

Cell Mass Balances Everglades Nutrient Removal Project

W. Walker for U.S. Dept of Interior

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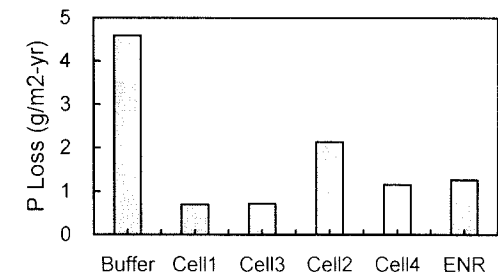
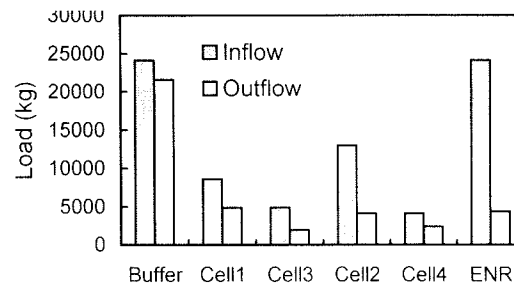
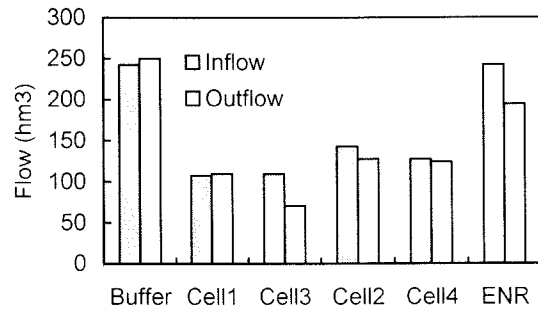
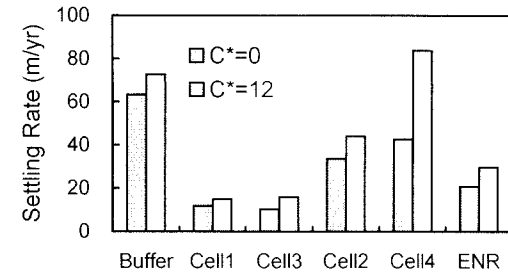
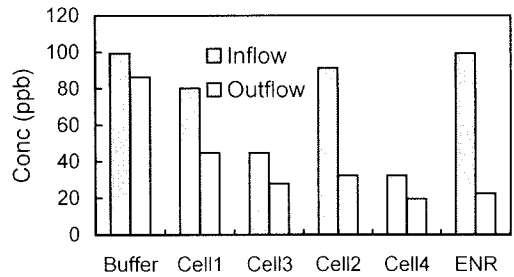
Water & P Balances - ENR Cells

Period: 9503 thru 9602 First 12 Months

Calculated from UVM Culvert & Pump Station Flows, Atmospheric & Groundwater Fluxes Ignored

	Area acres	Elev feet	Mean Depth feet	Flow (hm3)		P Load (kg)		Conc (ppb)		Water	Water	P Removal			Background Conc (ppb)			
				In	Out	In	Out	In	Out	m/yr	m/yr	g/m ² /yr	%	kg/yr	0	4	8	12
														Settling Rate (m/yr)				
Buffer	133	NA	NA	243	250	24126	21646	99	87	456.8	-13.8	4.60	10%	2480	63.4	66.2	69.4	72.8
Cell1	1299	11.97	1.87	108	110	8622	4913	80	45	20.6	-0.4	0.70	43%	3708	12.0	12.8	13.8	15.0
Cell3	999	11.60	1.30	110	71	4913	1978	45	28	22.2	9.6	0.72	60%	2935	10.5	11.9	13.6	16.1
Cell2	1022	12.00	2.60	143	128	13024	4145	91	32	32.6	3.6	2.14	68%	8879	33.7	36.6	40.0	44.2
Cell4	364	11.82	2.22	128	124	4145	2435	32	20	85.2	2.6	1.16	41%	1710	42.7	50.9	63.2	83.8
ENR	3817	11.86	1.95	243	195	24126	4413	99	23	14.1	3.1	1.27	82%	19713	20.9	23.0	25.8	29.7
Cell 1+3	2298		1.72	108	71	8622	1978	80	28	11.5	3.9	0.71	77%	6643	12.1	13.3	14.8	16.7
Cell 2+4	1386		2.50	143	124	13024	2435	91	20	25.4	3.3	1.88	81%	10590	39.0	43.6	49.9	59.3

	Inflow	Outflow
Buffer	G250+G250S	G252+G255
Cell 1	G252	G253
Cell 3	G253	G251 - G256
Cell 2	G255	G254
Cell 4	G254	G256
ENR	G250+G250S	G251



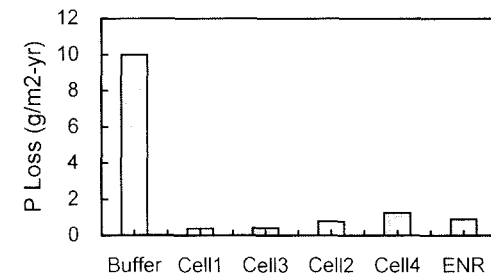
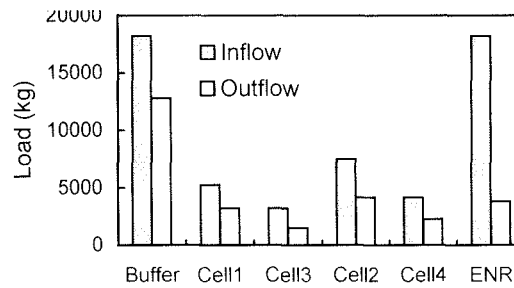
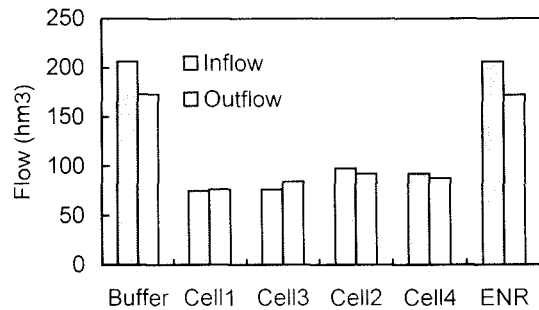
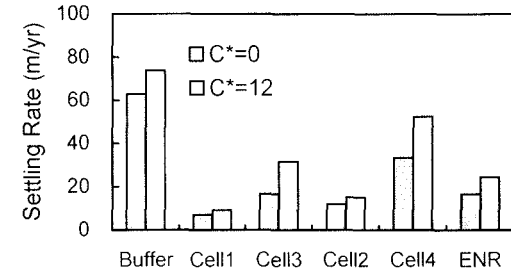
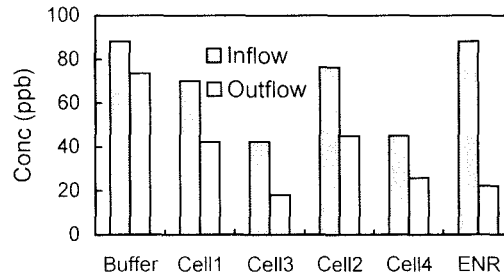
Water & P Balances - ENR Cells

Period: 9603 thru 9702 Second 12 Months

Calculated from UVM Culvert & Pump Station Flows, Atmospheric & Groundwater Fluxes Ignored

	Area acres	Elev feet	Mean Depth feet	Flow (hm ³)		P Load (kg)		Conc (ppb)		Water	Water	P Removal		Background Conc (ppb)				
				In	Out	In	Out	In	Out	m/yr	m/yr	g/m ² /yr	%	kg/yr	Settling Rate (m/yr)			
Buffer	133	NA	NA	206	173	18207	12780	88	74	349.9	60.8	10.00	30%	5427	62.9	66.2	69.8	73.9
Cell1	1299	12.04	1.94	75	77	5269	3248	70	42	14.3	-0.3	0.38	38%	2021	7.2	7.8	8.5	9.3
Cell3	999	11.69	1.39	77	84	3248	1531	42	18	19.8	-1.9	0.42	53%	1717	16.8	19.8	24.2	31.7
Cell2	1022	11.86	2.46	98	93	7512	4187	77	45	22.9	1.3	0.80	44%	3324	12.0	12.9	14.0	15.2
Cell4	364	11.58	1.98	93	88	4187	2291	45	26	60.8	3.1	1.28	45%	1897	33.6	38.1	44.1	52.4
ENR	3817	11.85	1.94	206	173	18207	3821	88	22	12.2	2.2	0.92	79%	14386	16.8	18.7	21.1	24.5
Cell 1+3	2298		1.70	75	84	5269	1531	70	18	8.0	-1.0	0.40	71%	3738	10.9	12.4	14.6	18.1
Cell 2+4	1386		2.34	98	88	7512	2291	77	26	17.4	1.8	0.92	70%	5221	18.7	20.7	23.2	26.5

	Inflow	Outflow
Buffer	G250+G250S	G252+G255
Cell 1	G252	G253
Cell 3	G253	G251 - G256
Cell 2	G255	G254
Cell 4	G254	G256
ENR	G250+G250S	G251



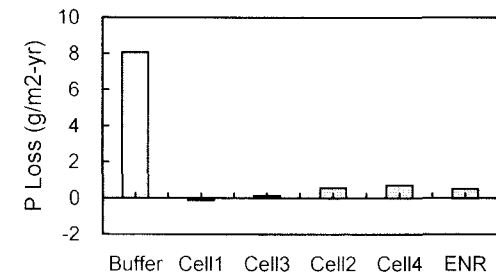
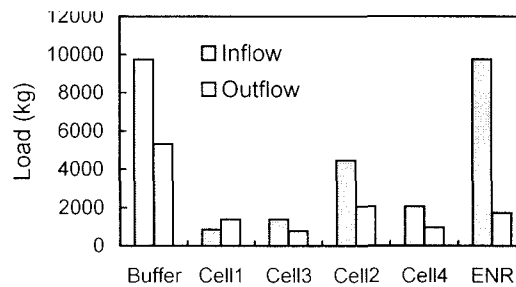
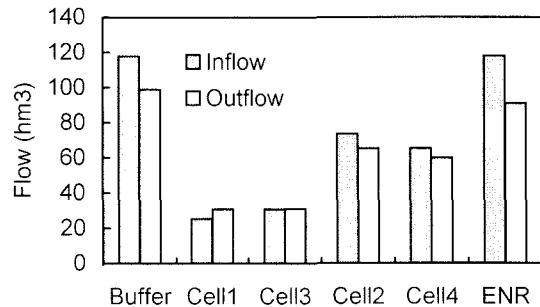
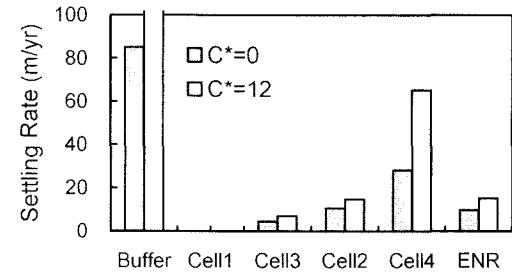
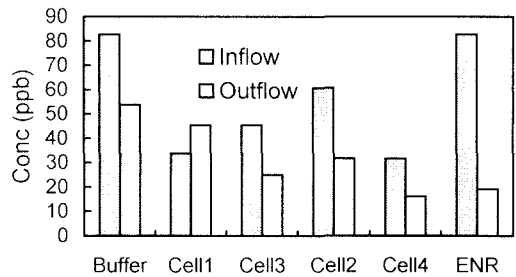
Water & P Balances - ENR Cells

Period: 9703 thru 9802 Third 12 Months

Calculated from UVM Culvert & Pump Station Flows, Atmospheric & Groundwater Fluxes Ignored

	Area acres	Elev feet	Mean Depth feet	Flow (hm3)		P Load (kg)		Conc (ppb)		Water	Water	P Removal		Background Conc (ppb)				
				In	Out	In	Out	In	Out	m/yr	m/yr	g/m ² /yr	%	kg/yr	0	4	8	12
				Settling Rate (m/yr)														
Buffer	133	NA	NA	118	99	9751	5327	83	54	197.8	34.4	8.07	45%	4424	85.1	90.5	96.8	104.0
Cell1	1299	11.65	1.55	26	31	864	1410	34	46	5.3	-1.0	-0.10	-63%	-546	-1.6	-1.8	-2.0	-2.3
Cell3	999	11.30	1.00	31	31	1410	781	46	25	7.5	0.0	0.15	45%	629	4.5	5.1	5.9	7.1
Cell2	1022	11.95	2.55	73	65	4463	2073	61	32	16.5	1.9	0.57	54%	2391	10.7	11.8	13.1	14.9
Cell4	364	11.83	2.23	65	60	2073	967	32	16	41.7	3.6	0.74	53%	1105	28.2	34.5	44.7	65.2
ENR	3817	11.65	1.74	118	91	9751	1748	83	19	6.6	1.7	0.51	82%	8003	9.7	10.9	12.6	15.2
Cell 1+3	2298		1.57	26	31	864	781	34	25	2.7	-0.6	0.01	10%	83	0.8	0.9	1.1	1.4
Cell 2+4	1386		2.46	73	60	4463	967	61	16	12.9	2.4	0.61	78%	3496	17.0	19.8	24.0	31.7

	Inflow	Outflow
Buffer	G250+G250S	G252+G255
Cell 1	G252	G253
Cell 3	G253	G251 - G256
Cell 2	G255	G254
Cell 4	G254	G256
ENR	G250+G250S	G251



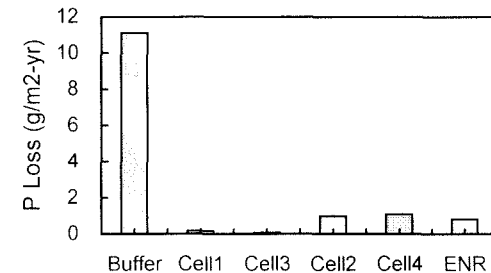
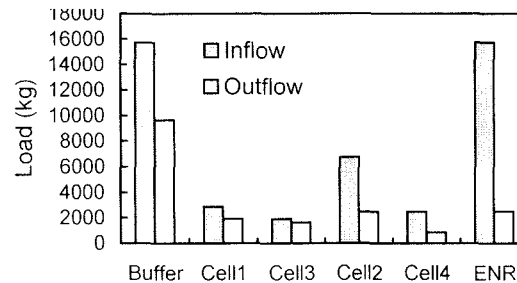
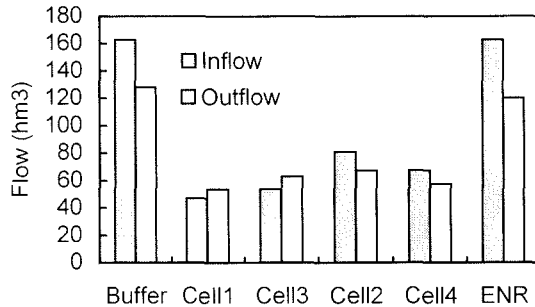
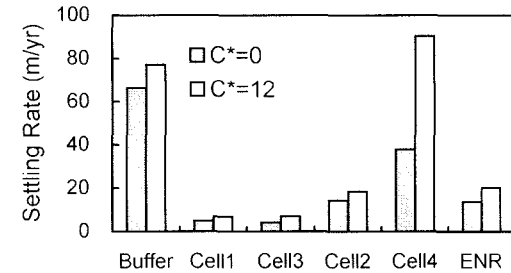
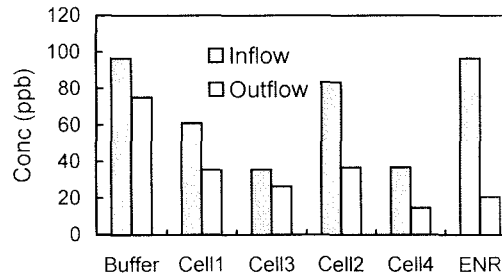
Water & P Balances - ENR Cells

Period: 9712 thru 9811 Most Recent 12 Months

Calculated from UVM Culvert & Pump Station Flows, Atmospheric & Groundwater Fluxes Ignored

	Area acres	Elev feet	Mean Depth feet	Flow (hm3)		P Load (kg)		Conc (ppb)		Water	Water	P Removal		kg/yr	Background Conc (ppb)			
				In	Out	In	Out	In	Out	m/yr	m/yr	g/m ² /yr	%		Settling Rate (m/yr)			
															0	4	8	12
Buffer	133	NA	NA	163	128	15747	9653	97	75	265.3	63.2	11.11	39%	6094	66.3	69.6	73.2	77.2
Cell1	1299	11.79	1.69	47	54	2894	1924	61	36	9.4	-1.2	0.18	34%	970	5.1	5.6	6.1	6.9
Cell3	999	11.40	1.10	54	63	1924	1667	36	26	14.2	-2.2	0.06	13%	257	4.3	4.9	5.8	7.0
Cell2	1022	11.95	2.55	81	68	6760	2494	84	37	17.6	3.2	1.01	63%	4266	14.4	15.5	16.9	18.6
Cell4	364	11.82	2.22	68	58	2494	857	37	15	41.7	6.6	1.09	66%	1638	38.0	46.3	60.1	90.4
ENR	3817	11.73	1.82	163	121	15747	2523	97	21	9.0	2.7	0.84	84%	13223	13.8	15.3	17.3	20.3
Cell 1+3	2298		1.61	47	63	2894	1667	61	26	5.0	-1.7	0.13	42%	1227	4.2	4.7	5.3	6.1
Cell 2+4	1386		2.46	81	58	6760	857	84	15	14.2	4.1	1.03	87%	5903	24.4	28.2	34.0	45.6

	Inflow	Outflow
Buffer	G250+G250S	G252+G255
Cell 1	G252	G253
Cell 3	G253	G251 - G256
Cell 2	G255	G254
Cell 4	G254	G256
ENR	G250+G250S	G251



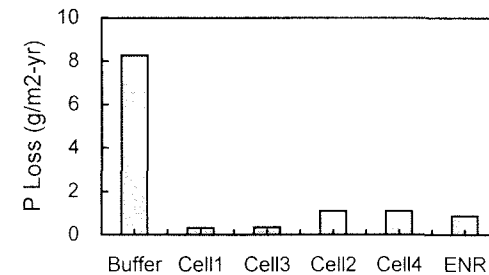
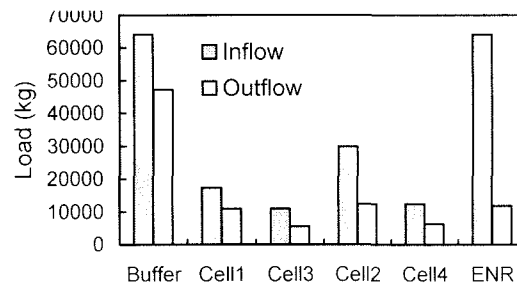
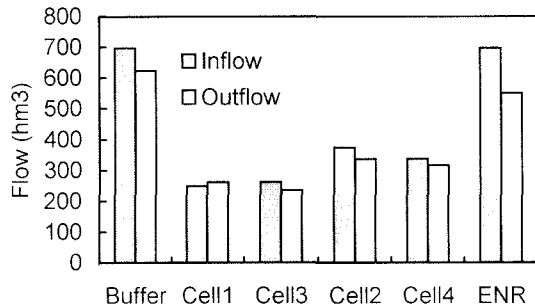
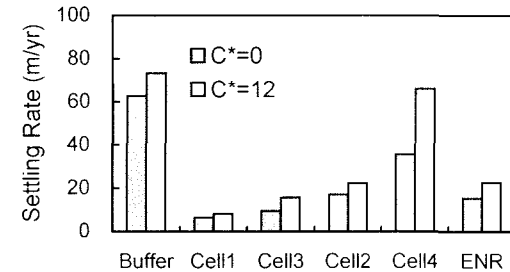
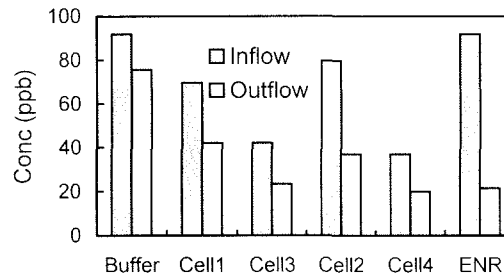
Water & P Balances - ENR Cells

Period: 9503 thru 9811 Cumulative

Calculated from UVM Culvert & Pump Station Flows, Atmospheric & Groundwater Fluxes Ignored

	Area acres	Elev feet	Mean Depth feet	Flow (hm3)		P Load (kg)		Conc (ppb)		Water	Water	P Removal		Background Conc (ppb)				
				In	Out	In	Out	In	Out	m/yr	m/yr	g/m ² /yr	%	kg/yr	Settling Rate (m/yr)			
Buffer	133	NA	NA	698	624	64163	47272	92	76	323.7	36.1	8.27	26%	16891	62.8	65.9	69.4	73.3
Cell1	1299	11.88	1.78	250	262	17412	11061	70	42	12.8	-0.6	0.32	36%	6351	6.4	7.0	7.6	8.3
Cell3	999	11.52	1.22	262	236	11061	5543	42	23	16.2	1.7	0.36	50%	5518	9.5	10.9	12.9	15.7
Cell2	1022	11.93	2.53	375	337	29860	12512	80	37	22.7	2.4	1.11	58%	17348	17.3	18.7	20.4	22.4
Cell4	364	11.75	2.15	337	316	12512	6356	37	20	58.4	3.8	1.10	49%	6156	35.8	42.1	51.2	66.0
ENR	3817	11.78	1.87	698	552	64163	11899	92	22	10.7	2.5	0.89	81%	52264	15.5	17.2	19.4	22.6
Cell 1+3	2298		1.66	250	236	17412	5543	70	23	7.1	0.4	0.34	68%	11869	7.7	8.6	9.8	11.4
Cell 2+4	1386		2.43	375	316	29860	6356	80	20	17.6	2.8	1.10	79%	23504	24.2	27.2	31.3	37.3

	Inflow	Outflow
Buffer	G250+G250S	G252+G255
Cell 1	G252	G253
Cell 3	G253	G251 - G256
Cell 2	G255	G254
Cell 4	G254	G256
ENR	G250+G250S	G251



Water & P Balances - ENR Cells

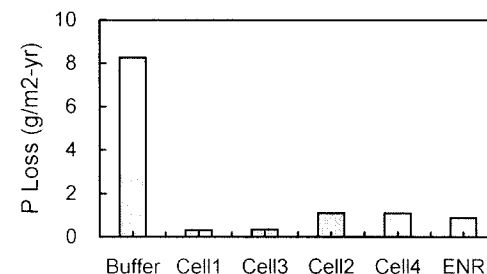
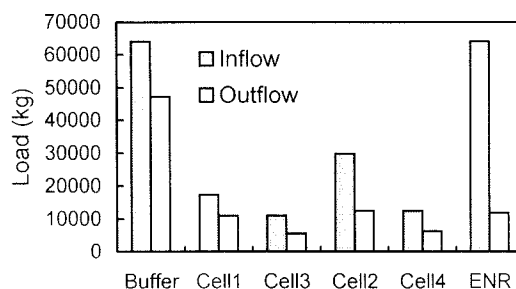
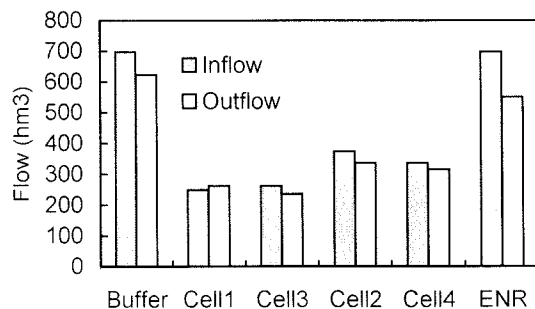
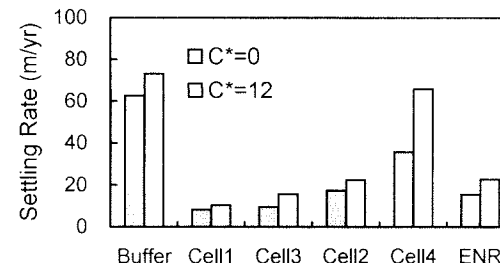
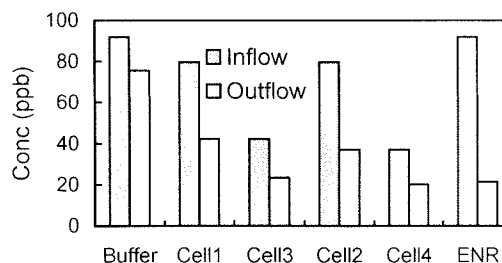
Period: 9503 thru 9811 Cumulative

G252 Concentration = G255 Concentration

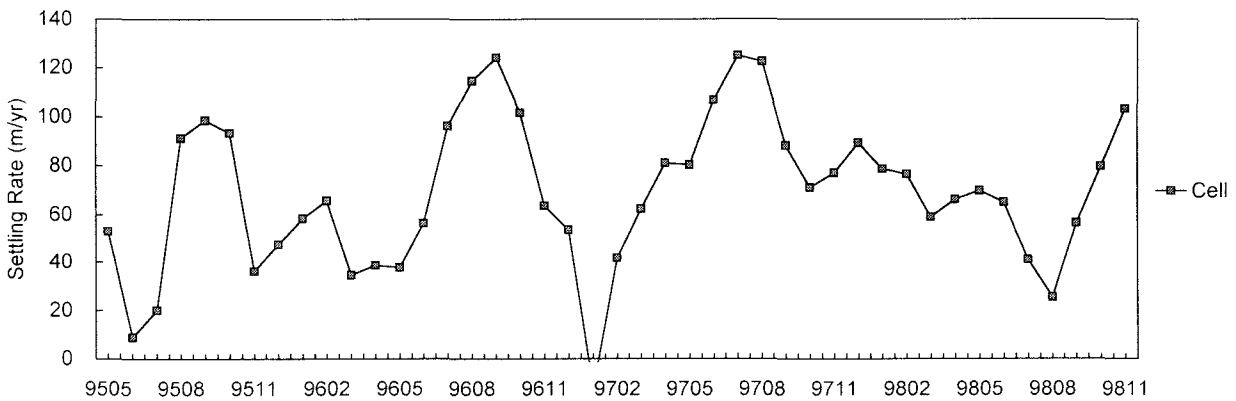
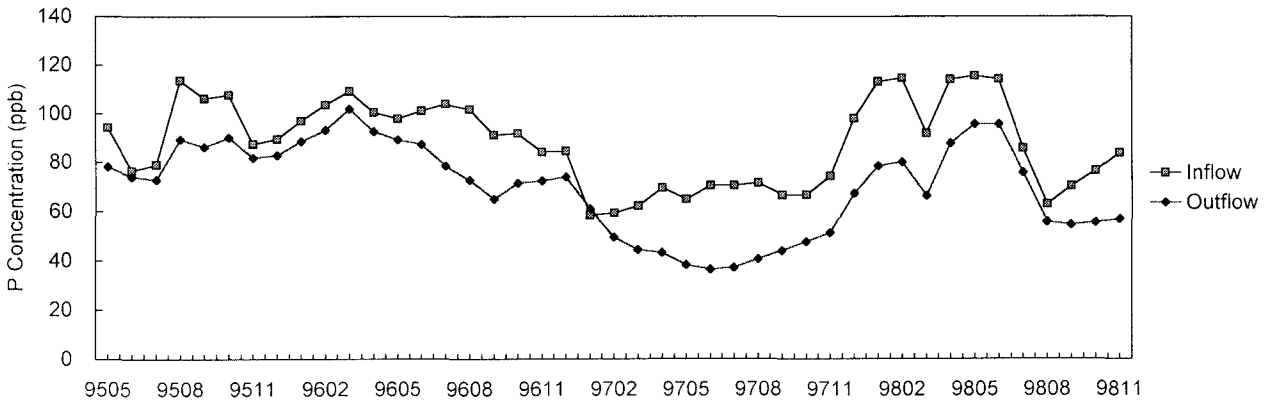
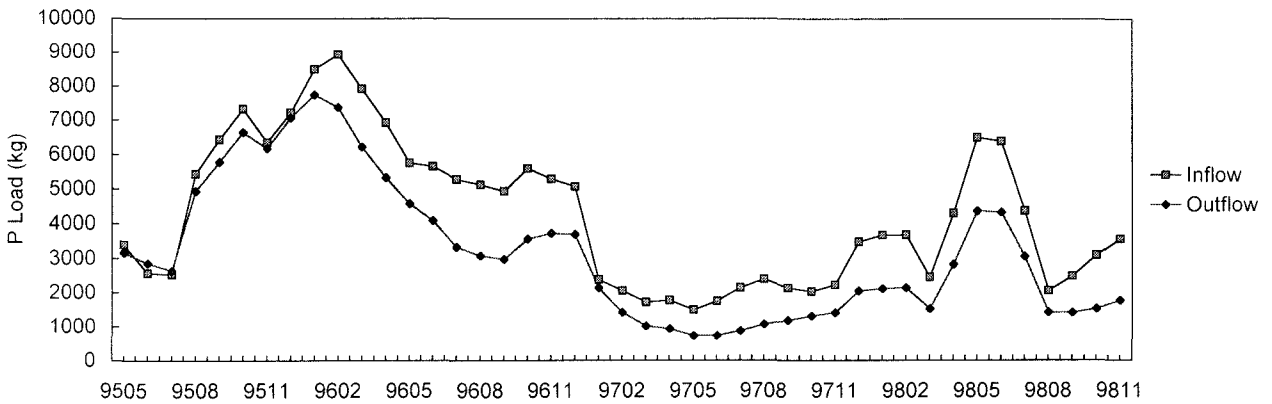
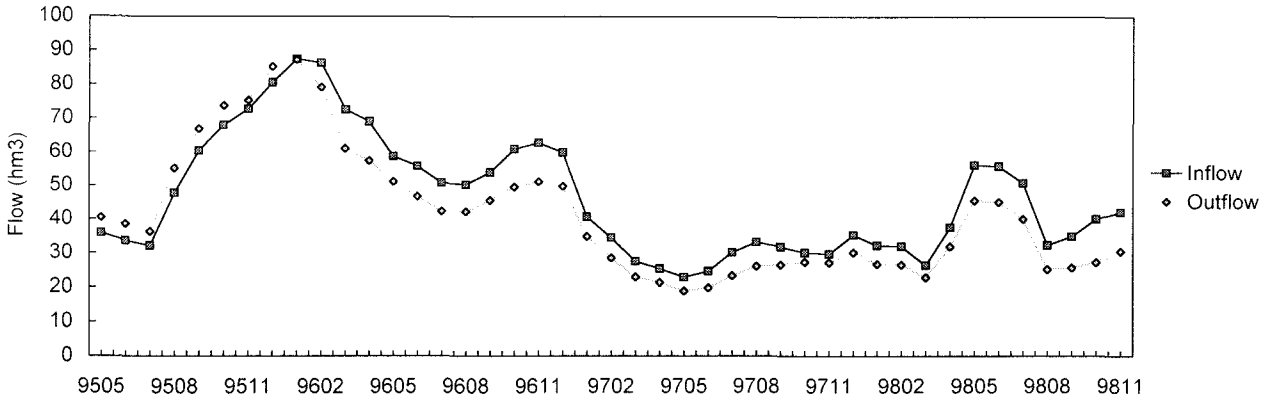
Calculated from UVM Culvert & Pump Station Flows, Atmospheric & Groundwater Fluxes Ignored

	Area acres	Elev feet	Mean Depth feet	Flow (hm3)		P Load (kg)		Conc (ppb)		Water	Water	P Removal		Background Conc (ppb)				
				In	Out	In	Out	In	Out	m/yr	m/yr	g/m ² /yr	%	kg/yr	Settling Rate (m/yr)			
															0	4	8	12
Buffer	133	NA	NA	698	624	64163	47272	92	76	323.7	36.1	8.27	26%	16891	62.8	65.9	69.4	73.3
Cell1	1299	11.88	1.78	250	262	17412	11061	80	42	12.8	-0.6	0.32	36%	6351	8.1	8.8	9.5	10.3
Cell3	999	11.52	1.22	262	236	11061	5543	42	23	16.2	1.7	0.36	50%	5518	9.5	10.9	12.9	15.7
Cell2	1022	11.93	2.53	375	337	29860	12512	80	37	22.7	2.4	1.11	58%	17348	17.3	18.7	20.4	22.4
Cell4	364	11.75	2.15	337	316	12512	6356	37	20	58.4	3.8	1.10	49%	6156	35.8	42.1	51.2	66.0
ENR	3817	11.78	1.87	698	552	64163	11899	92	22	10.7	2.5	0.89	81%	52264	15.5	17.2	19.4	22.6
Cell 1+3	2298		1.66	250	236	17412	5543	80	23	7.1	0.4	0.34	68%	11869	8.6	9.6	10.8	12.5
Cell 2+4	1386		2.43	375	316	29860	6356	80	20	17.6	2.8	1.10	79%	23504	24.2	27.2	31.3	37.3

	Inflow	Outflow
Buffer	G250+G250S	G252+G255
Cell 1	G252	G253
Cell 3	G253	G251 - G256
Cell 2	G255	G254
Cell 4	G254	G256
ENR	G250+G250S	G251

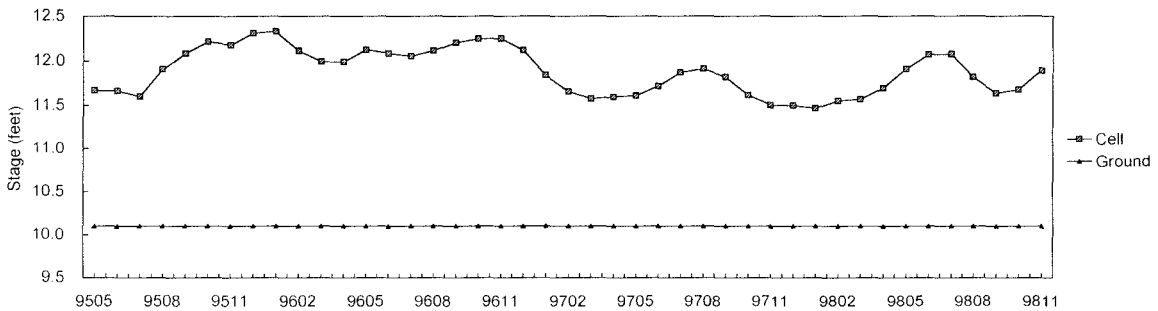
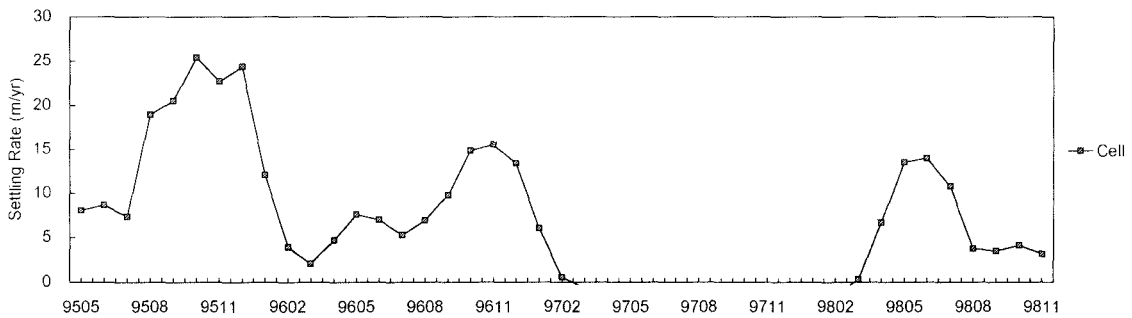
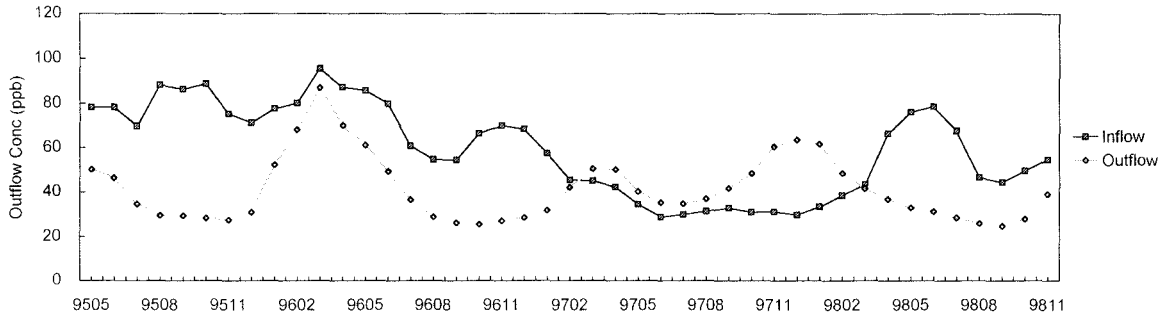
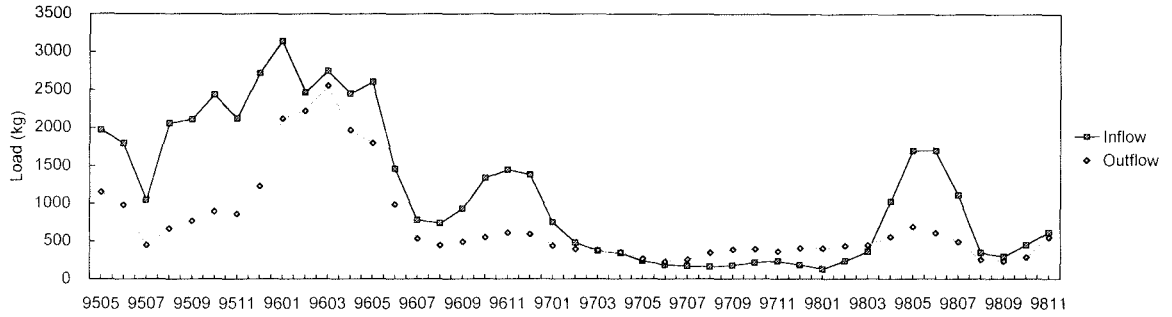
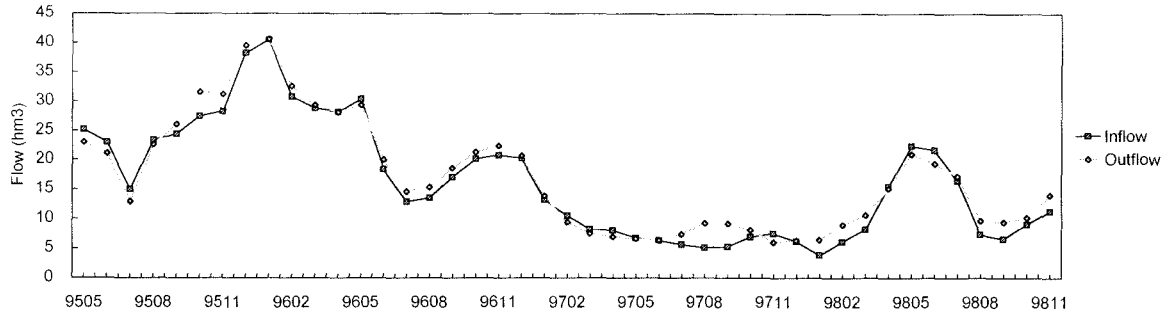


ENR Buffer Cell - Quarterly Flow & P Balances



3-Month Rolling Averages
 Inflow = G250 + G250 Seep Outflow = G252 + G255

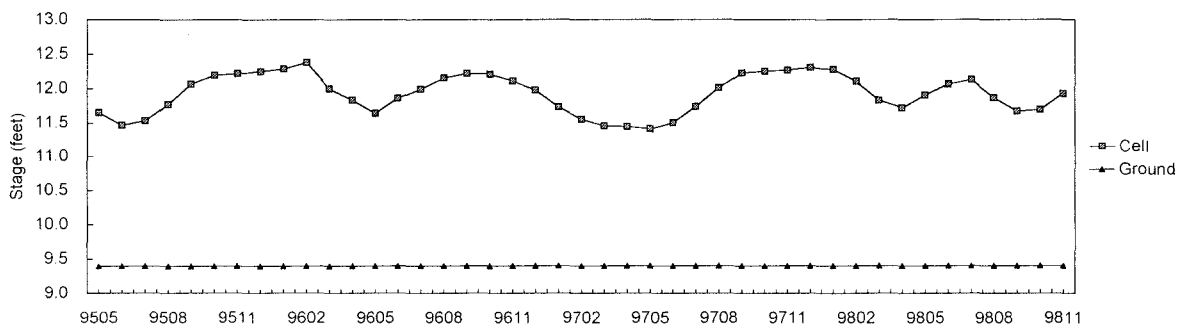
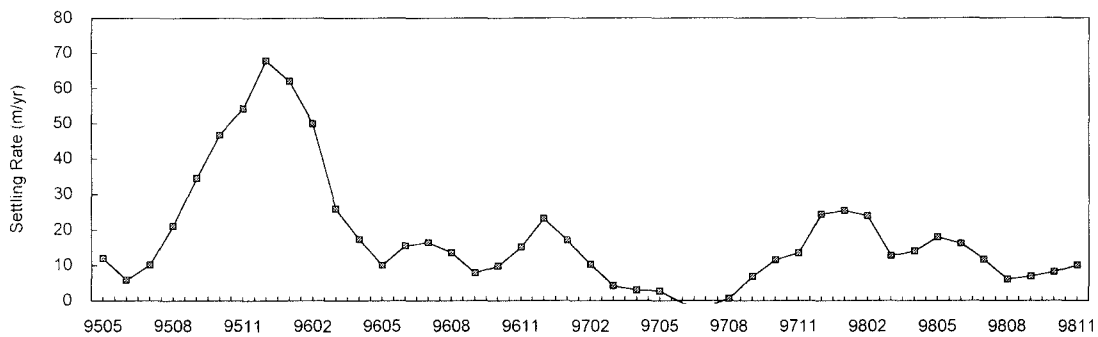
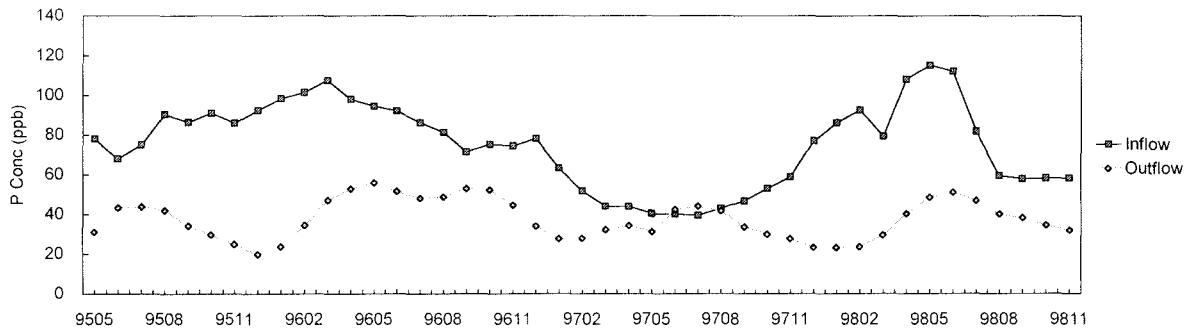
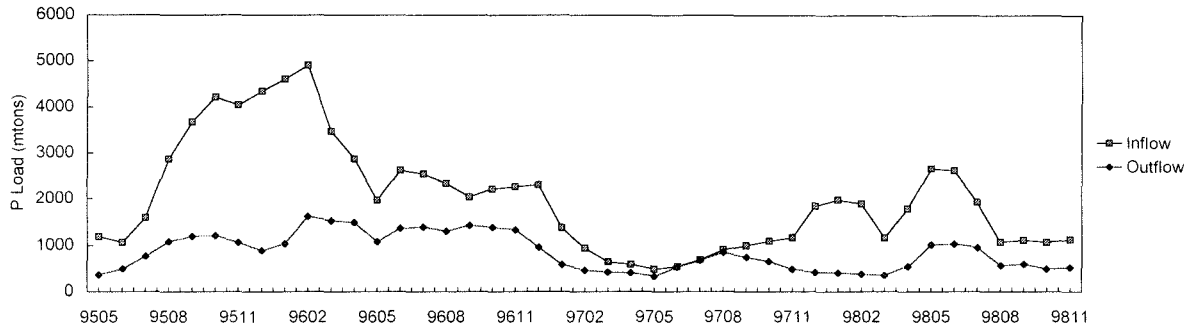
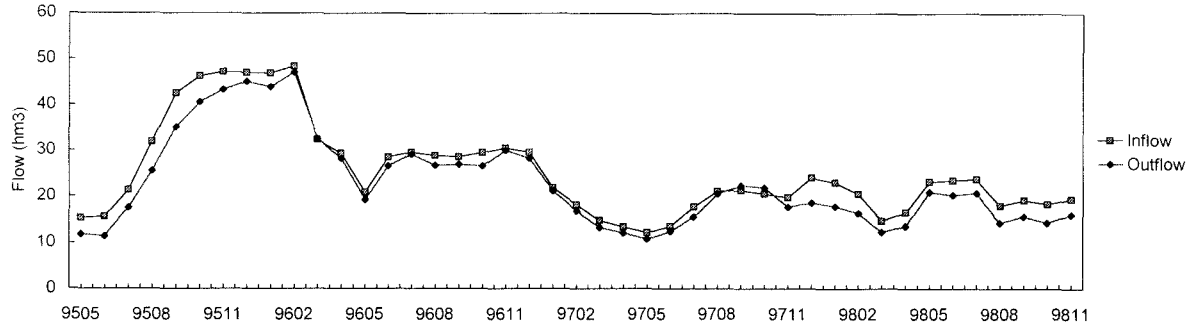
ENR Cell 1 - Quarterly Flow & P Balances



3-Month Rolling Averages
Inflow = G252

Outflow = G253

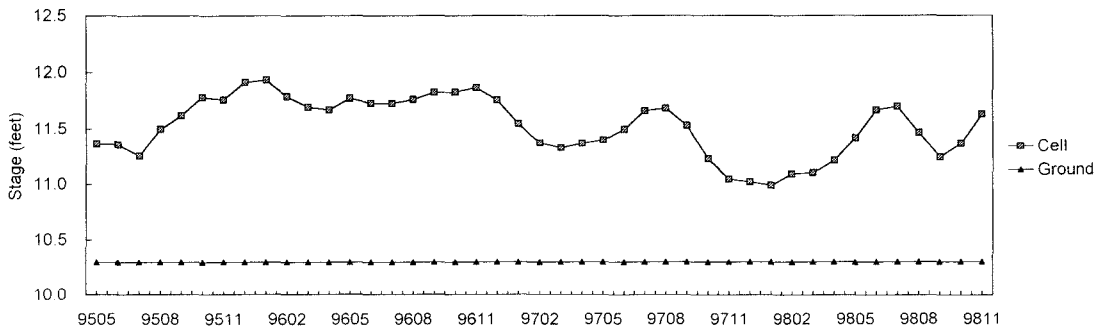
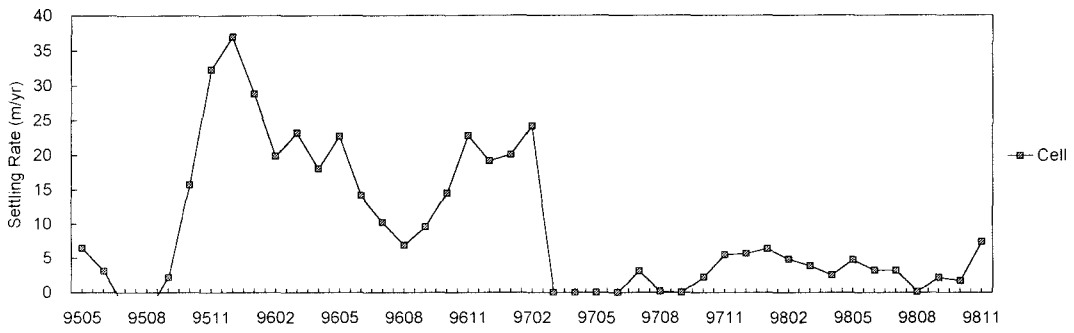
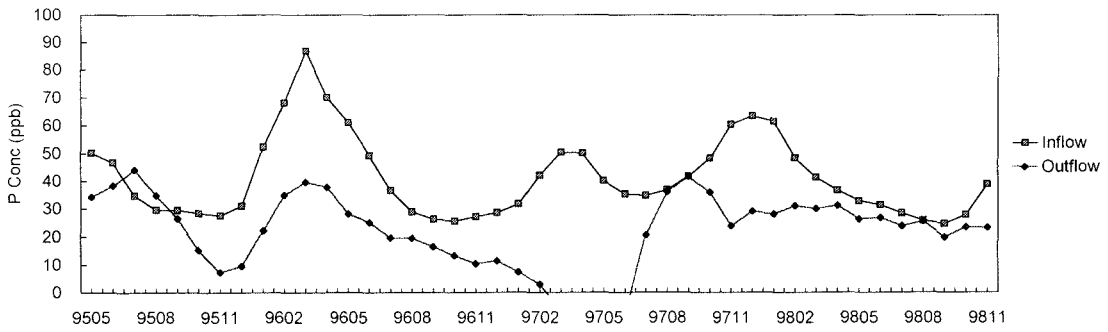
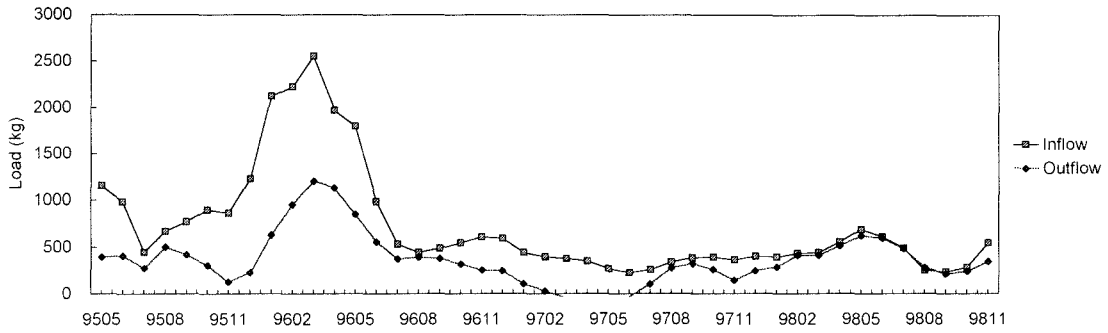
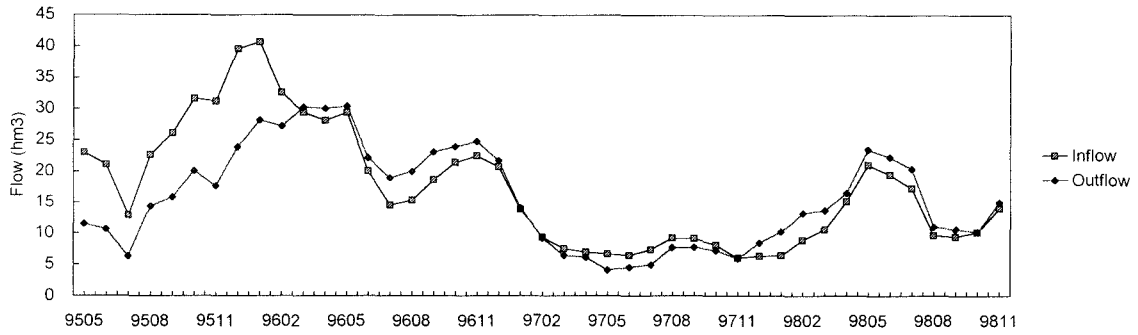
ENR Cell 2 - Quarterly Flow & P Balances



3-Month Rolling Averages
Inflow = G255

Outflow = G254

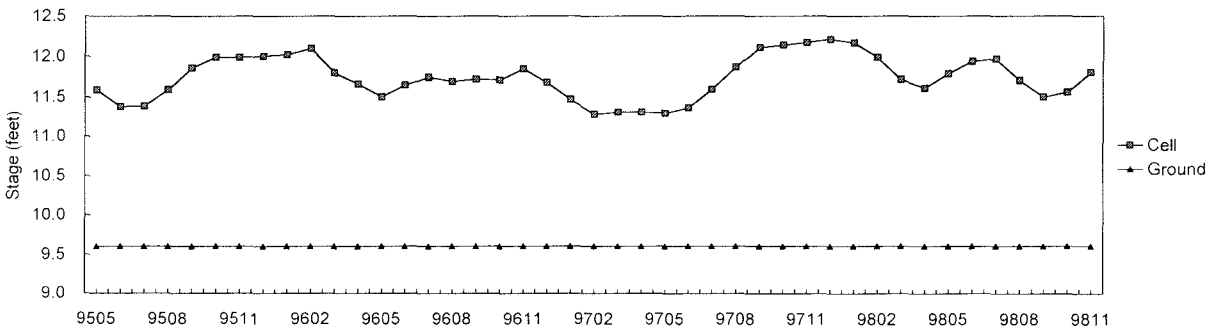
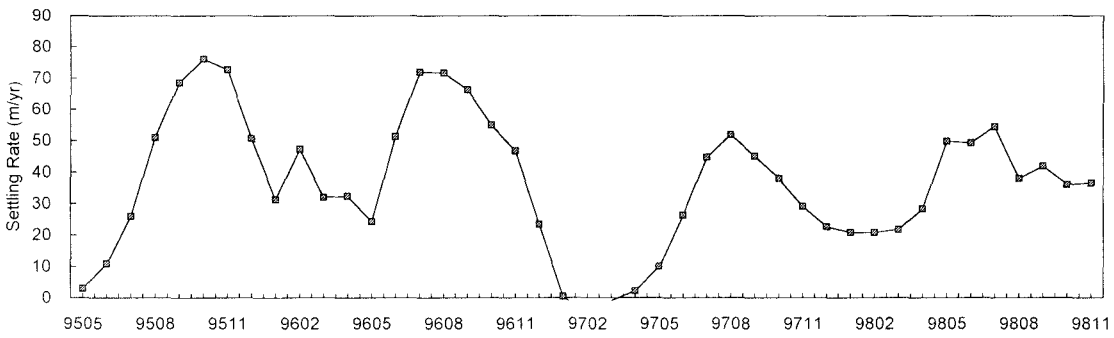
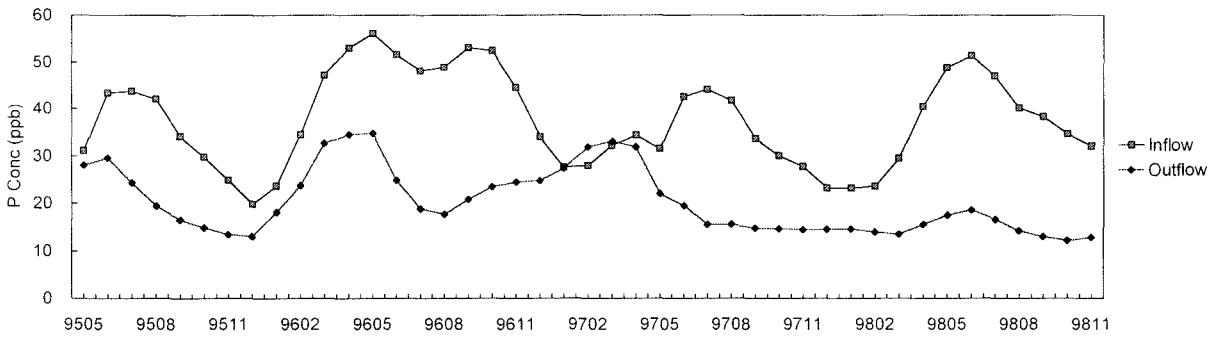
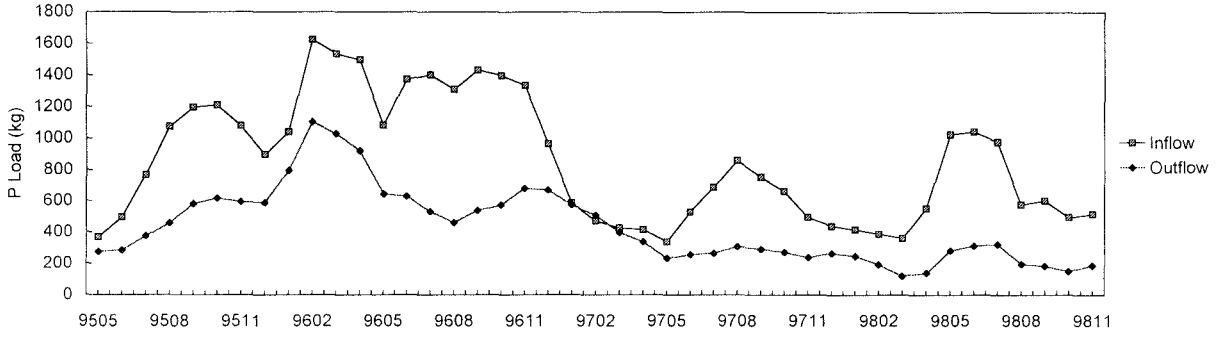
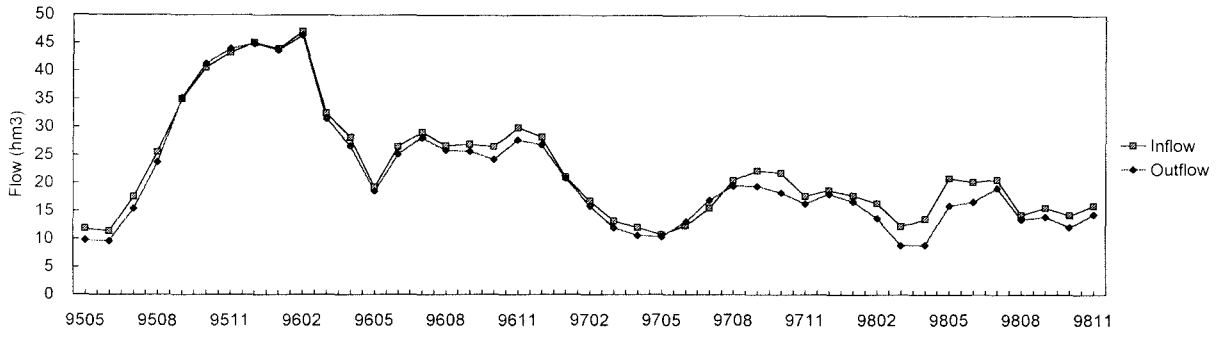
ENR Cell 3 - Quarterly Flow & P Balances



3-Month Rolling Averages
Inflow = G253

Outflow = G251 - G256

ENR Cell 4 - Quarterly Flow & P Balances



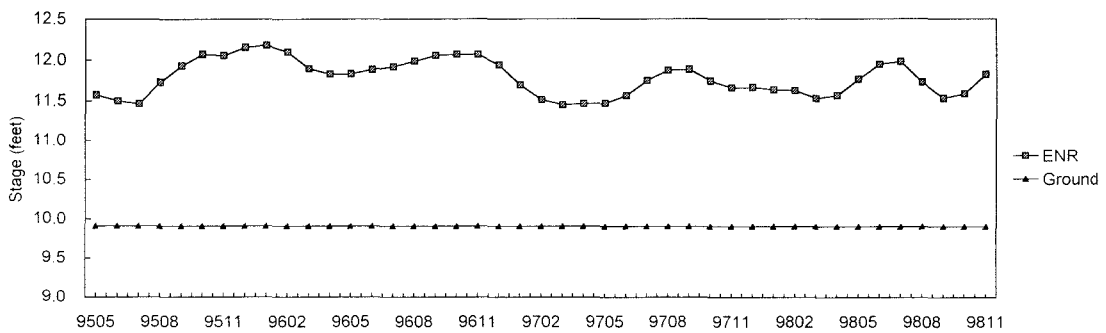
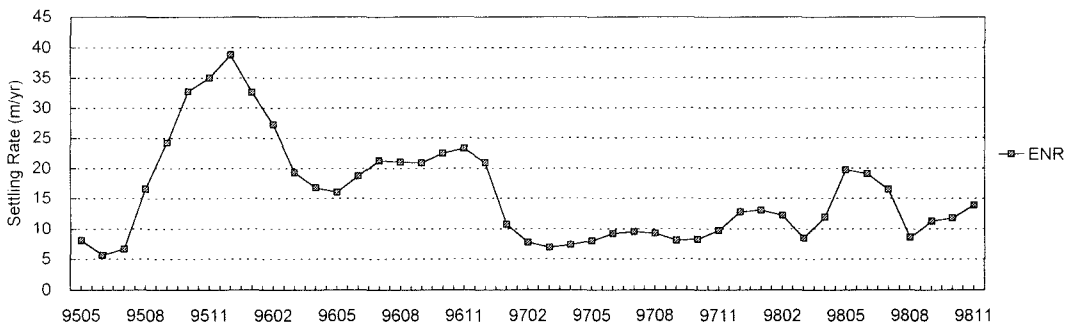
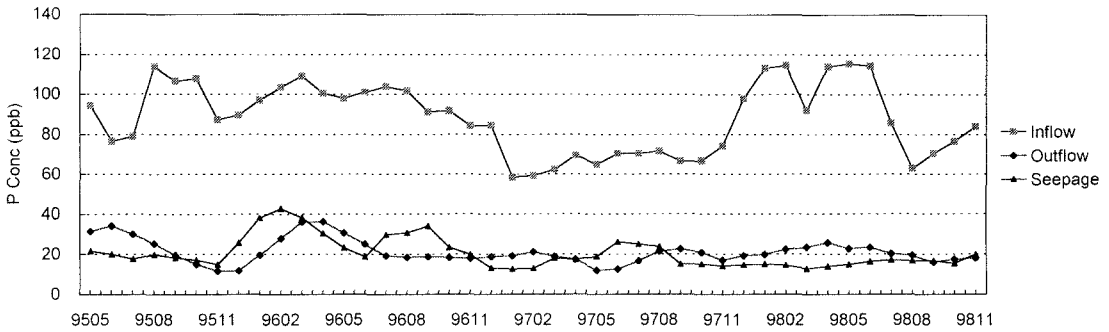
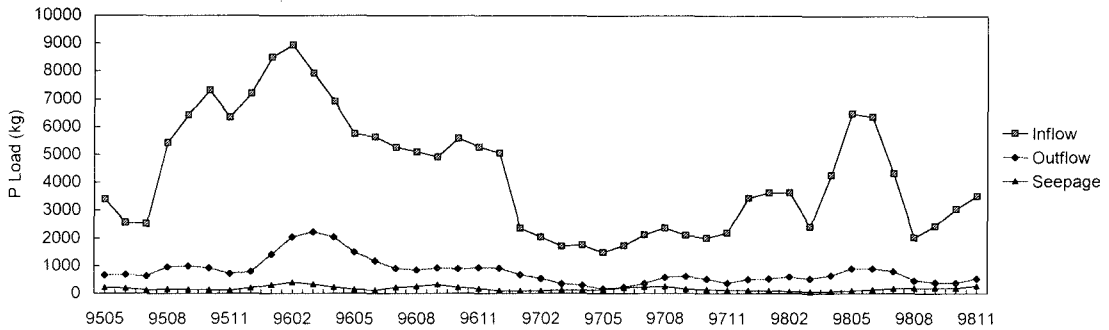
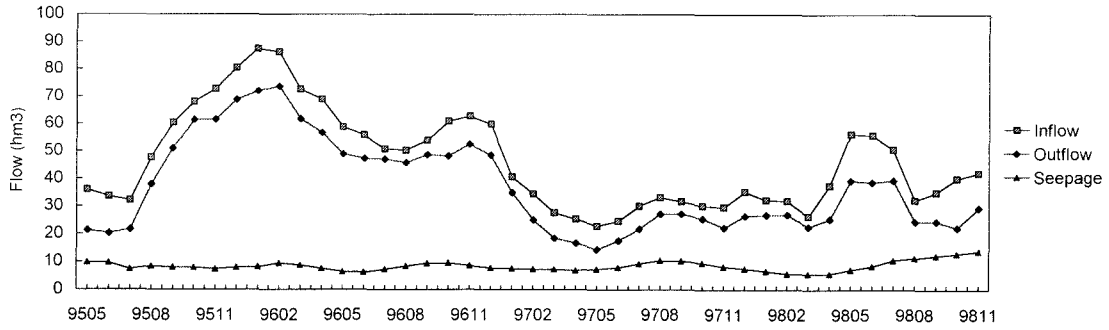
3-Month Rolling Averages

Inflow = G254

Outflow = G256

Ground Elevation = 9.6 ft

ENR Whole Project - Quarterly Flow & P Balances

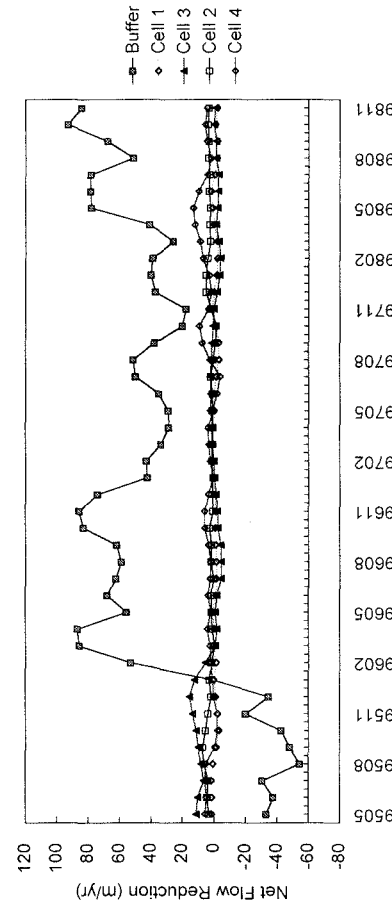
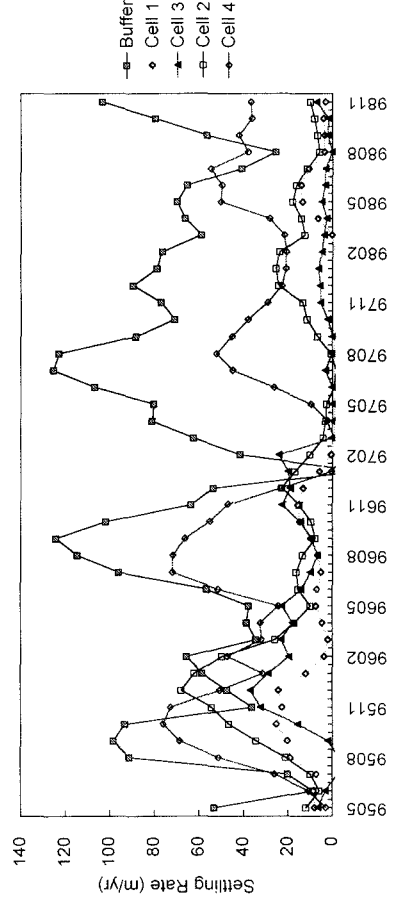
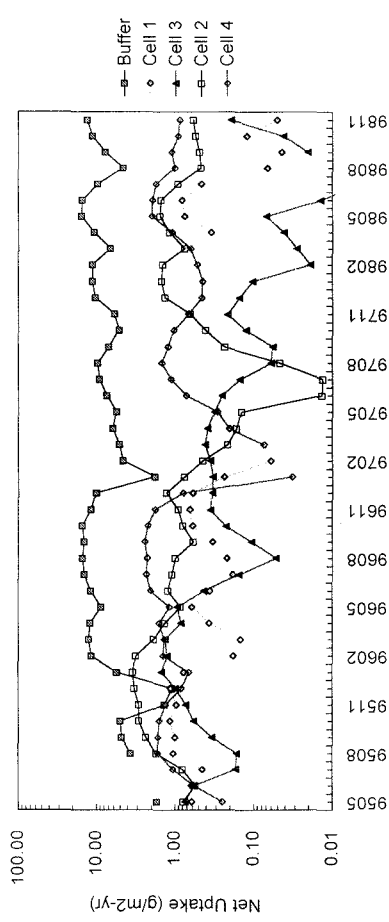
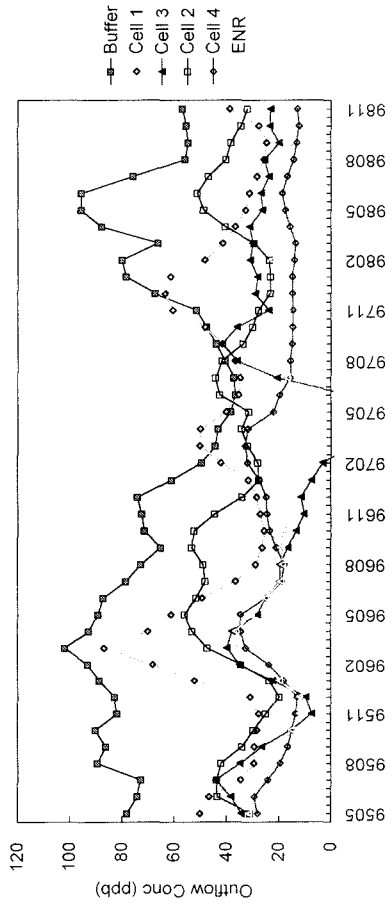
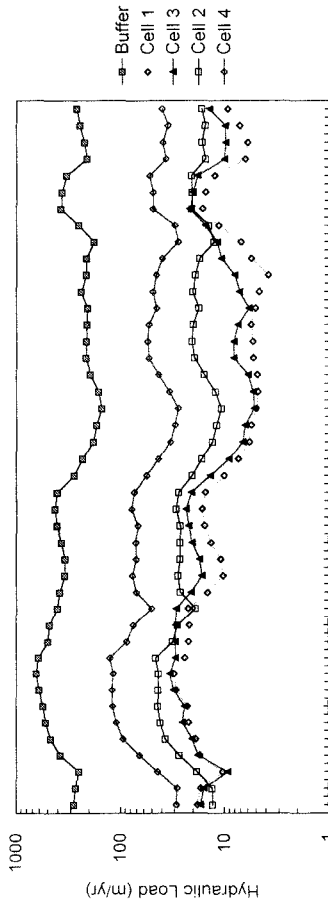
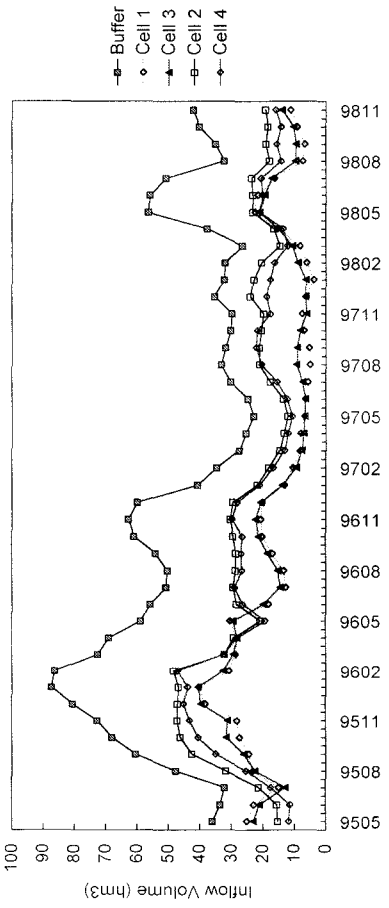


3-Month Rolling Averages
Inflow = G250 + G250 Seep

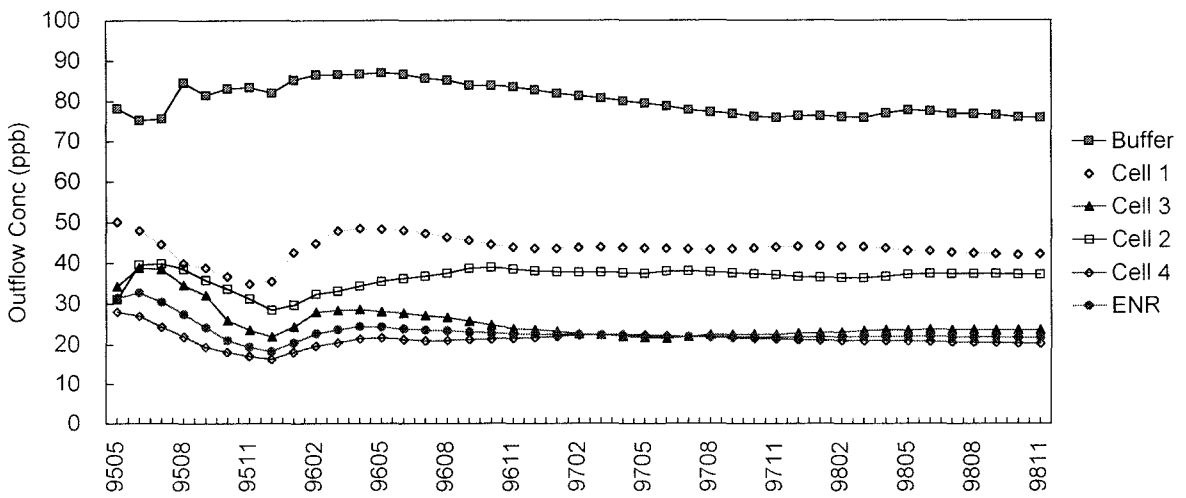
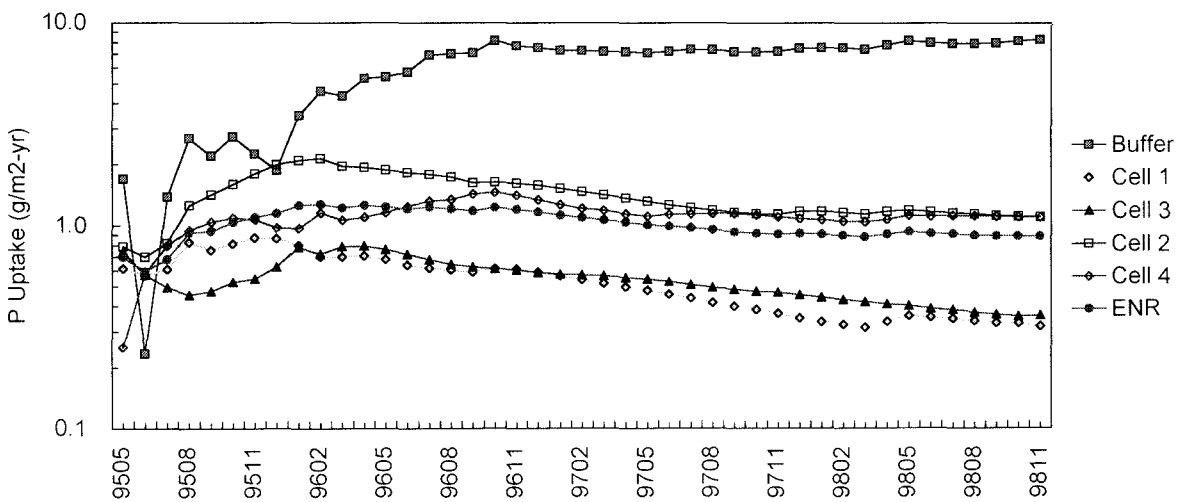
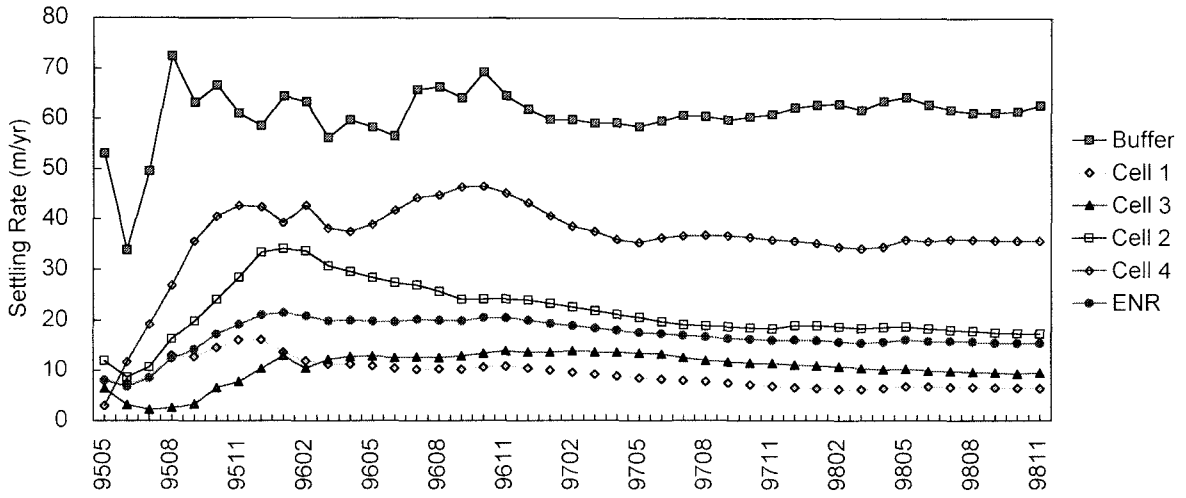
Outflow = G251

Seepage = G250 Seep

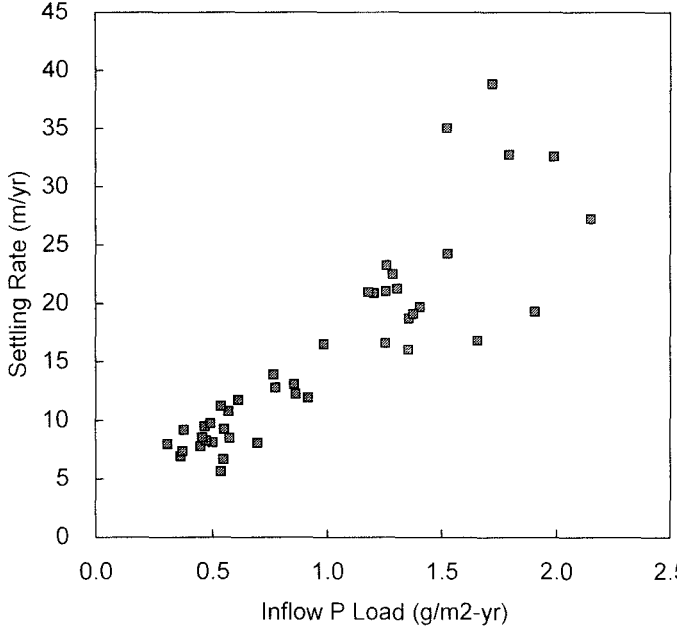
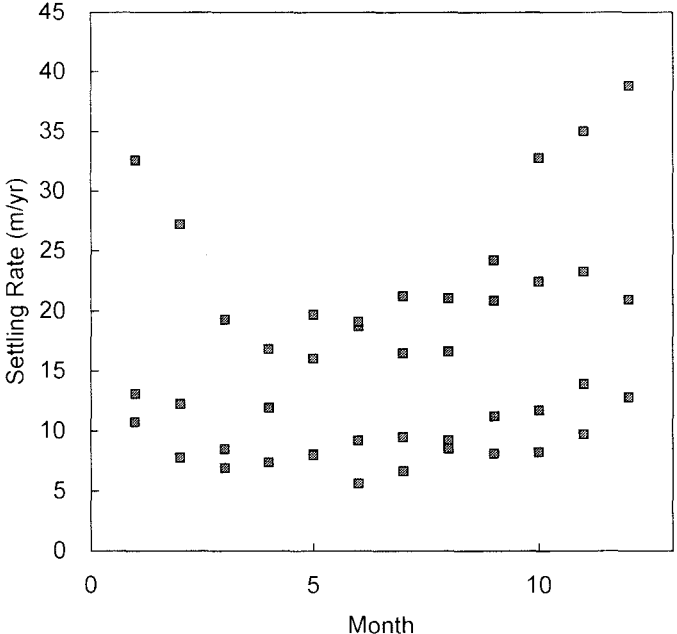
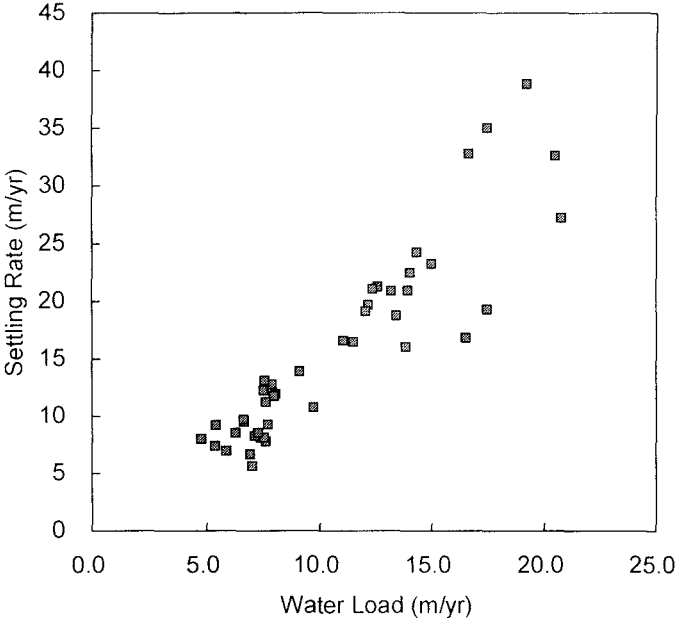
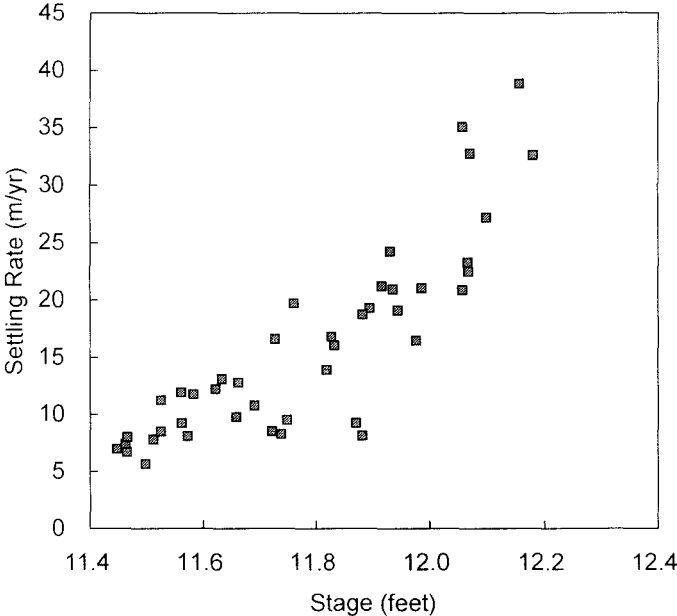
ENRP Cell Mass Balances - 3 Month Rolling Averages



ENR Cell Mass Balances - Cumulative Averages

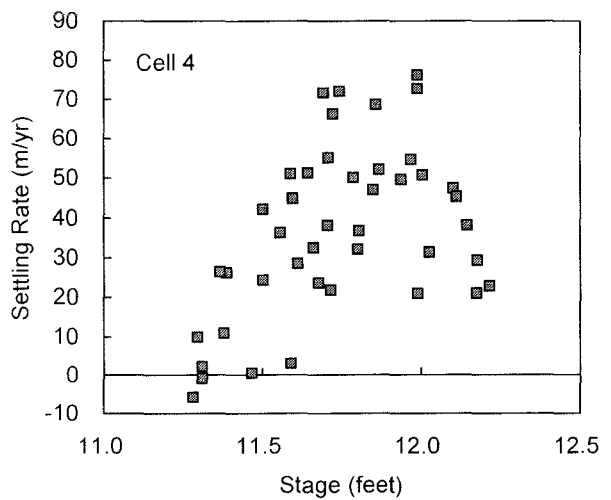
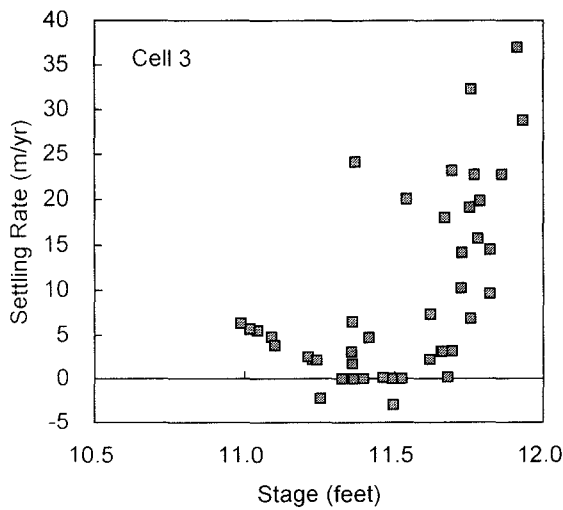
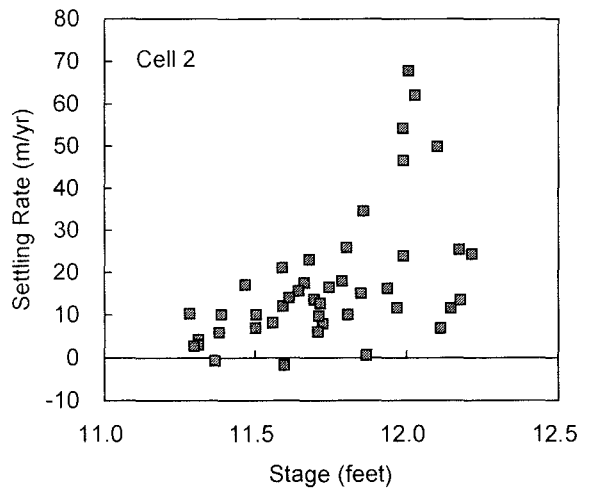
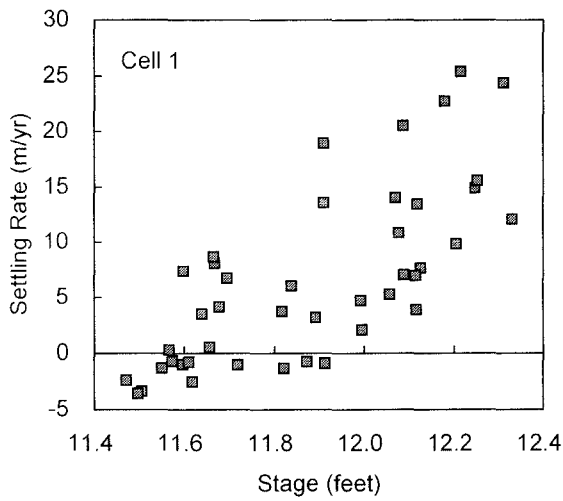
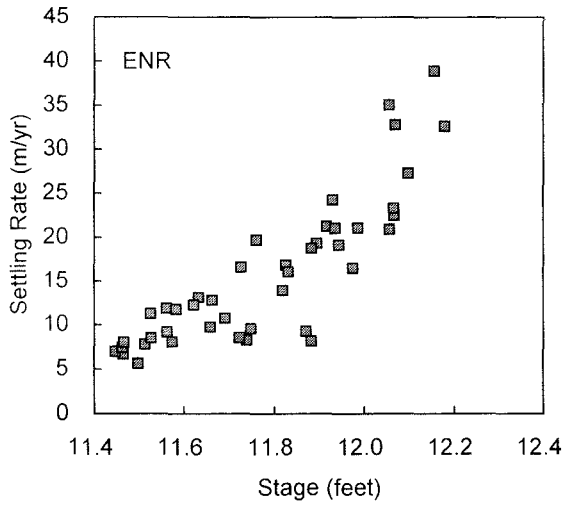


ENR Project Settling Rate Correlations 3-Month Rolling Avgs

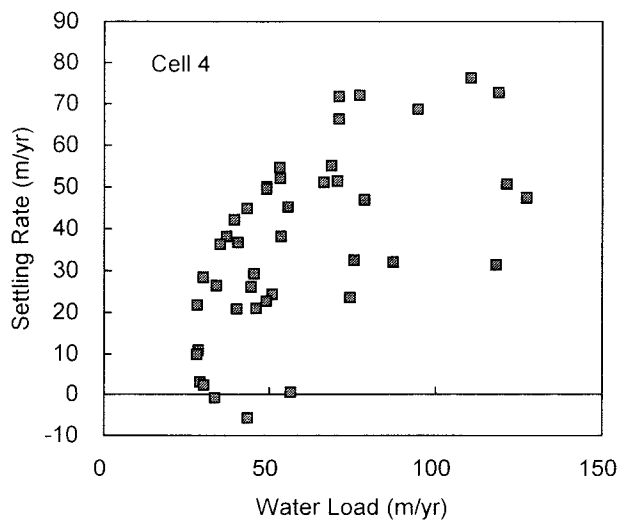
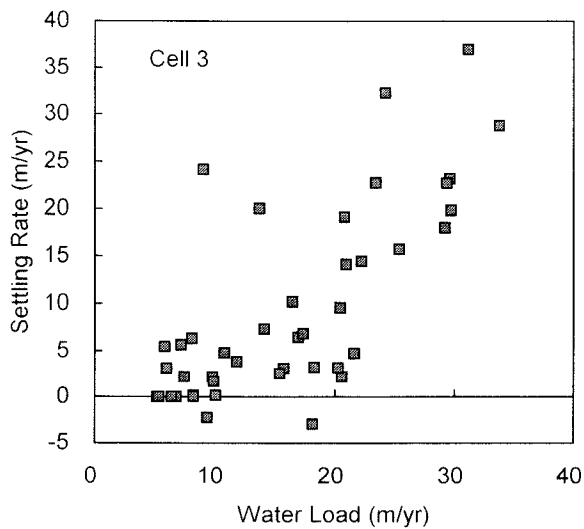
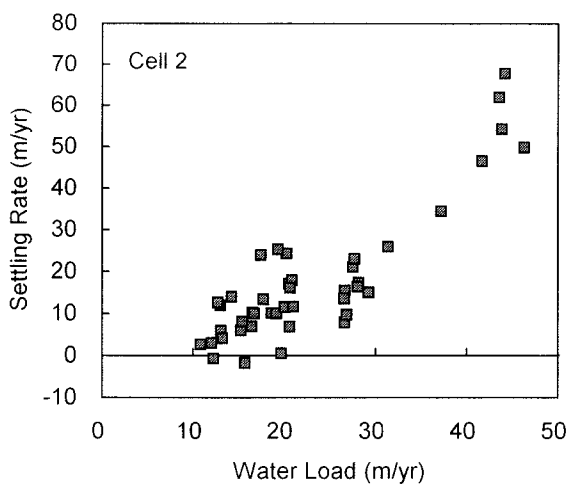
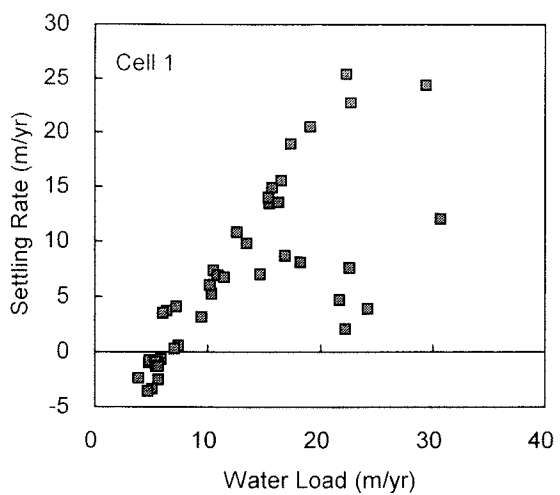
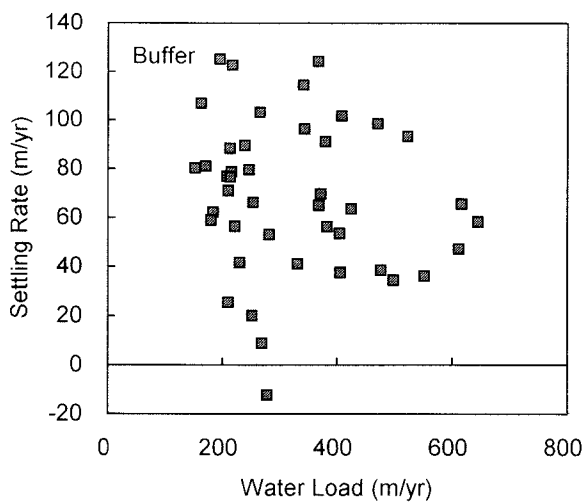
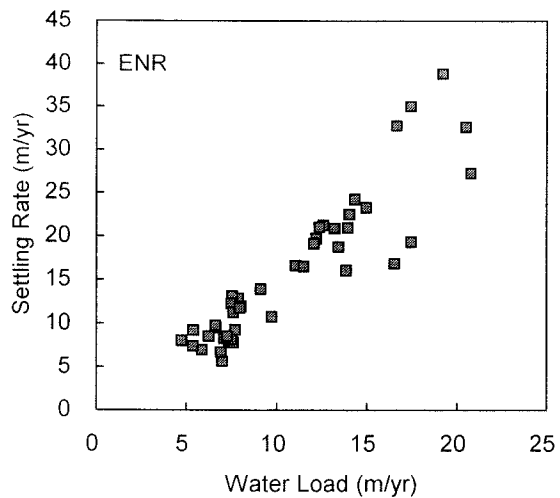


ENR Performance - P Settling Rate vs. Stage

3-Month Rolling Averages

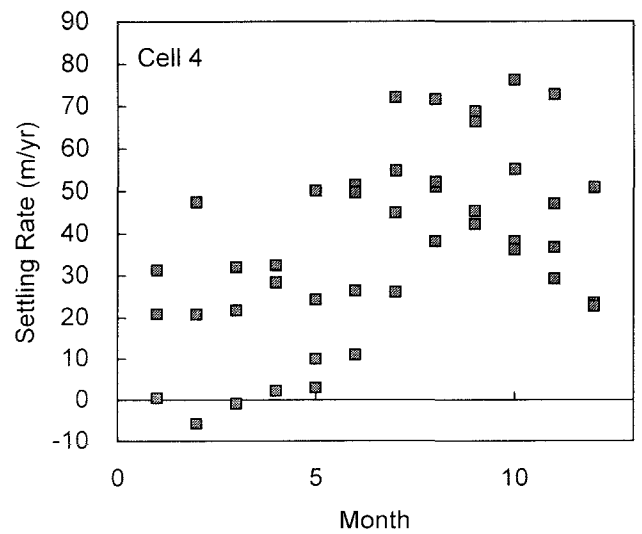
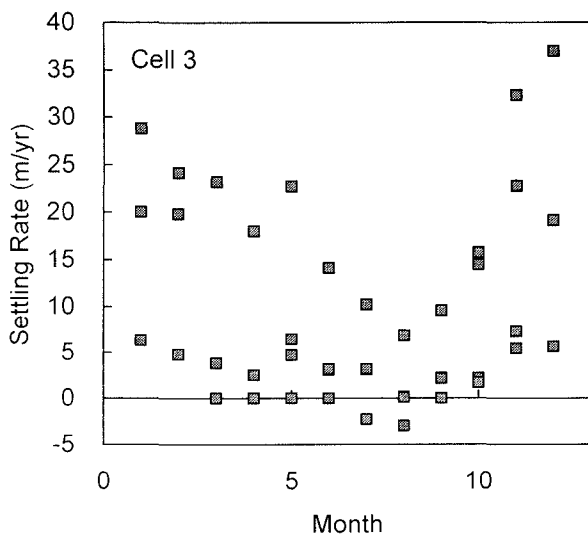
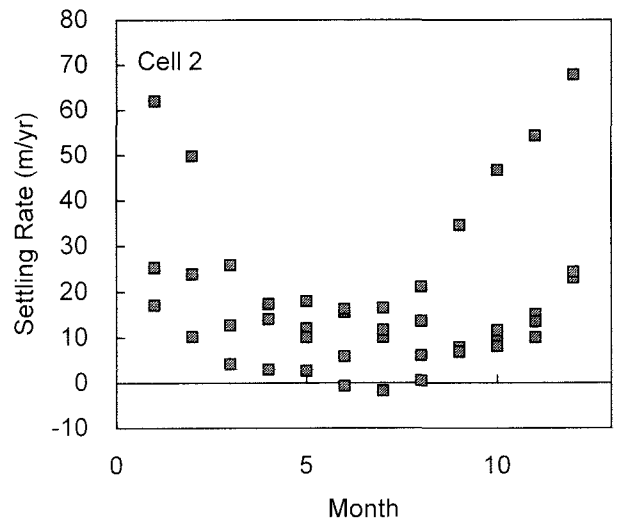
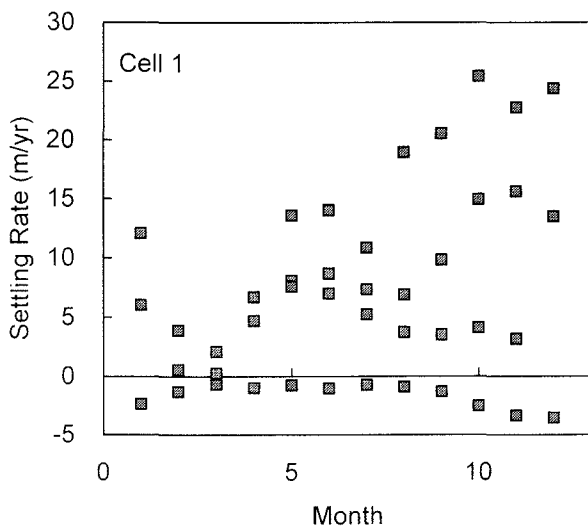
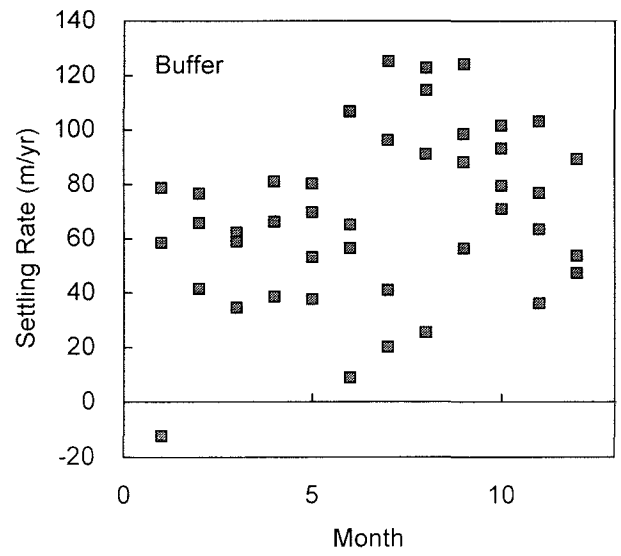
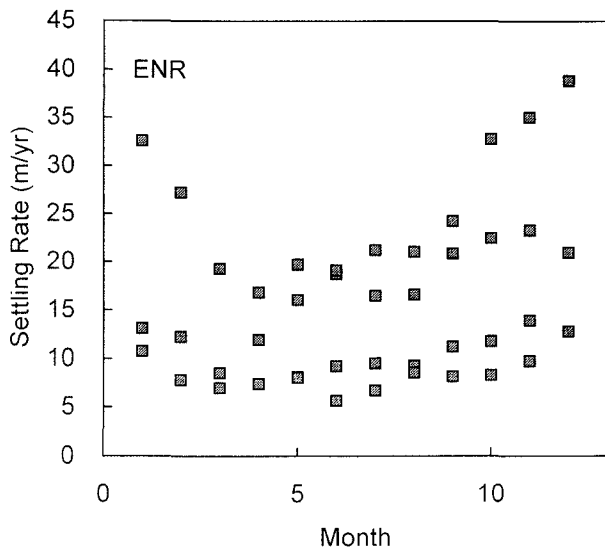


ENR Performance - P Settling Rate vs. Water Load 3-Month Rolling Averages

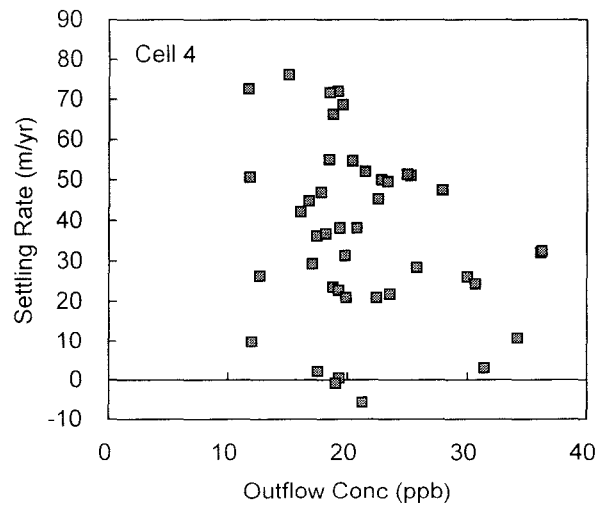
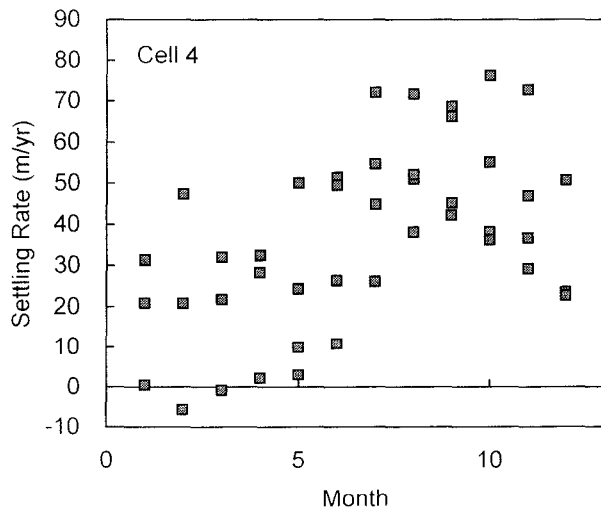
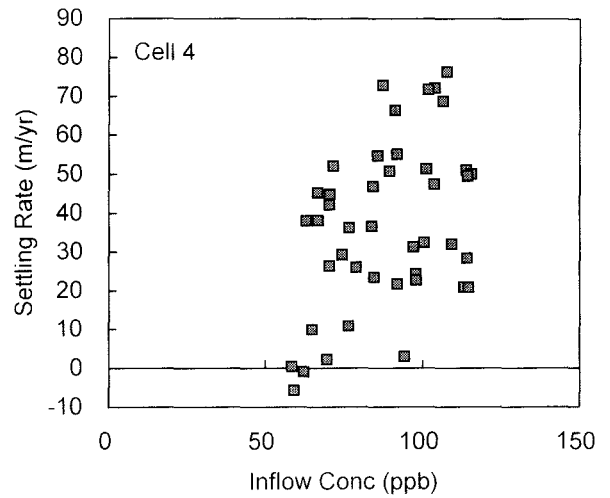
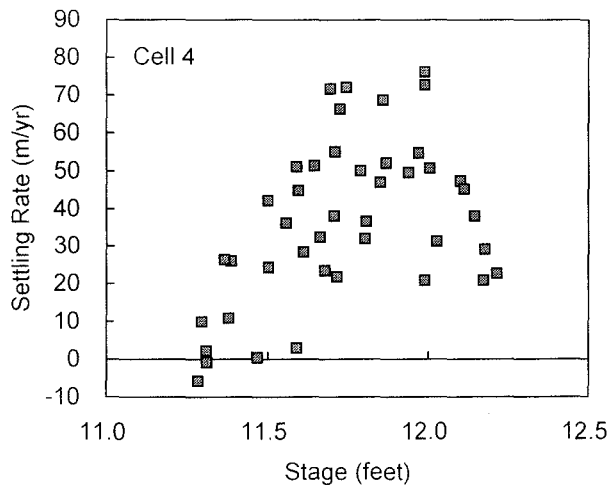
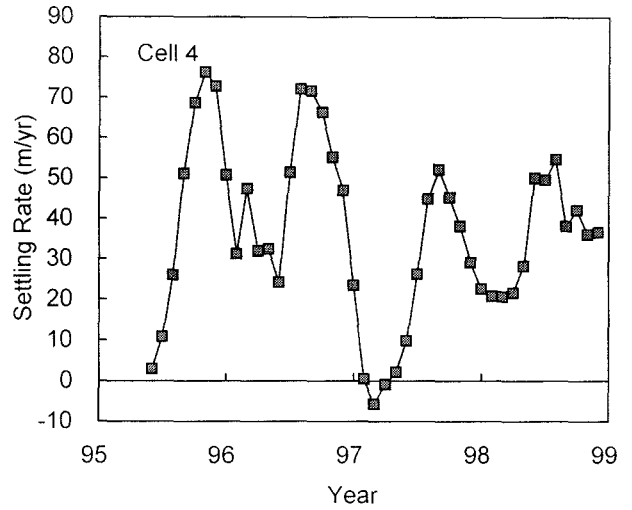
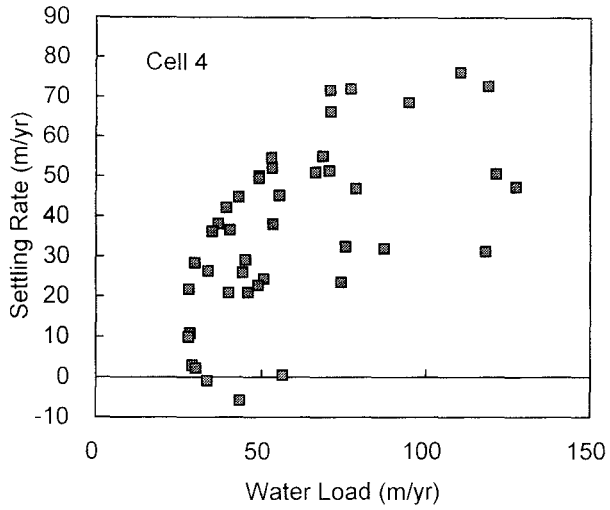


ENR Performance - P Settling Rate vs. Month

3-Month Rolling Averages



Cell 4 Settling Rates: 3-Month Rolling Averages



ENRP Cell 4 - Monthly Flow & P Balances

