

2008 Floodplain Composite Soil Samples

Analysis of THg

John W. Green, Ph.D., Ph.D.

Principal Consultant: Biostatistics

DuPont Applied Statistics Group

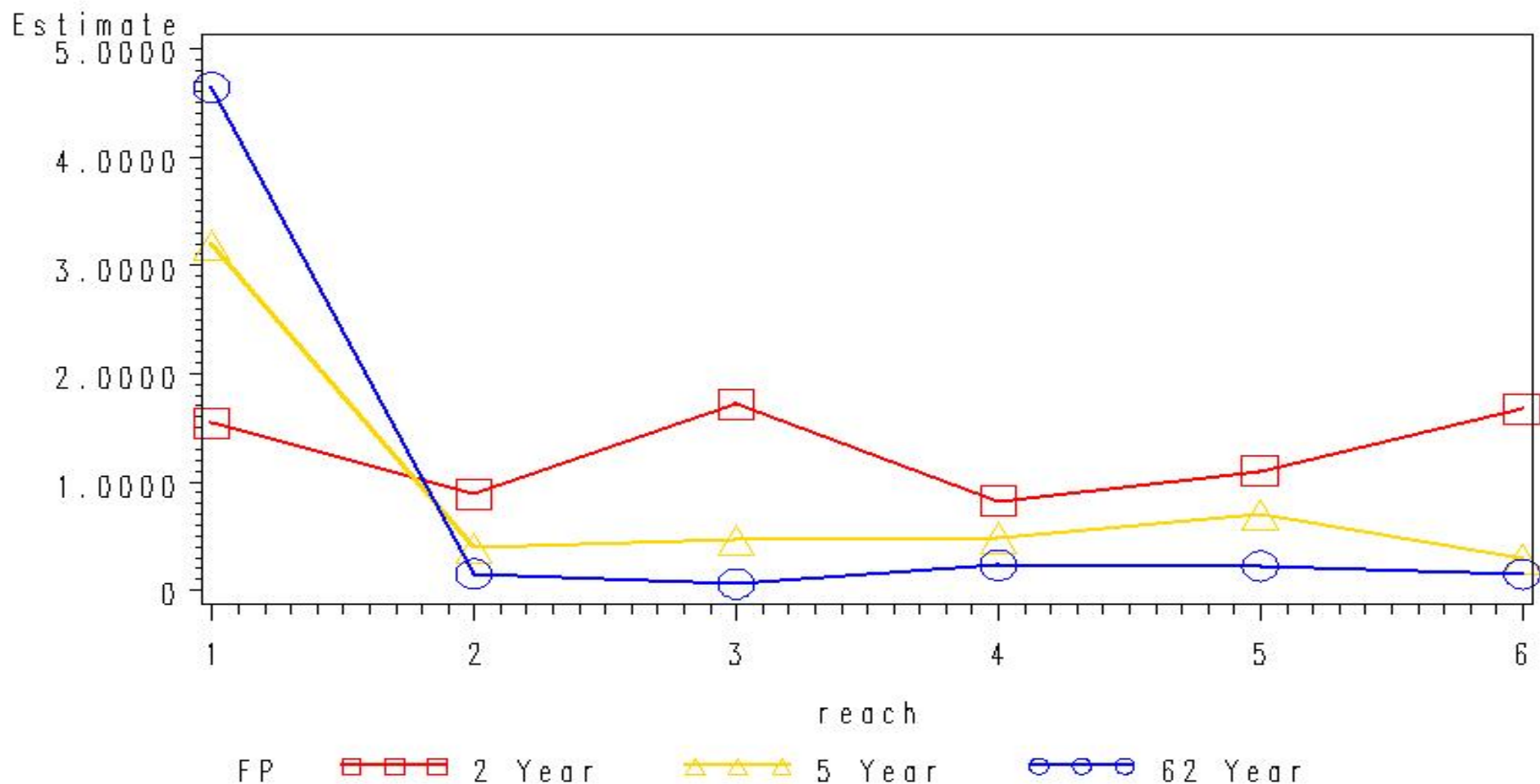
General Observations

- **Particle size and LOI correlated**
 - Inclusion of both causes difficulties
 - LOI removed from final model
 - **Clay% always neg correlated with THg**
 - Significant in reaches 2, 5, 6
 - **Silt% always pos correlated with THg**
 - Significant in reaches 1, 2, 4, 5
- **RRM adds nothing beyond river reach**
 - Removed from final model
- **Elevation above river significant**
 - in reaches 1, 2, 4, 5
 - THg decreases as elevation increases (except R6)

General Observations

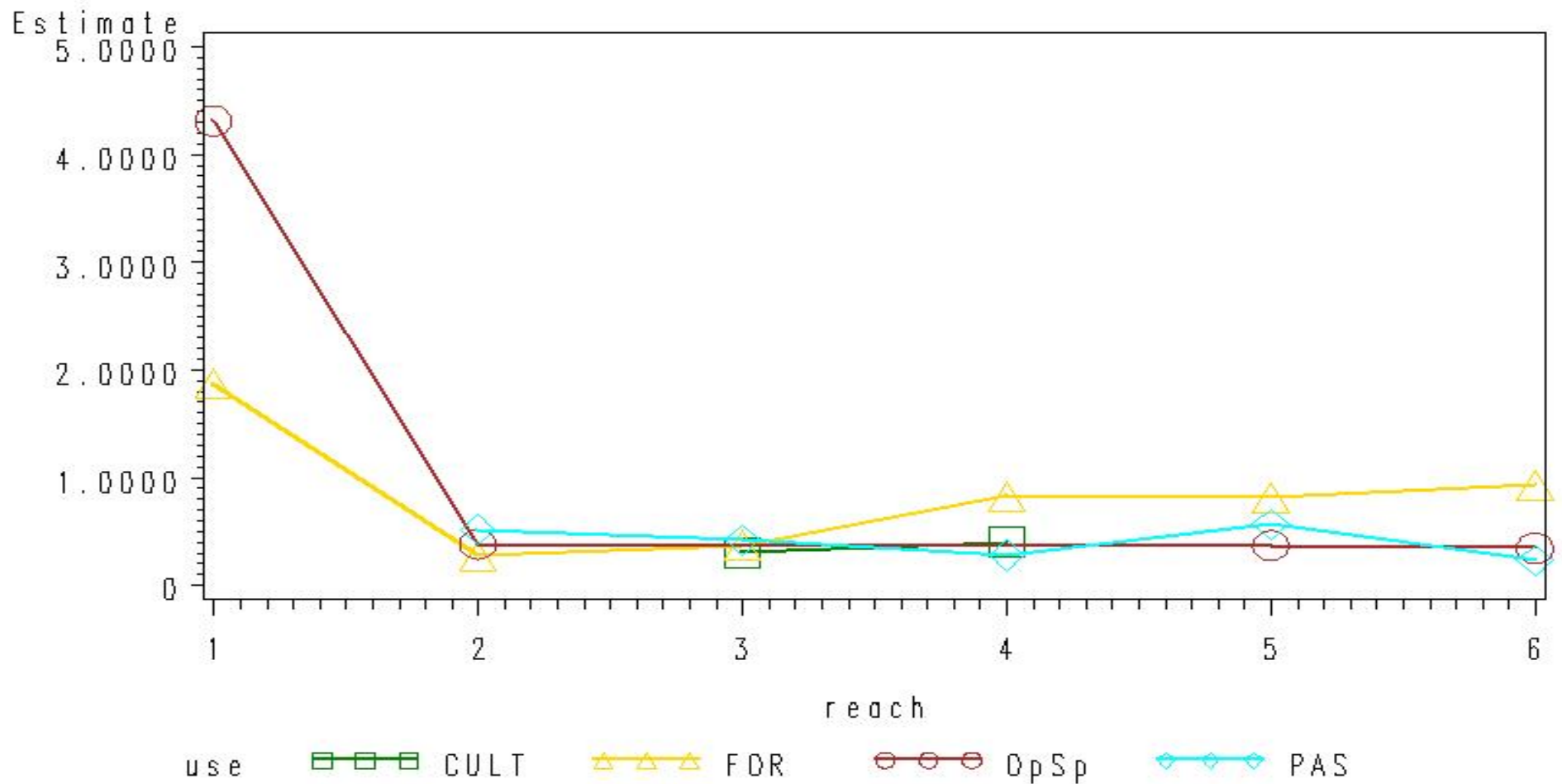
- **Distance from river significant**
 - In reaches 2, 3, 4, 5
 - THg decreases as distance increases
- **USE significant in all reaches**
- **FP significant in all reaches except 1, 4**
 - FP more important than USE for THg level
 - Greater average variation across FPs than across USE
 - Plots following show this clearly
 - THg highest in 2-Yr FP, lowest in 62-Yr FP
 - Exception in Reach 1 where 5Yr>62Yr>2Yr
- **Highest THg levels mostly in 2 Yr FP**
 - Except R 1, 2 where top 40% occur in 5 Yr FP

THg in Composite Samples by FP



THg averaged across landuse. Marked decrease in THg from reach 1 to 2 in 5- & 62-Yr FPs. Highest THg observed in 2-Yr FP except R1.

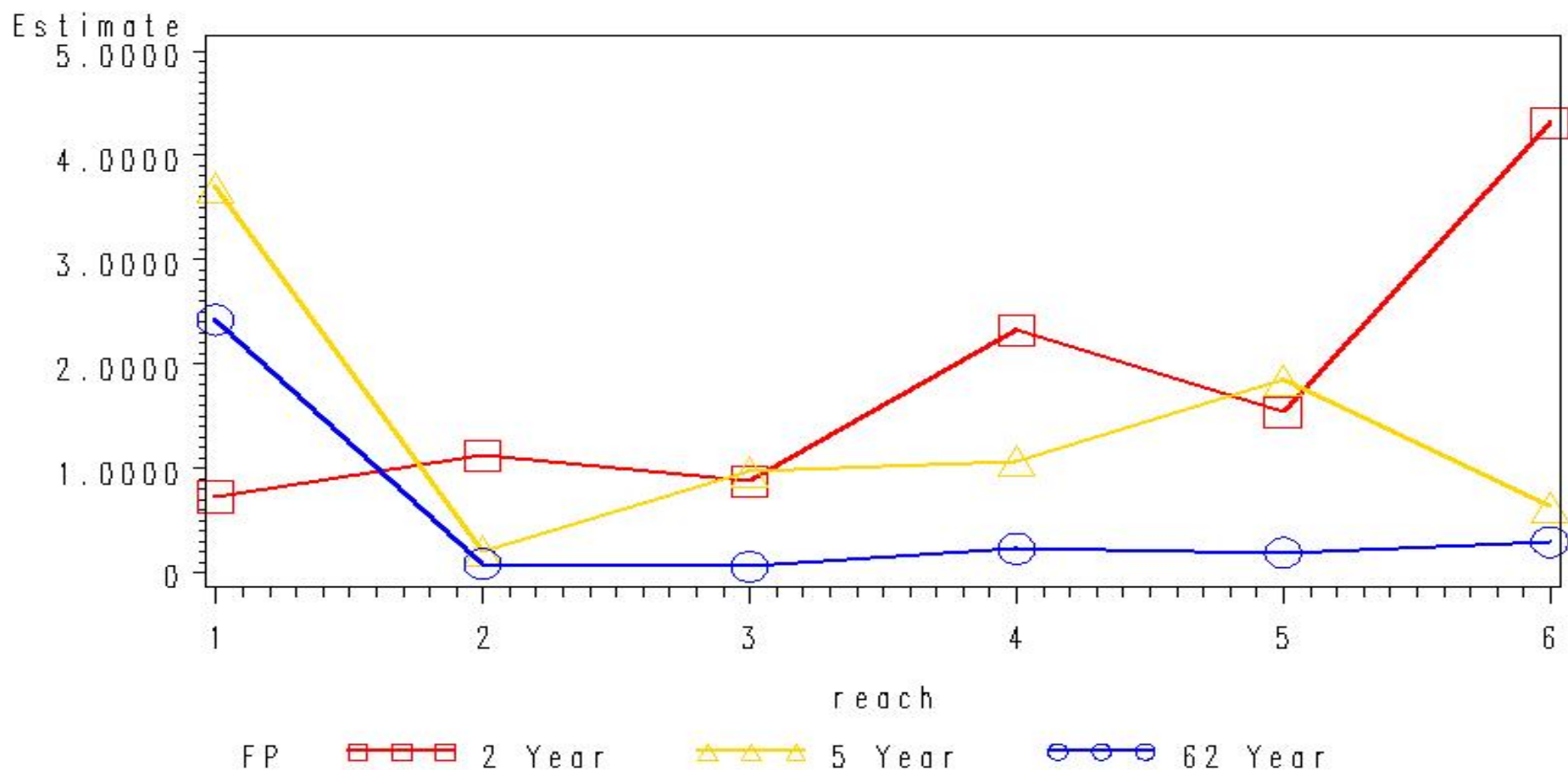
THg in Composite Samples by Use



THg averaged across floodplains. Marked decrease in THg from reach 1 to 2 in both landuses. Highest THg observed in forested areas in reaches 4-6, little variation among landuses in reaches 2 - 6.

THg in Composite Samples by FP and Use

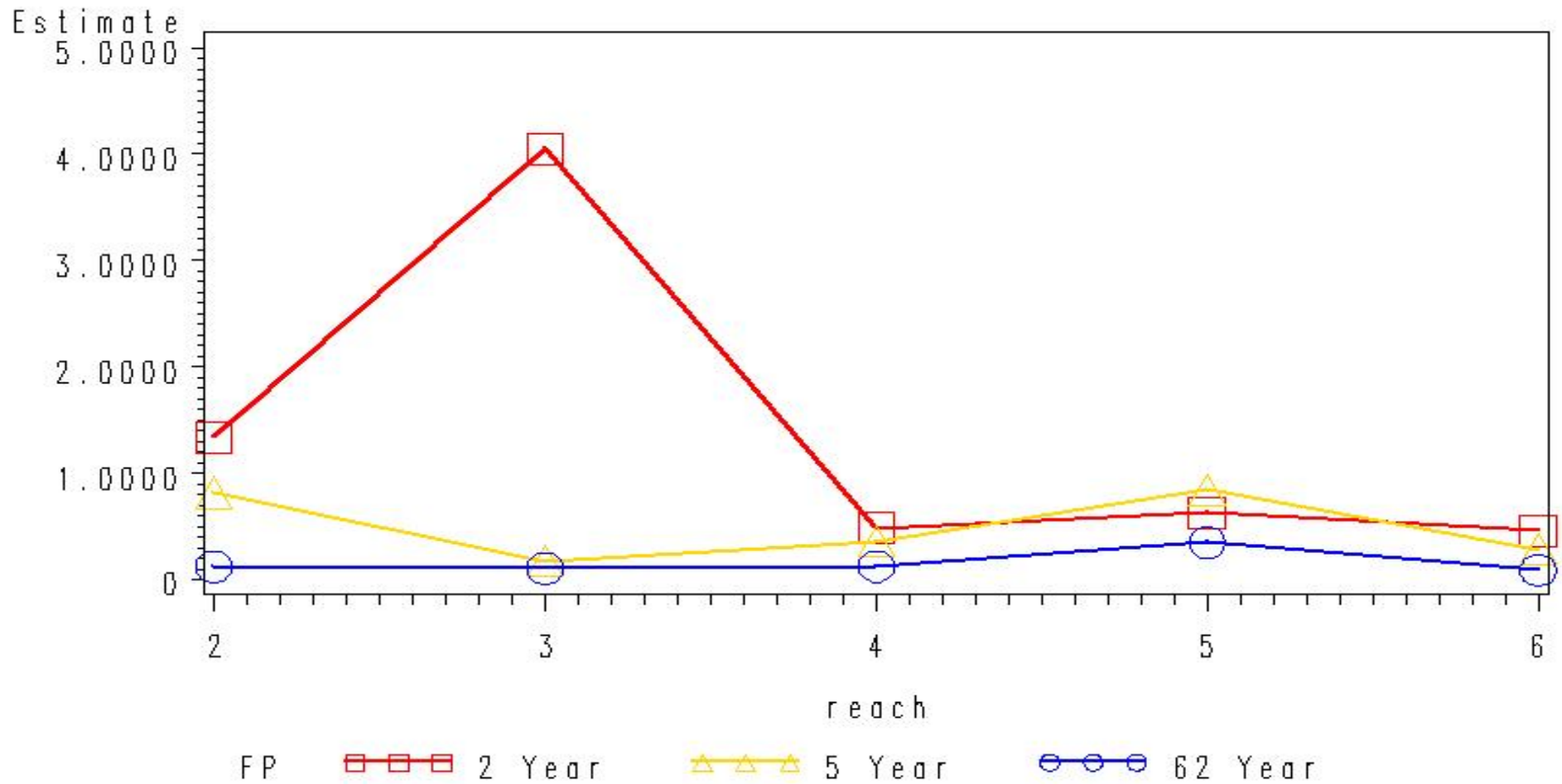
use=FDR



THg rises across reaches in forested area in 2-Yr FP. Less clear pattern in 5-Yr FP. Low, steady THg levels in 62-Yr FP after reach 1

THg in Composite Samples by FP and Use

use=PAS



Except for spike in reach 3 (Dooms, Crimora area), 2-Yr FP, low steady THg levels across reaches in pasture/hay areas.

Basics

- **Data normally distributed**
 - Moderate non-normality in R 3 ($p=0.035$)
- **Some variance heterogeneity in reaches 2 ($p=0.01$) and 4 ($p=0.01$)**
- **11 outliers**
 - 8 underestimated, 3 overestimated
 - 3 THg values 33-55 ppm underestimated

Reach 1, 2 Largest THg

FP	use	Hg	X	Y	El	DIS	RRM	CLAY%	SILT%	
5	Y	FOR	535	4420	5974	4.0	950	2.07	17	42
62	Y	OpSp	282	1753	3502	8.0	198	1.10	13	14
5	Y	FOR	105	415	1532	6.0	110	0.45	11	24
5	Y	FOR	99	4504	5462	4.3	682	1.97	21	35
2	Y	FOR	89	3333	4027	4.0	72	1.46	13	16
5	Y	FOR	89	4565	5058	4.0	552	1.90	17	23
2	Y	FOR	72	3870	5727	0.0	378	1.93	11	18
2	Y	WET	66	3784	5735	0.0	340	1.91	14	22
2	Y	WET	62	4178	4468	4.0	121	1.71	11	28
5	Y	FOR	61	4118	5569	3.6	447	1.93	19	29
R2										
2	Y	FOR	163	4030	10508	0.0	53	3.13	18	42
2	Y	FOR	59	3550	10865	2.5	117	3.18	26	52
2	Y	OpSp	34	6657	11672	2.7	99	3.73	25	36
2	Y	OpSp	23	6590	11364	2.8	162	3.65	16	42
2	Y	FOR	21	2486	9712	1.8	65	2.79	25	46
2	Y	PAS	19	5910	10692	4.0	347	3.39	15	20
5	Y	PAS	18	4460	10284	4.0	116	3.11	19	28
2	Y	FOR	14	4983	12003	2.9	118	3.61	16	20
5	Y	PAS	13	6684	14528	6.0	226	4.44	20	30
5	Y	PAS	9	2496	8942	6.0	90	2.58	21	43

Reach 1 Comparisons

Label	RATIO	LCBRAT	UCBRAT	SIG
R1, FOR, FP 5Y/2Y	5.071	1.034	24.858	**
R1, FOR, FP 62Y/2Y	3.321	0.201	54.855	
R1, FOR, FP 62Y/5Y	0.654	0.088	4.844	
R1, OPS, FP 5Y/2Y	0.837	0.133	5.242	
R1, OPS, FP 62Y/2Y	2.708	0.352	20.822	
R1, OPS, FP 62Y/5Y	3.232	0.720	14.503	
R1, 2YR, OPS/FOR	4.495	0.956	21.116	*
R1, 5YR, OPS/FOR	0.742	0.169	3.250	
R1, 62YR, OPS/FOR	3.665	0.662	20.284	

Reach 2 Comparisons

Label	RATIO	LCBRAT	UCBRAT	SIG
R2, FOR, FP 5Y/2Y	0.185	0.055	0.617	***
R2, FOR, FP 62Y/2Y	0.077	0.020	0.295	***
R2, FOR, FP 62Y/5Y	0.416	0.127	1.355	
R2, OPS, FP 5Y/2Y	0.774	0.205	2.921	
R2, OPS, FP 62Y/2Y	0.685	0.166	2.815	
R2, OPS, FP 62Y/5Y	0.885	0.237	3.299	
R2, PAS, FP 5Y/2Y	0.611	0.191	1.950	
R2, PAS, FP 62Y/2Y	0.093	0.025	0.346	***
R2, PAS, FP 62Y/5Y	0.153	0.047	0.498	***

Reach 2 Comparisons

Label	RATIO	LCBRAT	UCBRAT	SIG
R2, 2YR, OPS/FOR	0.421	0.112	1.578	
R2, 2YR, PAS/FOR	1.198	0.360	3.985	
R2, 2YR, PAS/OPS	2.842	0.791	10.202	
R2, 5YR, OPS/FOR	1.758	0.490	6.303	
R2, 5YR, PAS/FOR	3.947	1.331	11.703	**
R2, 5YR, PAS/OPS	2.244	0.634	7.935	
R2, 62YR, OPS/FOR	3.742	1.005	13.938	*
R2, 62YR, PAS/FOR	1.454	0.456	4.638	
R2, 62YR, PAS/OPS	0.388	0.113	1.333	

Reach 3, 4 Largest THg

FP	USE	Hg	x	y	El	Dist	RRM	CLAY%	SILT%
2	Y FOR	46	9981	28723	2.7	74	8.43	13	26
2	Y FOR	38	10681	27607	2.0	90	8.21	23	49
5	Y FOR	33	10256	28334	4.0	136	8.35	22	6
2	Y PAS	25	6896	24991	6.0	139	7.19	14	30
2	Y CUL	22	6987	17549	6.0	315	5.24	12	22
2	Y CUL	19	7201	18280	4.0	141	5.45	14	20
2	Y WET	16	9054	27258	2.0	852	7.96	27	32
2	Y PAS	12	8443	28068	4.0	558	8.13	17	24
2	Y PAS	11	10232	28614	0.0	189	8.42	26	34
2	Y WET	11	7374	17345	3.5	85	5.23	8	26
R 4									
2	Y PAS	57	9042	34262	2.0	78	9.82	26	44
2	Y FOR	23	12415	47718	2.0	114	13.66	13	17
5	Y FOR	23	11414	43169	4.0	183	12.37	8	14
2	Y FOR	18	9921	44662	0.0	133	12.68	8	24
5	Y FOR	17	13486	49908	4.0	101	14.32	10	14
2	Y PAS	13	9824	41231	1.2	100	11.75	26	46
2	Y FOR	11	8000	32571	0.0	1181	9.30	27	23
2	Y WET	11	9838	39375	0.6	89	11.25	13	22
2	Y FOR	10	11218	43290	0.8	122	12.39	10	18
2	Y WET	8	7433	37991	2.0	63	10.73	27	26

Reach 3 Comparisons

Label	RATIO	LCBRAT	UCBRAT	SIG
R3, CCP, FP 5Y/2Y	0.419	0.113	1.550	
R3, CCP, FP 62Y/2Y	0.024	0.005	0.102	***
R3, CCP, FP 62Y/5Y	0.057	0.014	0.229	***
R3, FOR, FP 5Y/2Y	1.109	0.294	4.178	
R3, FOR, FP 62Y/2Y	0.069	0.014	0.327	***
R3, FOR, FP 62Y/5Y	0.062	0.014	0.274	***
R3, PAS, FP 5Y/2Y	0.043	0.011	0.160	***
R3, PAS, FP 62Y/2Y	0.026	0.006	0.110	***
R3, PAS, FP 62Y/5Y	0.617	0.159	2.400	

Reach 3 Comparisons

Label	RATIO	LCBRAT	UCBRAT	SIG
R3, 2YR, FOR/CCP	0.613	0.169	2.217	
R3, 2YR, PAS/CCP	2.825	0.782	10.196	
R3, 2YR, PAS/FOR	4.606	1.262	16.811	**
R3, 5YR, FOR/CCP	1.621	0.451	5.824	
R3, 5YR, PAS/CCP	0.293	0.081	1.055	*
R3, 5YR, PAS/FOR	0.181	0.050	0.651	**
R3, 62YR, FOR/CCP	1.746	0.395	7.715	
R3, 62YR, PAS/CCP	3.137	0.873	11.260	*
R3, 62YR, PAS/FOR	1.795	0.450	7.155	

Reach 4 Comparisons

Label	RATIO	LCBR	UCBR	SIG
R4, CCP, FP 5Y/2Y	0.599	0.140	2.568	
R4, CCP, FP 62Y/2Y	0.885	0.181	4.322	
R4, CCP, FP 62Y/5Y	1.475	0.452	4.816	
R4, FOR, FP 5Y/2Y	0.459	0.130	1.622	
R4, FOR, FP 62Y/2Y	0.099	0.020	0.484	***
R4, FOR, FP 62Y/5Y	0.215	0.059	0.780	**
R4, PAS, FP 5Y/2Y	0.747	0.220	2.531	
R4, PAS, FP 62Y/2Y	0.262	0.054	1.272	
R4, PAS, FP 62Y/5Y	0.351	0.098	1.249	

Reach 4 Comparisons

Label	RATIO	LCBR	UCBR	SIG
R4, 2YR, FOR/CCP	4.716	1.505	14.783	***
R4, 2YR, PAS/CCP	0.985	0.321	3.021	
R4, 2YR, PAS/FOR	0.208	0.067	0.644	***
R4, 5YR, FOR/CCP	3.613	0.852	15.316	*
R4, 5YR, PAS/CCP	1.227	0.329	4.579	
R4, 5YR, PAS/FOR	0.339	0.101	1.138	*
R4, 62YR, FOR/CCP	0.528	0.129	2.162	
R4, 62YR, PAS/CCP	0.292	0.081	1.041	*
R4, 62YR, PAS/FOR	0.552	0.155	1.966	

Reach 5, 6 Highest THg

FP	USE	Hg	x	y	El	Dist	RRM	CLAY%	SILT%
2Y	WET	44	15054	56744	2.0	135	16.26	13	35
2Y	WET	18	14813	55965	2.0	97	16.04	7	20
2Y	PAS	12	15264	65914	3.2	137	18.74	25	33
5Y	FOR	11	14638	59045	4.0	83	16.85	9	19
2Y	FOR	11	15274	68939	3.4	669	19.56	11	31
5Y	PAS	10	14482	64361	2.3	195	18.27	12	18
2Y	WET	10	14295	54460	2.0	61	15.60	9	26
2Y	WET	10	14957	56315	0.0	26	16.14	11	17
5Y	FOR	9	14615	56280	5.9	268	16.11	10	24
5Y	FOR	9	14616	55213	4.0	287	15.82	13	17
R6									
2Y	OpSp	30	20072	81726	2.0	115	23.31	23	28
2Y	FOR	28	16755	80093	4.3	649	22.66	25	31
2Y	FOR	16	18030	79154	5.6	646	22.49	19	25
62Y	WET	14	14882	77204	0.4	161	21.78	13	42
2Y	FOR	11	20158	81030	2.4	84	23.13	17	28
2Y	FOR	9	19793	80417	4.0	371	22.94	15	15
2Y	WET	9	14703	77495	1.0	248	21.85	13	30
2Y	FOR	8	17808	79134	0.2	653	22.47	21	33
2Y	OpSp	7	19889	81586	4.1	234	23.26	17	22
2Y	WET	7	16769	79901	4.5	548	22.61	21	34

Reach 5 Comparisons

Label	RATIO	LCBR	UCBR	SIG
R5, FOR, FP 5Y/2Y	1.197	0.376	3.811	
R5, FOR, FP 62Y/2Y	0.125	0.037	0.420	***
R5, FOR, FP 62Y/5Y	0.104	0.032	0.334	***
R5, OPS, FP 5Y/2Y	0.162	0.048	0.542	***
R5, OPS, FP 62Y/2Y	0.121	0.038	0.384	***
R5, OPS, FP 62Y/5Y	0.748	0.229	2.441	
R5, PAS, FP 5Y/2Y	1.351	0.413	4.420	
R5, PAS, FP 62Y/2Y	0.560	0.172	1.819	
R5, PAS, FP 62Y/5Y	0.414	0.137	1.249	

Reach 5 Comparisons

Label	RATIO	LCBR	UCBR	SIG
R5, 2YR, OPS/FOR	0.893	0.286	2.789	
R5, 2YR, PAS/FOR	0.406	0.119	1.386	
R5, 2YR, PAS/OPS	0.454	0.143	1.440	
R5, 5YR, OPS/FOR	0.120	0.036	0.400	***
R5, 5YR, PAS/FOR	0.458	0.148	1.418	
R5, 5YR, PAS/OPS	3.791	1.141	12.587	**
R5, 62YR, OPS/FOR	0.866	0.265	2.829	
R5, 62YR, PAS/FOR	1.821	0.570	5.812	
R5, 62YR, PAS/OPS	2.102	0.730	6.051	

Reach 6 Comparisons

Label	RATIO	LCBR	UCBR	SIG
R6, FOR, FP 5Y/2Y	0.146	0.041	0.510	***
R6, FOR, FP 62Y/2Y	0.068	0.016	0.279	***
R6, FOR, FP 62Y/5Y	0.471	0.116	1.906	
R6, OPS, FP 5Y/2Y	0.057	0.016	0.191	***
R6, OPS, FP 62Y/2Y	0.052	0.012	0.219	***
R6, OPS, FP 62Y/5Y	0.927	0.225	3.812	
R6, PAS, FP 5Y/2Y	0.623	0.185	2.102	
R6, PAS, FP 62Y/2Y	0.199	0.055	0.709	**
R6, PAS, FP 62Y/5Y	0.319	0.096	1.061	*

Reach 6 Comparisons

Label	RATIO	LCBR	UCBR	SIG
R6, 2YR, OPS/FOR	0.555	0.168	1.829	
R6, 2YR, PAS/FOR	0.106	0.032	0.352	***
R6, 2YR, PAS/OPS	0.191	0.058	0.626	***
R6, 5YR, OPS/FOR	0.216	0.064	0.732	**
R6, 5YR, PAS/FOR	0.454	0.129	1.598	
R6, 5YR, PAS/OPS	2.094	0.597	7.342	
R6, 62YR, OPS/FOR	0.426	0.084	2.163	
R6, 62YR, PAS/FOR	0.308	0.068	1.375	
R6, 62YR, PAS/OPS	0.722	0.211	2.460	

2-Year Floodplain

Label	RATIO	LCBR	UCBR	SIG	
2YR, CCP, REACH4/3	0.378	0.107	1.340		
2YR, FOR, REACH2/1	0.557	0.176	1.755		
2YR, FOR, REACH3/1	0.244	0.075	0.792	**	
2YR, FOR, REACH4/1	1.086	0.349	3.383		
2YR, FOR, REACH5/1	0.602	0.180	2.014		
2YR, FOR, REACH6/1	1.092	0.331	3.604		
2YR, FOR, REACH3/2	0.438	0.128	1.498		
2YR, FOR, REACH4/2	1.950	0.574	6.620		
2YR, FOR, REACH5/2	1.081	0.288	4.052		
2YR, FOR, REACH6/2	1.961	0.566	6.787		
2YR, FOR, REACH4/3	4.450	1.266	15.641	**	
2YR, FOR, REACH5/3	2.468	0.638	9.536		
2YR, FOR, REACH6/3	4.475	1.257	15.926	**	
2YR, FOR, REACH5/4	0.554	0.155	1.982		
2YR, FOR, REACH6/4	1.005	0.286	3.535		
2YR, FOR, REACH6/5	1.813	0.472	6.954		

2-Year Floodplain

Label	RATIO	LCBR	UCBR	SIG
2YR, OPS, REACH2/1	0.057	0.016	0.203	***
2YR, OPS, REACH5/1	0.167	0.052	0.534	***
2YR, OPS, REACH6/1	0.230	0.069	0.764	**
2YR, OPS, REACH5/2	2.888	0.736	11.325	
2YR, OPS, REACH6/2	3.984	1.053	15.061	**
2YR, OPS, REACH6/5	1.379	0.395	4.809	
2YR, PAS, REACH3/2	1.624	0.460	5.738	
2YR, PAS, REACH4/2	0.274	0.076	0.986	**
2YR, PAS, REACH5/2	0.501	0.133	1.884	
2YR, PAS, REACH6/2	0.302	0.085	1.070	*
2YR, PAS, REACH4/3	0.169	0.047	0.607	***
2YR, PAS, REACH5/3	0.308	0.080	1.177	*
2YR, PAS, REACH6/3	0.186	0.052	0.662	**
2YR, PAS, REACH5/4	1.823	0.457	7.266	
2YR, PAS, REACH6/4	1.100	0.297	4.073	
2YR, PAS, REACH6/5	0.603	0.163	2.228	

5-Year Floodplain

Label	RATIO	LCBR	UCBR	SIG
5YR, CCP, REACH4/3	0.232	0.051	1.058	*
5YR, FOR, REACH2/1	0.039	0.012	0.126	***
5YR, FOR, REACH3/1	0.175	0.049	0.626	***
5YR, FOR, REACH4/1	0.155	0.042	0.567	***
5YR, FOR, REACH5/1	0.286	0.085	0.958	**
5YR, FOR, REACH6/1	0.075	0.020	0.275	***
5YR, FOR, REACH3/2	4.411	1.097	17.731	**
5YR, FOR, REACH4/2	3.903	0.906	16.808	*
5YR, FOR, REACH5/2	7.185	1.783	28.952	***
5YR, FOR, REACH6/2	1.904	0.456	7.945	
5YR, FOR, REACH4/3	0.884	0.183	4.258	
5YR, FOR, REACH5/3	1.628	0.363	7.291	
5YR, FOR, REACH6/3	0.431	0.099	1.874	
5YR, FOR, REACH5/4	1.840	0.431	7.847	
5YR, FOR, REACH6/4	0.488	0.098	2.413	
5YR, FOR, REACH6/5	0.265	0.059	1.180	*

5-Year Floodplain

Label	RATIO	LCBR	UCBR	SIG
5YR, OPS, REACH2/1	0.156	0.038	0.634	**
5YR, OPS, REACH5/1	0.118	0.028	0.494	***
5YR, OPS, REACH6/1	0.048	0.011	0.200	***
5YR, OPS, REACH5/2	0.757	0.155	3.677	
5YR, OPS, REACH6/2	0.313	0.071	1.370	
5YR, OPS, REACH6/5	0.413	0.085	2.000	
5YR, PAS, REACH3/2	0.177	0.045	0.684	**
5YR, PAS, REACH4/2	0.382	0.099	1.475	
5YR, PAS, REACH5/2	0.726	0.173	3.045	
5YR, PAS, REACH6/2	0.347	0.086	1.393	
5YR, PAS, REACH4/3	2.159	0.508	9.179	
5YR, PAS, REACH5/3	4.099	0.899	18.674	*
5YR, PAS, REACH6/3	1.962	0.455	8.460	
5YR, PAS, REACH5/4	1.898	0.420	8.558	
5YR, PAS, REACH6/4	0.908	0.207	3.983	
5YR, PAS, REACH6/5	0.478	0.111	2.065	

62-Year Floodplain

Label	RATIO	LCBR	UCBR	SIG
62Y, CCP, REACH4/3	5.897	1.596	21.792	***
62Y, FOR, REACH2/1	0.126	0.040	0.390	***
62Y, FOR, REACH3/1	0.087	0.026	0.284	***
62Y, FOR, REACH4/1	0.183	0.054	0.614	***
62Y, FOR, REACH5/1	0.250	0.073	0.855	**
62Y, FOR, REACH6/1	0.409	0.103	1.618	
62Y, FOR, REACH3/2	0.690	0.187	2.548	
62Y, FOR, REACH4/2	1.454	0.401	5.265	
62Y, FOR, REACH5/2	1.980	0.531	7.382	
62Y, FOR, REACH6/2	3.242	0.748	14.047	
62Y, FOR, REACH4/3	2.105	0.537	8.250	
62Y, FOR, REACH5/3	2.868	0.730	11.260	
62Y, FOR, REACH6/3	4.694	1.018	21.639	**
62Y, FOR, REACH5/4	1.362	0.369	5.026	
62Y, FOR, REACH6/4	2.229	0.499	9.962	

62-Year Floodplain

Label	RATIO	LCBR	UCBR	SIG
62Y, OPS, REACH2/1	0.071	0.020	0.253	***
62Y, OPS, REACH5/1	0.075	0.024	0.230	***
62Y, OPS, REACH6/1	0.109	0.033	0.358	***
62Y, OPS, REACH5/2	1.059	0.274	4.084	
62Y, OPS, REACH6/2	1.527	0.402	5.799	
62Y, OPS, REACH6/5	1.442	0.405	5.131	
62Y, PAS, REACH3/2	1.035	0.318	3.365	
62Y, PAS, REACH4/2	0.638	0.191	2.135	
62Y, PAS, REACH5/2	2.204	0.698	6.954	
62Y, PAS, REACH6/2	0.981	0.299	3.216	
62Y, PAS, REACH4/3	0.616	0.169	2.237	
62Y, PAS, REACH5/3	2.127	0.635	7.129	
62Y, PAS, REACH6/3	0.947	0.268	3.341	
62Y, PAS, REACH5/4	3.451	0.987	12.064	*
62Y, PAS, REACH6/4	1.536	0.428	5.514	
62Y, PAS, REACH6/5	0.445	0.130	1.522	