cross-sectional increment (m)																				
No.	Position	LB	3	6	9	10.5	12	13.5	15	18	21	24	27	30	33	36	39	42	45	48	51	54	RB
17	surface				0.08		0.53		1.04	1.68	1.73	1.66	1.57	1.47	1.72	1.16	0.00						
	mid				0.00		0.10		0.10	1.02	1.40	1.22	1.08	0.83	1.39	0.57	0.00						
	sub.				0.00		0.11		0.08	0.19	0.05	0.13	0.45	0.17	0.40	0.02	0.00						
18	surface			0.00	0.68		1.08		1.13	1.13	1.07	1.02	1.38	1.42	1.58	1.51	1.77	1.67	0.06				
	mid			0.00	0.00		0.08		0.63	0.40	0.55	0.76	0.87	1.20	1.03	1.44	1.45	1.54	0.01				
	sub.			0.00	0.00		0.00		0.08	0.00	0.17	0.20	0.11	0.10	0.25	0.04	0.65	0.98	0.00				
21	surface			0.41	1.14		1.20		0.78	0.85	0.85	0.85	1.00	1.23	1.74	1.74	1.40	0.00					
	mid			0.02	0.56		1.03		0.17	0.73	0.64	0.20	0.60	0.70	1.68	1.40	1.17	0.00					
	sub.			0.05	0.00		0.39		0.00	0.27	0.38	0.00	0.07	0.11	0.80	0.55	0.59	0.32					
25	surface		0.00	0.77	0.75		0.79		0.50	1.12	1.46	1.48	1.21	1.10	1.28	1.55	1.74	1.27	0.46				
	mid		0.00	0.72	0.69		0.68		0.30	0.68	1.50	1.37	1.24	0.98	0.50	1.11	1.64	1.06	0.00				
	sub.		0.00	0.34	0.35		0.06		0.03	0.07	0.60	1.04	0.82	0.88	0.06	0.28	0.18	0.65	0.00				
26	surface			0.37	0.88		1.53		1.74	1.88	1.85	1.80	1.37	1.13	0.99								0.02
	mid			0.24	0.91		1.02		0.91	1.32	1.69	1.79	1.32	0.45	0.76								0.12
	sub.			0.08	0.34		0.47		0.12	0.38	1.31	1.36	0.90	0.00	0.04								0.11
29	surface		0.99	1.02	0.91		0.91		1.29	1.57	1.98	2.01	2.29	1.68	1.24	1.13	0.47	0.00	0.00				0.24
	mid		0.64	0.04	0.85		0.61		1.07	1.28	1.94	1.43	2.31	1.31	0.96	0.79	0.00	0.00	0.00				
	sub.		0.00	0.02	0.00		0.29		0.51	0.85	1.46	0.54	1.22	0.42	0.16	0.57	0.00	0.00	0.00				0.21
30	surface	0.45	1.13	1.09	1.27		1.07		0.96	1.03	1.52	1.54	1.21	0.86	0.15								
	mid		1.15	0.86	0.77		0.62		0.68	0.95	1.50	1.20	1.28	0.81	0.17								
	sub.	0.62	0.48	0.08	0.16		0.12		0.23	0.35	0.21	0.26	0.86	0.54	0.17								
32	surface		1.34	1.83	1.96		1.61		1.46	0.36													
	mid		1.27	1.69	1.80		1.65		1.45	0.07													1.40
	sub.		0.49	1.28	1.03		1.06		1.17	0.07													
33	surface		0.12	0.98	1.13		1.43		1.36	0.67													
	mid		0.09	0.92	0.96		1.25		1.65	0.87													
	sub.		0.05	0.70	0.65		0.46		1.39	0.06													
36	surface			0.28	1.01		1.04		1.08	1.26	1.35	1.26	1.13	1.92	1.20								
	mid				0.35		0.47		0.75	0.79	1.04	0.79	0.95	1.34	0.99								
	substrate			0.07	0.05		0.00		0.00	0.00	0.00	0.00	0.11	0.68	0.09								
37	surface			0.39	0.45		1.30		1.58	1.62	1.56	1.45	1.53	1.55	1.36	0.30							
	mid			0.36	0.32		0.71		1.16	1.15	0.95	1.19	1.48	1.20	0.86	0.30							
	sub.			0.25	0.05		0.48		0.88	0.13	0.24	0.06	0.45	0.02	0.00	0.30							

Appendix E. Water velocity measurements of selected transects. Transects for the start and end of each study unit are included. LB=left bank, LEW=left edge water, RB=right bank, REW=right edge water. Three positions in the water column were measured at each three meter increment on the transect (continued).

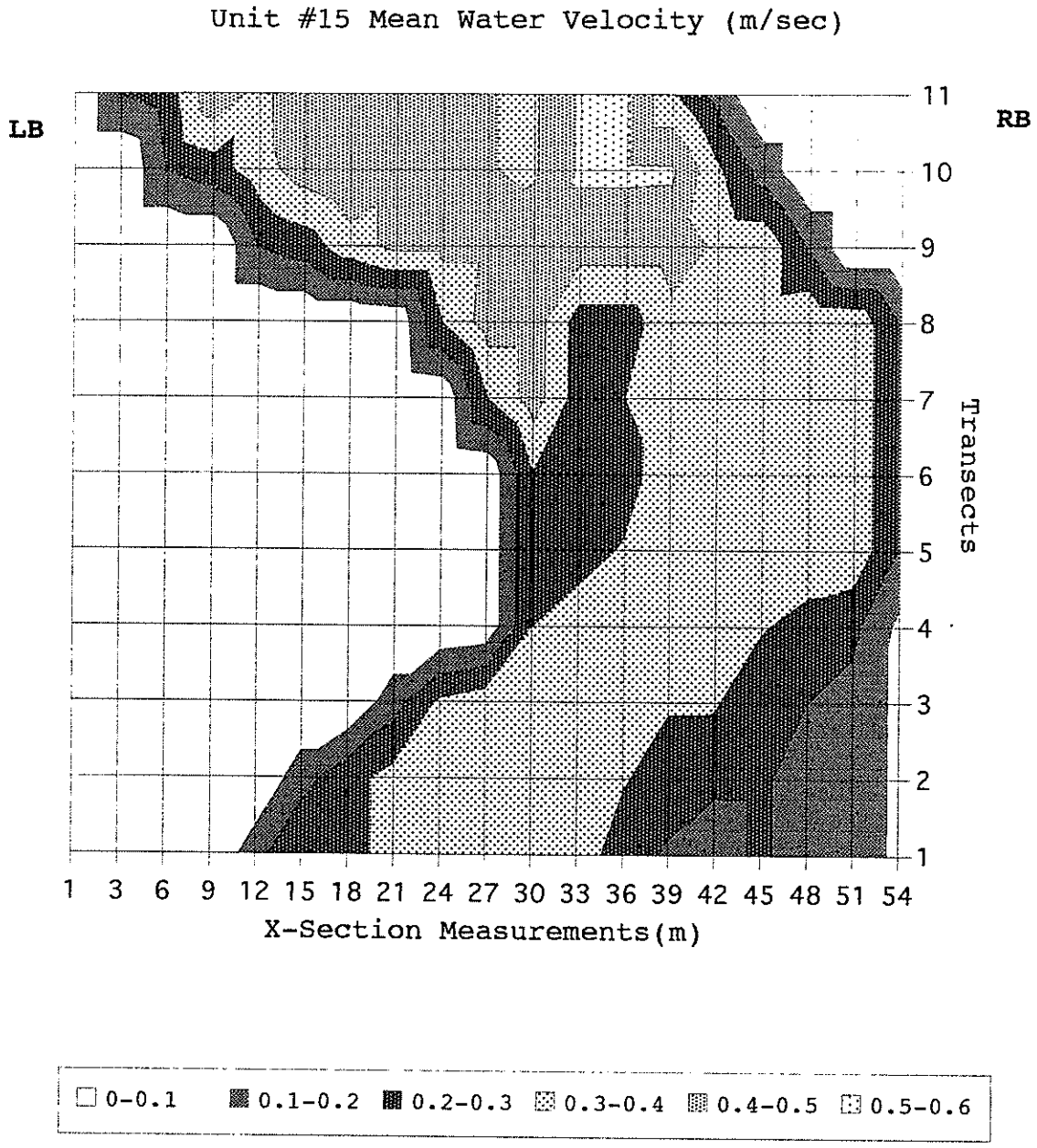
Unit		Cross-sectional increment (m)																				
No.	Position	LB	3	6	9	10.5	12	13.5	15	18	21	24	27	30	33	36	39	42	45	48	51	54	RB
40	surface		0.47	0.66	0.10	1.23	0.04	0.46	0.55	2.56	2.09	2.07	1.74										0.00
	mid		0.00	0.14	0.10	0.79	0.00	0.92	0.73	2.14	2.31	1.88	1.64										0.78
	sub.		0.06	0.06	0.00	1.02	0.12	0.78	0.67	0.68	1.52	1.35	1.14										0.71
46	surface			0.00	0.90		1.47		1.47	1.41	1.35	0.87	0.64	1.64	1.88	0.39							
	mid			0.02	0.47		1.47		0.61	1.14	1.01	0.67	0.11	1.45	1.75	0.65							
	sub.			0.02	0.04		0.60		0.05	0.04	0.05	0.04	0.04	0.07	0.29	0.20							
47	surface			1.13	0.93		1.24		1.45	1.48	1.19	0.84	1.16	1.85	1.49								0.55
	mid			0.54	0.42		0.51		0.11	1.26	0.97	0.10	0.99	1.87	1.49								0.80
	sub.			0.00	0.00		0.00		0.00	0.52	0.61	0.00	0.79	1.15	0.00								0.46
49	surface		0.43	1.44	1.78		1.96		2.22	1.90	0.18	0.27	0.27										
	mid		0.37	1.37	1.73		1.81		2.10	2.00	0.07	0.33	0.26										
	sub.		0.24	0.90	1.02		0.88		1.03	1.04	0.00	0.10	0.13										
50	surface		0.26	0.15	0.23		0.10		2.70	2.53	2.43	2.09	0.70	0.36	0.54								0.88
	mid		0.31	0.07	0.04		0.90		0.38	2.42	2.23	1.81	0.35	0.36	0.54								0.80
	sub.		0.00	0.00	0.00		0.00		0.10	1.97	1.50	0.43	0.13	0.00	0.54								0.46
51	surface		0.63	0.55	0.90		1.14		1.45	1.32	1.27	1.37	1.45	1.40	0.81	0.01							
	mid		0.26	0.35	0.81		1.12		1.24	1.26	1.15	1.01	1.07	0.22	0.75	0.00							
	sub.		0.06	0.26	0.52		0.90		0.85	0.91	0.66	0.42	0.54	0.00	0.46	0.00							
52	surface	0.33	1.18	1.65	1.13		1.09		1.37	1.49	1.62	0.71	0.24	0.26	0.32	0.12	0.00	0.48	0.42				0.42
	mid	0.62	0.95	1.61	1.15		1.06		1.30	1.28	1.19	0.69	0.05	0.25	0.14	0.12	0.00	0.06	0.23				0.44
	sub.	0.22	0.42	1.21	1.06		0.94		0.10	0.70	0.14	0.64	0.00	0.00	0.09	0.02	0.00	0.00	0.15				0.44
53	surface	0.00	0.00	1.42	2.06		1.96		1.59	1.16	0.49	0.56	0.06	0.57	0.97	0.24							
	mid	0.00	0.00	1.77	1.83		1.91		0.96	0.94	0.20	0.14	0.03	0.07	0.53	0.24							
	sub.	0.00	0.00	1.19	0.96		0.94		0.78	0.10	0.02	0.00	0.00	0.00	0.00	0.19							
59	surface		1.03	1.54	1.31		0.75		1.70	1.39	0.00	1.89	1.47	1.38	0.63								0.03
	mid		0.99	0.97	1.27		0.39		1.24	1.39	0.21	1.61	0.67	0.87	0.53								0.00
	sub.		0.78	0.68	0.04		0.19		0.41	1.30	2.01	0.90	0.17	0.03	0.35								0.00
60	surface		1.62	0.00	0.04		0.04		1.05	1.78	1.94	2.11	2.34	1.93	2.06	1.32							
	mid	0.26	1.91	0.00	0.14		0.12		1.19	0.19	1.94	1.81	2.02	1.55	1.83	1.12							
	sub.		0.68	0.05	0.04		0.16		0.99	0.30	1.41	1.08	0.71	0.84	0.91	0.88							
61	surface		1.05	0.07	0.05		0.04		0.06	0.08	1.06	1.69	0.53	0.41	2.02	1.86	2.06	1.62					0.67
	mid		0.98	0.07	0.05		0.04		0.06	0.05	0.63	1.09	0.83	0.33	1.68	1.48	1.96	1.31					0.77
	sub.		0.92	0.07	0.05		0.04		0.06	0.05	0.29	0.82	0.72	0.33	0.93	0.89	0.57	0.93					



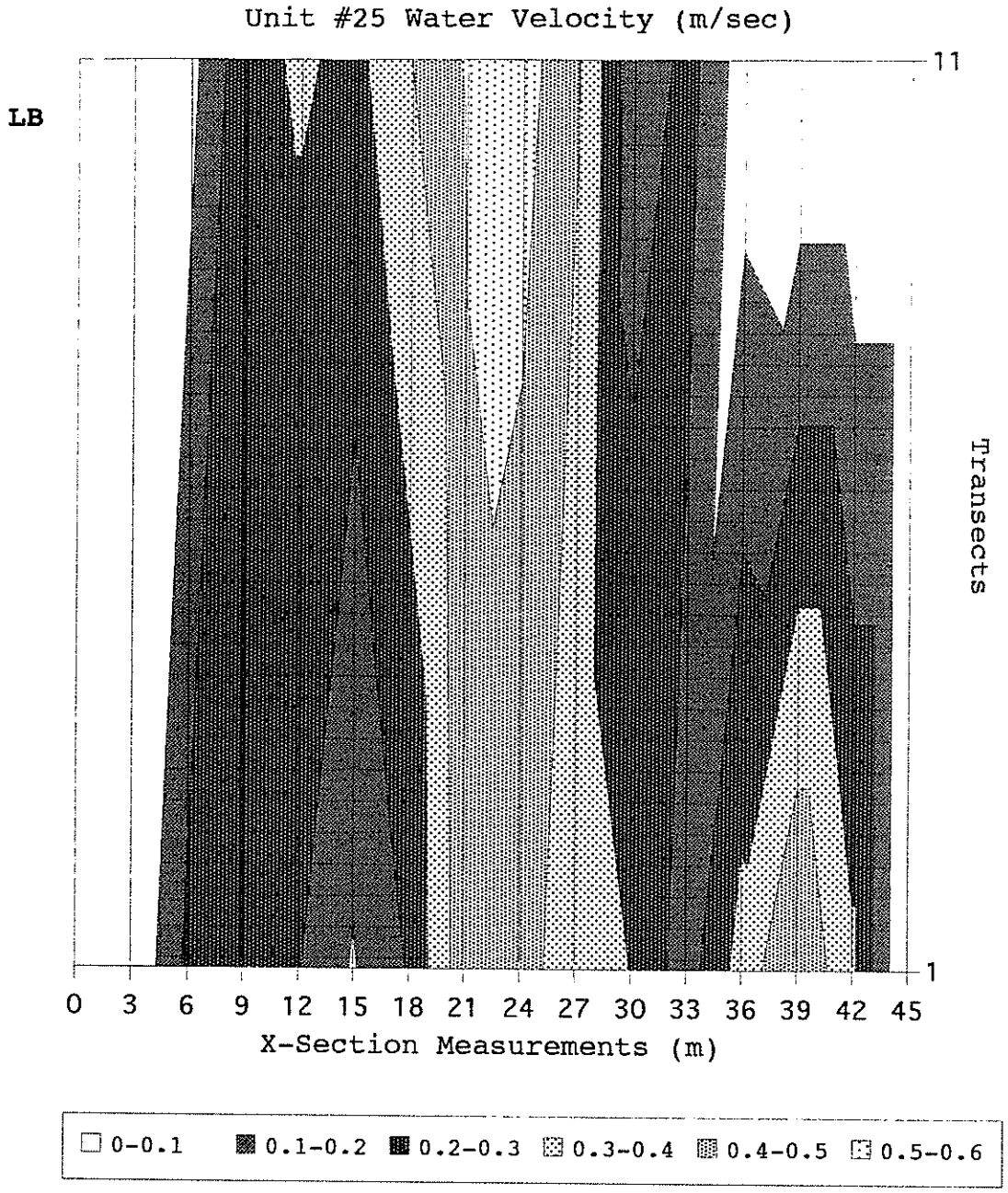
Appendix F. Study Unit #2 mean water velocity profile. Water velocity was measured along the first and last transects of the unit. These measurements were expanded to represent water velocity throughout the unit.



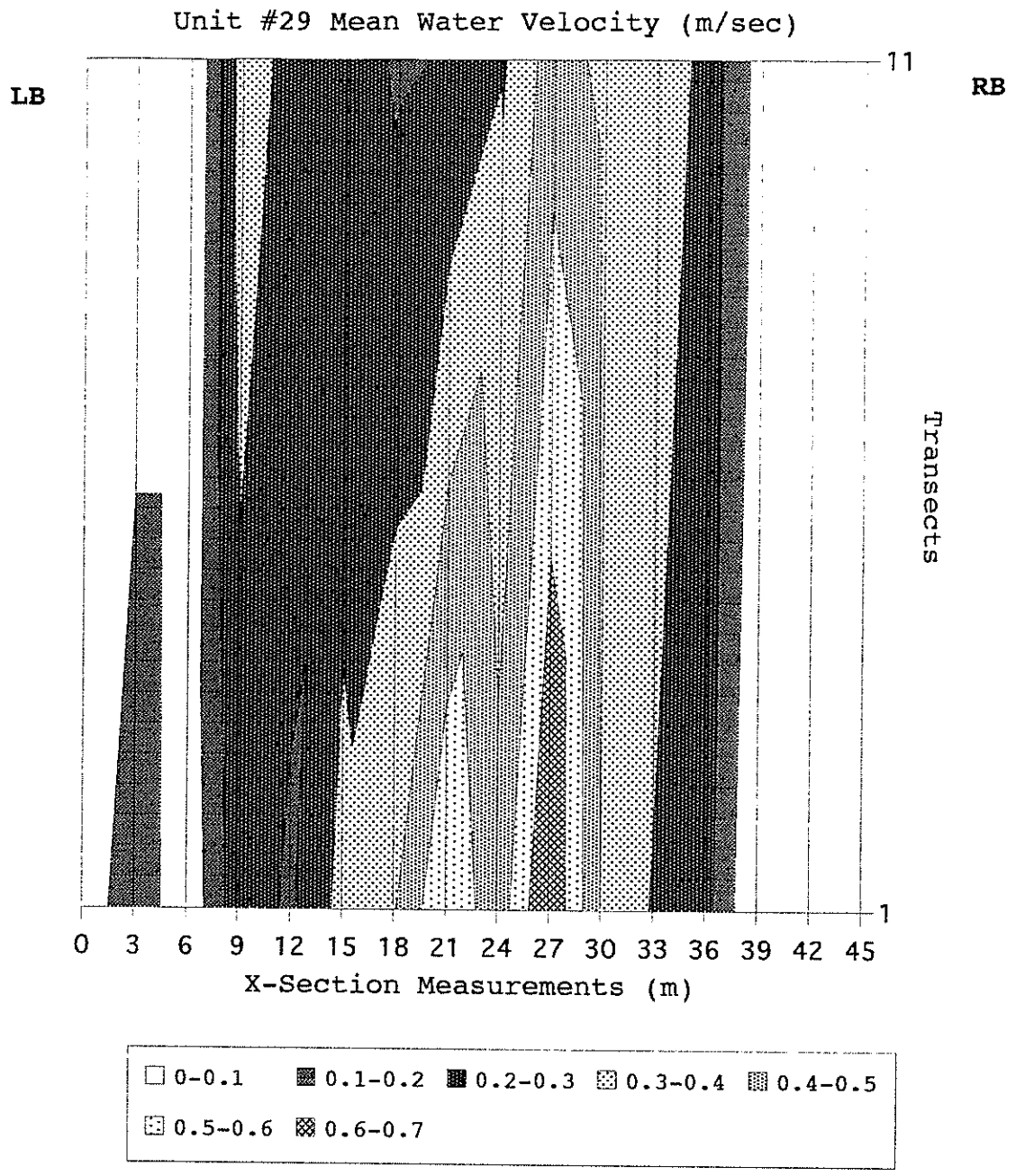
Appendix F. Unit #6 mean water velocity profile. Water velocity was measured along the first, middle (6th), and last transects of the unit. These measurements were expanded to represent water velocity throughout the unit (continued).



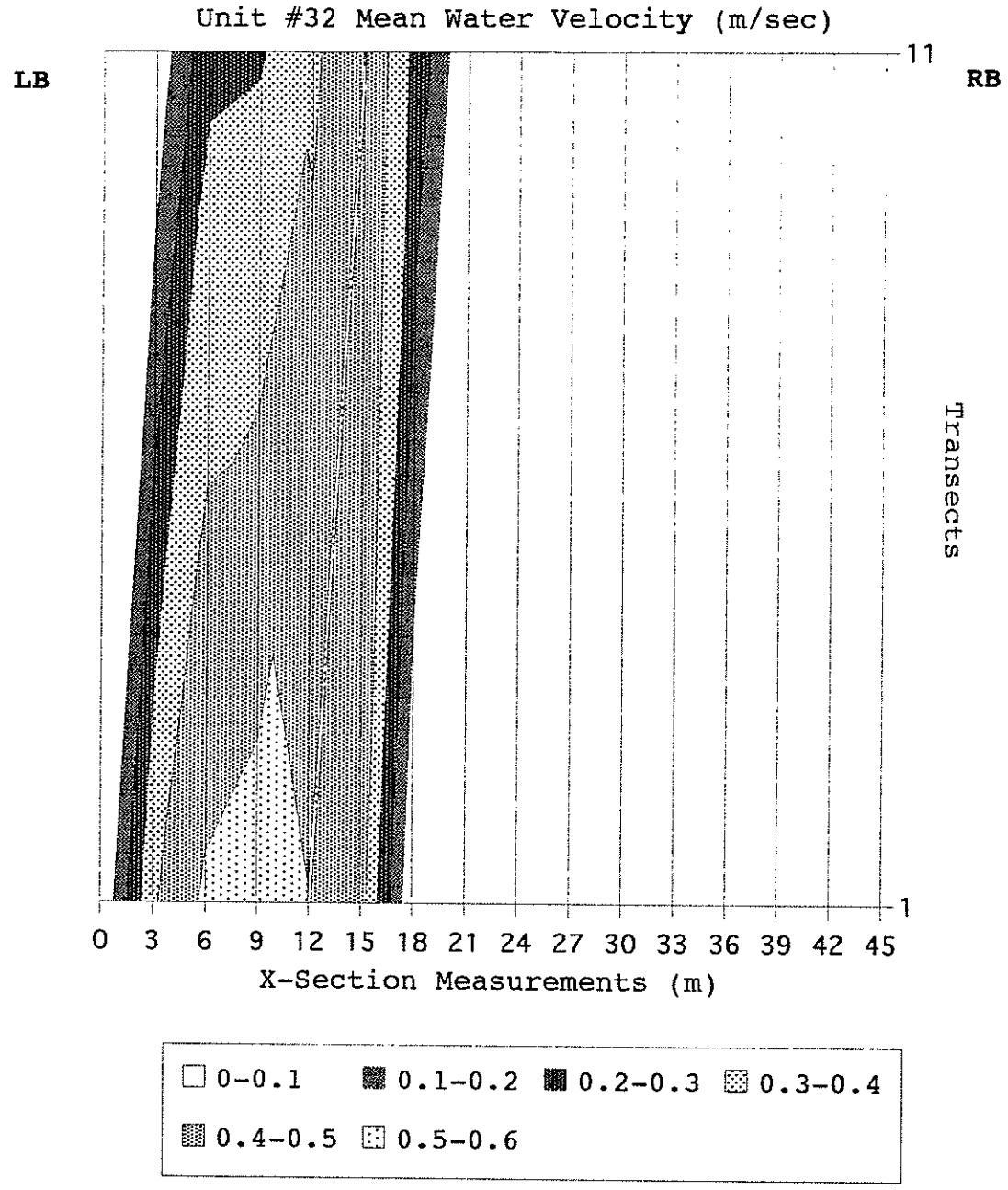
Appendix F. Unit #15 mean water velocity profile. Water velocity was measured along all 11 transects of the unit. These measurements were expanded to represent water velocity throughout the unit (continued).



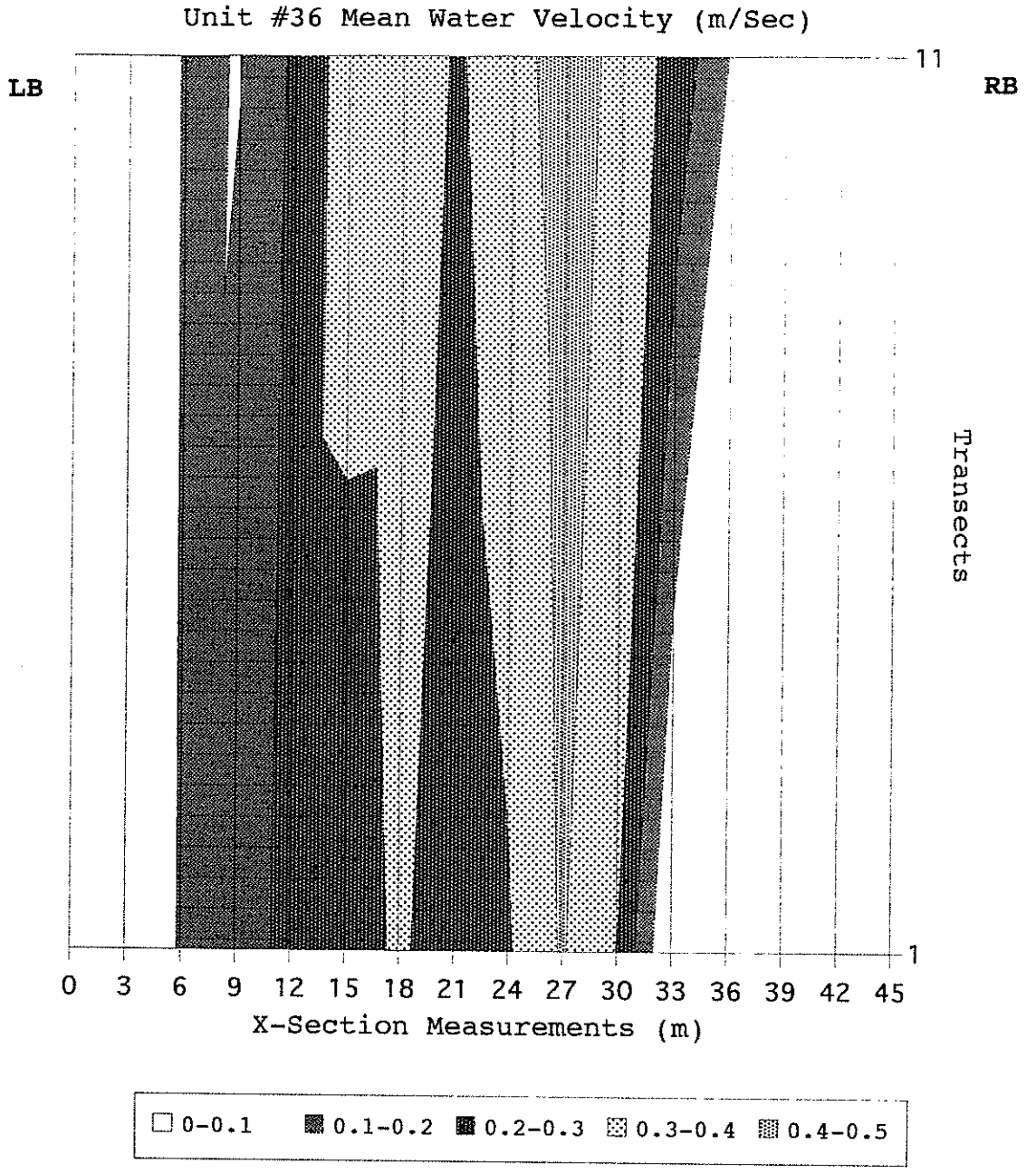
Appendix F. Study Unit #25 mean water velocity profile. Water velocity was measured along the first and last transects of the unit. These measurements were expanded to represent water velocity throughout the unit (continued).



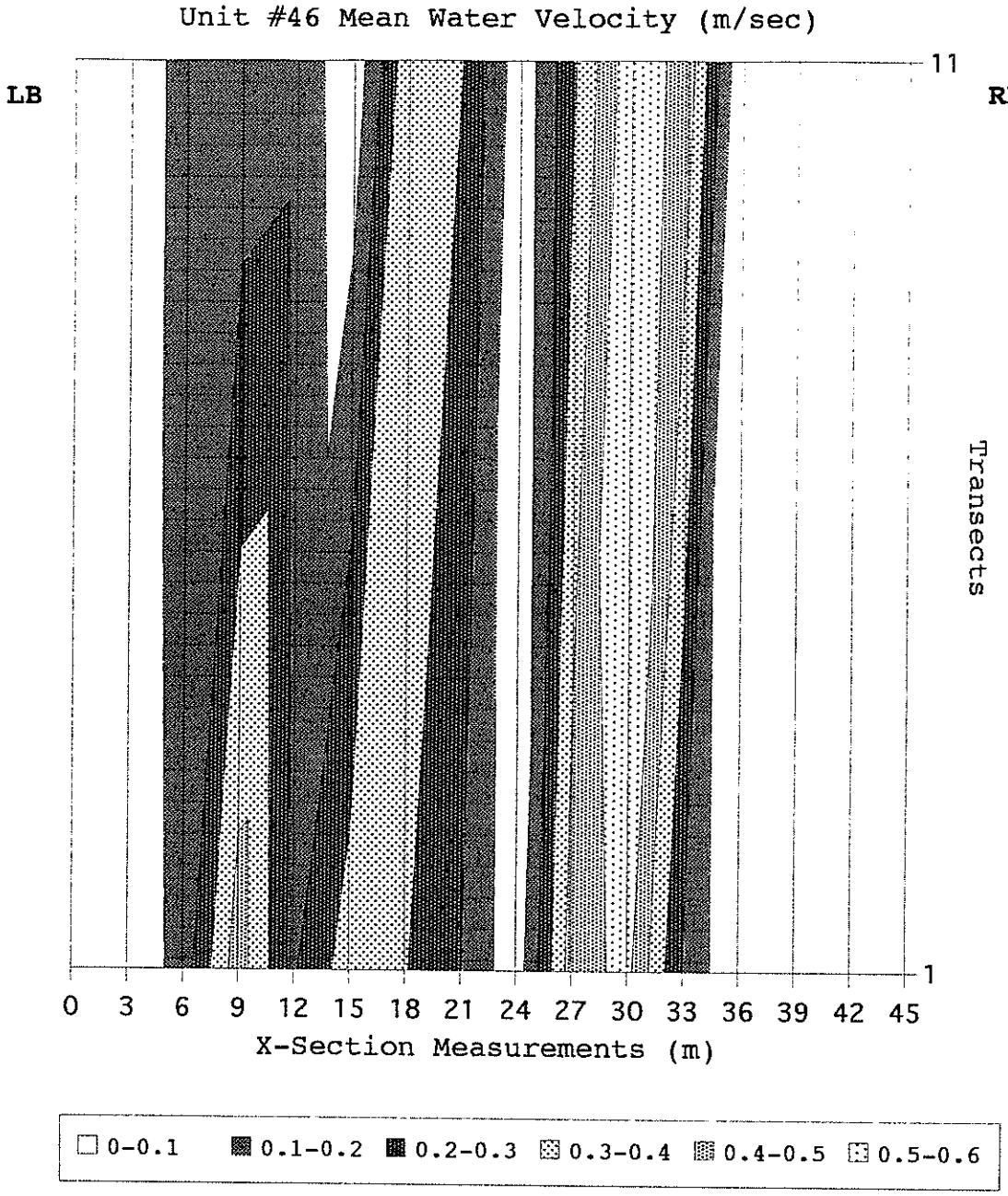
Appendix F. Study Unit #29 mean water velocity profile. Water velocity was measured along the first and last transects of the unit. These measurements were expanded to represent water velocity throughout the unit (continued).



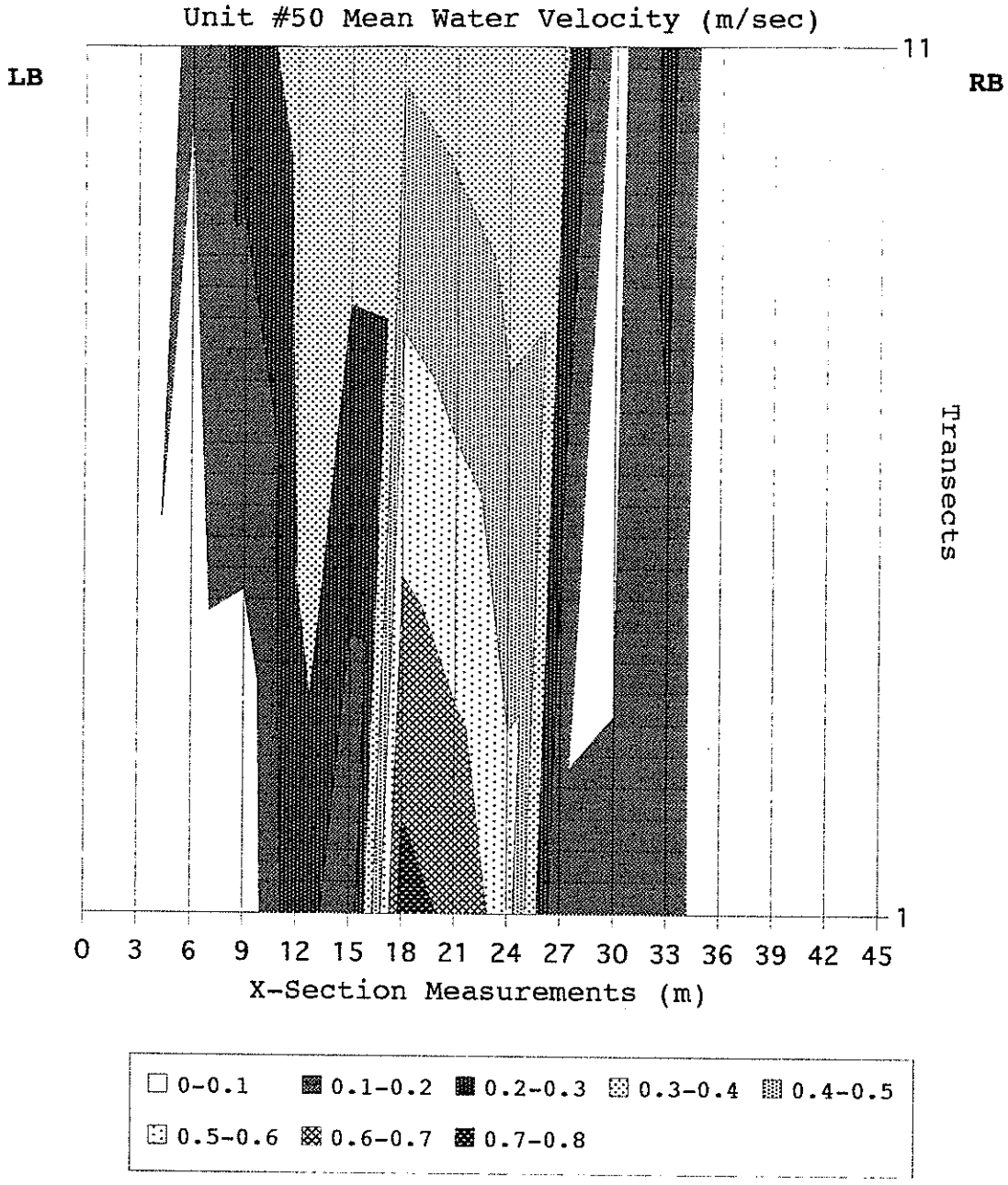
Appendix F. Study Unit #32 mean water velocity profile. Water velocity was measured along the first and last transects of the unit. These measurements were expanded to represent water velocity throughout the unit (continued).



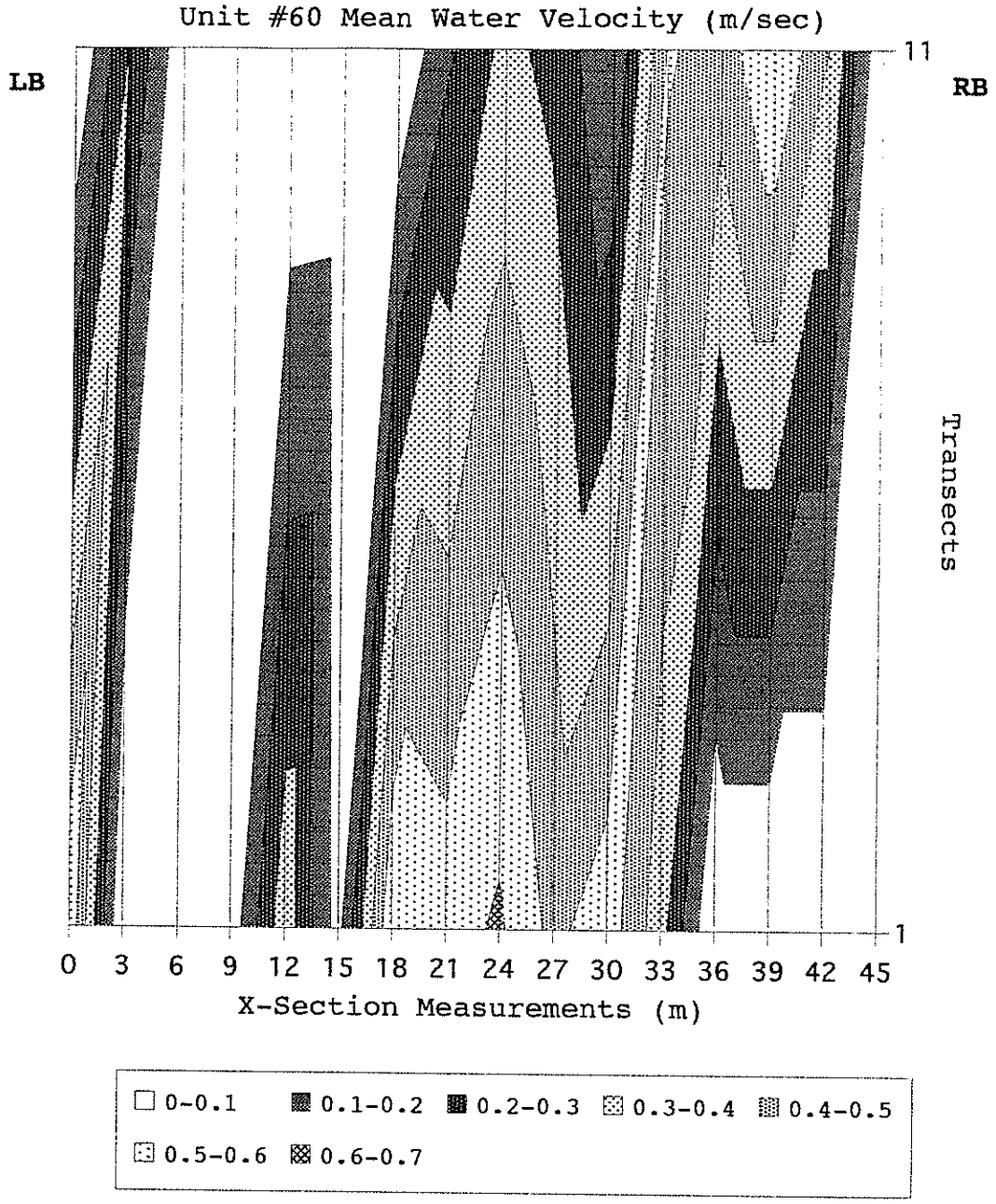
Appendix F. Study Unit #36 mean water velocity profile. Water velocity was measured along the first and last transects of the unit. These measurements were expanded to represent water velocity throughout the unit (continued).



Appendix F. Study Unit #46 mean water velocity profile. Water velocity was measured along the first and last transects of the unit. These measurements were expanded to represent water velocity throughout the unit (continued).



Appendix F. Study Unit #50 mean water velocity profile. Water velocity was measured along the first and last transects of the unit. These measurements were expanded to represent water velocity throughout the unit (continued).



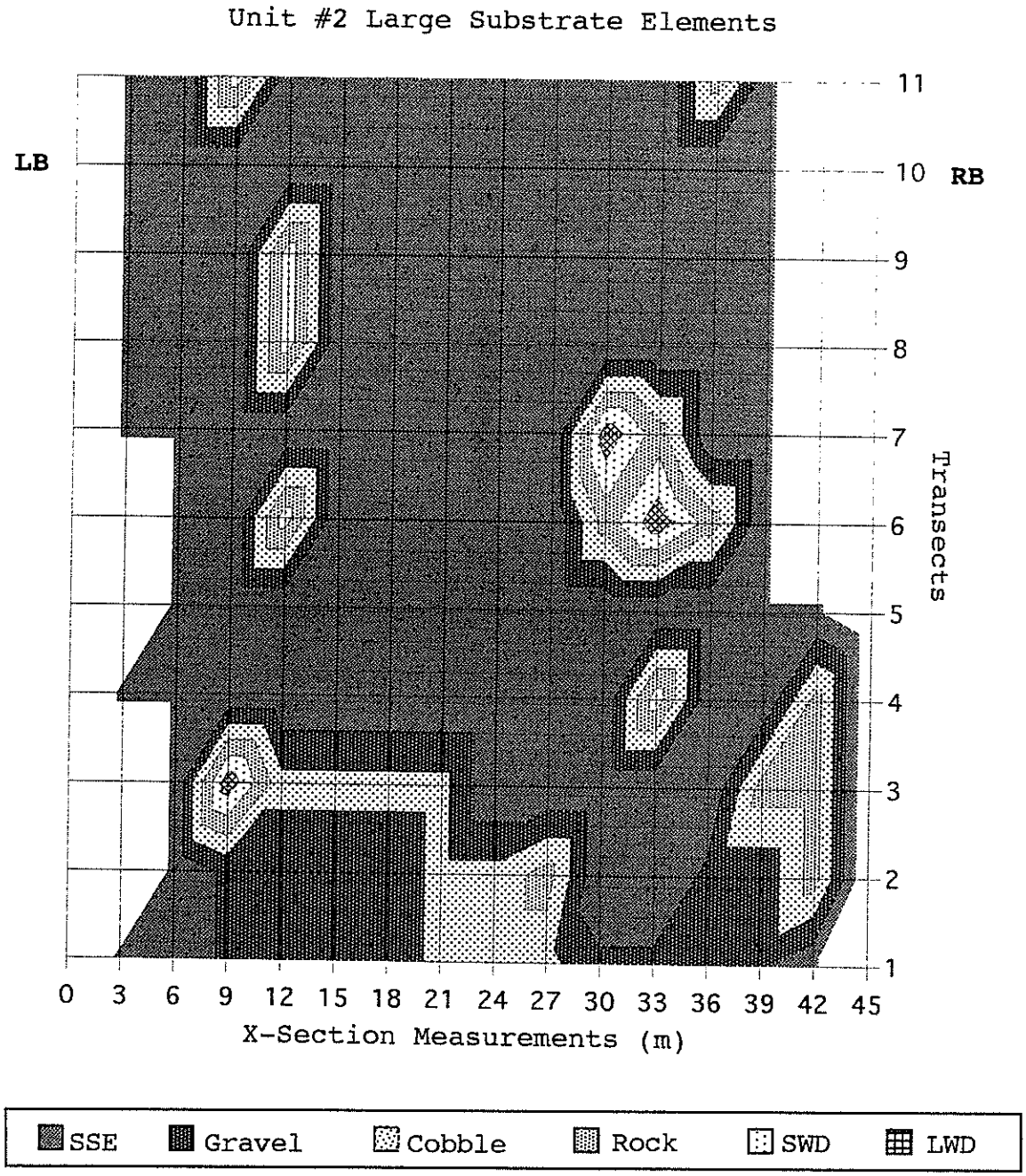
Appendix F. Study Unit #60 mean water velocity profile. Water velocity was measured along the first and last transects of the unit. These measurements were expanded to represent water velocity throughout the unit (continued).

Appendix G. Substrate composition is reported as coded particle sizes, 1=sod, 2=mud, 3 silt, 4=sand, 5=pebbles, 6=gravel, 7=cobble, 8=rocks, 9=boulders, 10=diatomite bedrock, 11=small woody debris (SWD), 12=large woody debris (LWD). The first number is the dominant substrate particle followed by subdominant substrate particles in diminishing abundance.

		Cross-sectional Increment																	
UNIT	DATE	LB	LEW	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	RB
1	22-Aug	4,7		4	4	4,5,12	5,7,12	5,7	4,5,12	4	4	4,5	4,6	6,4	5,4	4,7					3,4
2	5-Jul			2,1,3	4,5	4,5,6	4,5,6	5,5,6	4,5,6	5,6,7	5,6,7	5,6,7	5,4,6	5,4,6	5,4,6	5,4,6	4,5				
3	5-Jul				4	4	4,7	4,5	5,6,4	5,6,4	5,6,4	5,6,7	4,5	7,5,4	7,4,5	7,4,5	1				
4	22-Aug		3,4	3,4	4,5	4,6	4,5	5,4	4,5	4,5	4,5	4,5	4	4	4	3,1					3,4
5	22-Aug			2,10	2,4,10	4	4	4	4,5	4,6	4,6	4	4,5	4	4,6	6,4					2,4
6	22-Jul				4	4,5	5,6,4	6,7,4	5,7,6	6,5,4	4,7	4,7,6	4,7	4	4,7	4,3	3,4				
7	22-Jul			2,1	4,3	4,3	4	4,6	5,4	5,4	4,5	6,5,4	4,8	4,3	4						
8	22-Aug	3,1		3,1	4,5	4,6	4	4,5	4,5	4,5	4,3	2	4,3	3,4	2,3	1					4,3
9	12-Jul	1		4,3	3,2	4,3	4,3	4,7	4,5	4,5	4	4,5	4	4	4,3	3,1,4,1:2					
10	22-Aug	1		4	4	4	4	4	4	4,7	4,7	4	2	4,6							3,6
11	22-Aug			3,4	3,4	3,4	3,4	5,4	5,7,4	4	4,8	4,8	4,8	3,4,8							
12	22-Aug	2		2	2	3,4	4,6	4,5	4	4	4	3,1									3,1
13	22-Aug	3,1		2,4	3,4	4	4	4,5	4,5	6,4	6	6,8	10								
14	22-Aug	3,1	3,1	3,4	3,4	4,3	4,5	4	5,4	6,5,4	7,6	8,12	2,12								
15on	22-Jul							3	4	4	4	4	4	4	4	4	4	4,5	4,5	4,5	
15off	12-Jul			4,3	4,5	4,5,12	4,5	4,5	4,6	4,6	4,3	4,3	4,3	4,3	2,1	1					
15.7	13-Jul			4,3	4,5	4,5	4,6	4,3	4,6	4,6	3,4,10	10	10	10							
16	22-Jul			4	4	4	4,6,7	6,5,4	6,4,7	6,4,5	5,6,4	6,5	4,5,6	5,6,4	5,6,4	4,5,7	10				
17	22-Aug			3,1	3,1	6,4	4	5,4	4,5	5,4	4,5	4,5	5,4	4,3	4	3,4					
18	22-Aug	3,1	3,1	3	3	3,4	5,4	5,6,4	4	4,5	4,5	4,5	4,5	4,6	4	4	4,3	3,4			
19	22-Aug			3,4,5	6,4	4	4	4	4	4	4	4,11	4,5	4	4,5	4,5	4,6	2	3,4		
20	22-Aug			3,1	4,5	4	4	4	4	4	4	4	4	6,4	4	3,4	2	2			
21	6-Jul				2	3,4	4,3	4,3	5,4,6	4,6,5	4,5	4	4,11	4,5,11	4,3	4,3	12,1				
22	22-Aug			4	3,4	4	4	4	5,6,4	5	4,5	4	4	3,4							
23	23-Aug			2,12	3,4	4	4	4	4	5,4,6	4,7	5,4,2	4,5	5,7	4,6	4	4,7	2			
24	22-Aug			2	5,4	4	6,4	4	5	5,4	4,5	5,6	4	4	4	3,4,	3,4				
25	6-Jul			4,8	10,8,5	4,5,7	4,3	4	4,6	4,5	4,5	5,4,6	4	4	5,6,4	4,5	4,3	3,2			
26	6-Jul				10,12	8,12,4,6	4,8	4,6,11	4,6,8	4,5	4	4,5	4	4,2	2						
27	22-Aug			2	4	4	4,5	4,5	6,7,4	8,7,4,11	8,7,11	8,7,4	7,8,6,4	7,6,4	10						12
28	23-Aug			4,3	4	4	5,4	4,5,8	6,7,4	4,6	4,6	4,5	4,8	5							
29	26-Aug			1,3	4,8	4,7	4,7	4	4	4,5,6	4,5,6	5,6,4	5,6,4	4,5,6	3,4	3,4	1,3				2
30	27-Aug					3,5,7	4,6,8	4,7,5	4,5	4,5	4,17	4	4,5	4,6	4	3,2,4					2
31	22-Aug	2	2	2	2	3,4	4	4	4,5	4	4	4	5,4	5,4	5,4,7	4,5					4
31A	24-Aug			1	4	4	4	4	3,4	2,4	2,4	3,4									
31B	24-Aug			2	4	4	4	4	4,3	3,7	4,7	3,4									
31C	24-Aug			3,4	3,4	4,3	4	4	4,11	4,8,7	8,4,3										
32	24-Aug			10,4,3,8	4	4	4	4	4												
33	24-Aug			10	10	7,5,6,4	4,6	4,5	3,1												
33.3	22-Aug			4	4,7	5,4	5,4	4,5	6,4,7	3,4	3,4	4	4	4,6	10,8	10	10,6,4				
34	22-Aug			2	3,4	3,4	4	4,8	4	4	4	4	3,4	2							
35	23-Aug	2,1	2,1	2,12	3,4	4	4,5	4,5,6	4	4	4	4	2,4	2							
36	22-Aug	4		4,6	4,6	4	5,6,4	4,	4,11	3,4	3,4	3,4									
37	5-Jul				2,6,4	4,6	6,5,4	6,5,4	4,7,5	6,5,4	4,5	4,5,6	4,5	4,5	1						
38	22-Aug			4	4	4,5,12	5,7,4	6,4	6,4	6,4	2	8,4	8,6								
39	23-Aug			4,3	8,7,4	7,6,4	7,6,5	2,7,6	2	2	2,12	2									

Appendix G. Substrate composition is reported as coded particle sizes, 1=sod, 2=mud, 3 silt, 4=sand, 5=pebbles, 6=gravel, 7=cobble, 8=rocks, 9=boulders, 10=diatomite bedrock, 11=small woody debris (SWD), 12=large woody debris (LWD). The first number is the dominant substrate particle followed by subdominant substrate particles in diminishing abundance (continued).

				Cross-sectional Increment																
UNIT	DATE	LB	LEW	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	RB	REW
40	22-Aug			10,7,6,4	6,4	7,6,4	8,7,4	7,5,4	6,4	2	8,4,6	8,7,6										
41	23-Aug			3,4	7,6,4	7,6,4	6,4	7,6,4	6,8,4	4,8	4	2	2,12	2								
42	22-Aug			4,5	5,6,4	4	4	5,4	4,5	4,5,7	7,5,4	7,5,4	5,4	4,5,7	6,4	7,4	3,4	2	4,8,5			
43	23-Aug			6,7,4	5,4	4	4	4,3	4,3	4,3	4,3	4,3	4,12,3	4	4	4,5	4	4,3	4,6			
44	22-Aug			3,2	5,4	5,4	4,5	4	4,6	4	4	5,4	5,4	4,5	3,4							
45	23-Aug			5,4	5,4	4	4,5	5,4	5,6,4	6,5,4	6	5,6	3,4	2								
46	5-Jul				2,4	4,10	5,4,6	5,4,6	5,4,6	4,5	4	4	4,5	6,5,4	4							
47	5-Jul				2	4	4	4,5	5,6,4,7	4,5	4	4,5	4,5	4	4							
48	23-Aug			3,4,7	7,6,4	4,5,7	5,6,7	5,6,7,4	9,7,6,5	7,6,4	9,7											
49	7-Jul			4,3,8	4,5	5,4,6	6,4,5	7,4,5	6,4,5	12,4,3	3,8	12,3,6										
50	8-Jul			12,2,3	12,2,3	12,3,4	12,4,3	12,6,5,4	5,4,7	8,4,7	4,5,7	12,4	12,2,3,5	2,3,8								
51	7-Jul			3	4	4	4	4	4,5,6	6,7,4	6,7,4	8,4,7	4,3	10,4,3,7	1,3							
52	8-Jul	1	1	4,3	4	4	4,6,5	4,5	6,5,4	6,5,4,8	6,5,4	2,4	2,4	2	2	2,4	2,3	4,3,5	10,4			
53	11-Jul	3,4	3,4	3,4	5,6,4	4,7,5	4,6,5	6,5,4	4	3,4	2,3	2,4	3,4	3,4,11	3,4,8							
54	23-Aug	4		4	4	4,6	6,4	4,6	4	3,4	2	2										
55	23-Aug			4	4	4,6	4,7	8,12,4	9	8,4												
56	23-Aug			10,8,7,4	7,6,4	5,6,8	3	11,3,6,8	12,2	12,2	12,2											
57	23-Aug			10,7,6,4	7,6,5	4,7,5	5,4	4,5	4,3	12,2	12,2	2,12										
58	23-Aug			3,4	4	4,6	6,4,7	4,6,7	4,6,7	4,7	4	4,7	3,4	3,4	4,5							
59	11-Jul			4,5	5,4	5,4,6	4,6	4,5,6	4,5	12,6,7,5	6,4,7	7,6,5,4	8,6,4	8,4,5							4,3,5	
60	24-Aug						4,5	4,3	2	4,3	4	4	7,6,4	5,4,7	6,7	5,6,7	8,6,4	5,3,4				
61	24-Aug			4,3,6,12	4,3,12	3,4	3	3	3	4	5,4	4,6	4	8,6	8,6,4	6,4	6	4,6,3				



Appendix H. Substrate particle size measured at each corner of the study unit grid. Large substrate elements represent substrate that was gravel size or larger. Small substrate elements (SSE) were pebbles, sand, silt, mud, and sod. SWD=small woody debris, LWD=large woody debris.