

APPENDIX **E**

Spearman Rank Correlations  
between Chesapeake Bay  
Water Quality Monitoring  
Program Data and  
Measures of SAV Area

**TABLE E-1.** Tidal fresh Spearman rank correlations between water quality parameters from Chesapeake Bay Program midchannel water quality monitoring stations over the whole growing season, and measures of SAV area over Chesapeake Bay Program segments, adding half tidal range for PLW and PLL.

Parameter	Tidal fresh (April-October)					KEY
	PCT_T2	PCT_T3	SAVH	LAGSAVH	CHGSAVH	
<b>K<sub>d</sub></b>	-0.0596	-0.06005	-0.06537	-0.03866	0.07773	r <sub>s</sub>
	0.4906	0.4874	0.4496	0.6699	0.3684	P
	136	136	136	124	136	N
<b>PLW(1+)</b>	0.10356	0.10757	0.11983	0.11201	-0.06748	r <sub>s</sub>
	0.2524	0.2344	0.185	0.2397	0.4564	P
	124	124	124	112	124	N
<b>PLL(1+)</b>	0.14137	0.14702	0.16066	0.15532	-0.07284	r <sub>s</sub>
	0.1173	0.1032	0.0747	0.102	0.4214	P
	124	124	124	112	124	N
<b>TSS</b>	-0.17325	-0.18466	-0.17423	-0.19696	0.00593	r <sub>s</sub>
	0.0543	0.0401	0.053	0.0374	0.9479	P
	124	124	124	112	124	N
<b>CHLA</b>	0.08112	0.0791	0.09939	0.11388	-0.04165	r <sub>s</sub>
	0.3425	0.3547	0.2444	0.2024	0.6264	P
	139	139	139	127	139	N
<b>DIP</b>	-0.15833	-0.18026	-0.21387	-0.20039	0.10017	r <sub>s</sub>
	0.0627	0.0337	0.0115	0.0239	0.2407	P
	139	139	139	127	139	N
<b>DIN</b>	0.5474*	0.53887*	0.54511*	0.54664*	0.08264	r <sub>s</sub>
	0.0001	0.0001	0.0001	0.0001	0.3335	P
	139	139	139	127	139	N

KEY: PCT\_T2 = SAVH/Tier II area\*100, PCT\_T3 = SAVH/Tier III area\*100, SAVH = SAV hectares for same year as water quality data; LAGSAVH = SAV hectares for following year; CHGSAVH = change in SAV hectares from that year to next; K<sub>d</sub> = light attenuation; PLW = percent light through water column; PLL = percent light at the leaf; TSS = total suspended solids; CHLA = chlorophyll *a*; DIP = dissolved inorganic phosphorus; DIN = dissolved inorganic nitrogen; P r<sub>s</sub> = Spearman rank correlation coefficient, P = statistical probability (*significant shown in italics if P < 0.05*) and N = sample size, number of segment-year combinations. Expected correlations: Negative for all parameters (more pollution, less SAV) except PLL/PLW (more light, more SAV). \*Statistically significant but not in the expected direction; probably spurious (no DIN requirement).

**TABLE E-2.** Tidal fresh Spearman rank correlations between water quality from Chesapeake Bay Program midchannel water quality stations over the spring, and measures of SAV area over Chesapeake Bay Program segments, adding half tidal range for PLW and PLL.

Parameter	Tidal fresh (April-June)					KEY
	PCT_T2	PCT_T3	SAVH	LAGSAVH	CHGSAVH	
<b>K<sub>d</sub></b>	0.00761	0.01365	0.01317	0.02831	0.02677	r <sub>s</sub>
	0.9302	0.8752	0.8795	0.7559	0.7579	P
	135	135	135	123	135	N
<b>PLW(1+)</b>	0.03689	0.03551	0.04127	0.03922	-0.02224	r <sub>s</sub>
	0.6854	0.6966	0.6504	0.6828	0.8071	P
	123	123	123	111	123	N
<b>PLL(1+)</b>	0.07907	0.08164	0.08834	0.08791	-0.016	r <sub>s</sub>
	0.3847	0.3693	0.3312	0.3589	0.8606	P
	123	123	123	111	123	N
<b>TSS</b>	-0.04713	-0.05391	-0.0369	-0.06151	-0.01242	r <sub>s</sub>
	0.6047	0.5537	0.6853	0.5213	0.8915	P
	123	123	123	111	123	N
<b>CHLA</b>	0.15644	0.1566	<i>0.17161*</i>	0.15875	-0.02269	r <sub>s</sub>
	0.0669	0.0666	<i>0.0442</i>	0.0758	0.7917	P
	138	138	<i>138</i>	126	138	N
<b>DIP</b>	-0.14858	<i>-0.17211</i>	<i>-0.2064</i>	<i>-0.19851</i>	0.07019	r <sub>s</sub>
	0.082	<i>0.0435</i>	<i>0.0151</i>	<i>0.0259</i>	0.4133	P
	138	<i>138</i>	<i>138</i>	<i>126</i>	138	N
<b>DIN</b>	<i>0.48438*</i>	<i>0.47468*</i>	<i>0.48123*</i>	<i>0.48596*</i>	0.04703	r <sub>s</sub>
	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	0.5839	P
	<i>138</i>	<i>138</i>	<i>138</i>	<i>126</i>	138	0.01365

KEY: PCT\_T2 = SAVH/Tier II area\*100, PCT\_T3 = SAVH/Tier III area\*100, SAVH = SAV hectares for same year as water quality data; LAGSAVH = SAV hectares for following year; CHGSAVH = change in SAV hectares from that year to next; K<sub>d</sub> = light attenuation; PLW = percent light through water column; PLL = percent light at the leaf; TSS = total suspended solids; CHLA = chlorophyll *a*; DIP = dissolved inorganic phosphorus; DIN = dissolved inorganic nitrogen; r<sub>s</sub> = Spearman rank correlation coefficient, P = statistical probability (*significant shown in italics if P < 0.05*) and N = sample size, number of segment-year combinations. Expected correlations: Negative for all parameters (more pollution, less SAV) except PLL/PLW (more light, more SAV).

\*Statistically significant but not in the expected direction; probably spurious (no DIN requirement).

**TABLE E-3.** Oligohaline Spearman rank correlations between water quality from Chesapeake Bay Program midchannel water quality stations over the whole growing season, and measures of SAV area over Chesapeake Bay Program segments, adding half tidal range for PLW and PLL.

Parameter	Oligohaline (April-October)					KEY
	PCT_T2	PCT_T3	SAVH	LAGSAVH	CHGSAVH	
<b>K<sub>d</sub></b>	<i>-0.32228</i>	<i>-0.3198</i>	<i>-0.3359</i>	<i>-0.30592</i>	-0.03497	r <sub>s</sub>
	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	0.631	P
	191	191	191	175	191	N
<b>PLW(1+)</b>	<i>0.38378</i>	<i>0.37999</i>	<i>0.4001</i>	<i>0.36512</i>	0.03749	r <sub>s</sub>
	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	0.6154	P
	182	182	182	166	182	N
<b>PLL(1+)</b>	<i>0.36968</i>	<i>0.36543</i>	<i>0.38394</i>	<i>0.35327</i>	0.03471	r <sub>s</sub>
	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	0.6418	P
	182	182	182	166	182	N
<b>TSS</b>	<i>-0.51599</i>	<i>-0.52088</i>	<i>-0.53017</i>	<i>-0.53113</i>	-0.0005	r <sub>s</sub>
	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	0.9947	P
	182	182	182	166	182	N
<b>CHLA</b>	-0.13135	-0.12639	<i>-0.15859</i>	<i>-0.16549</i>	0.03371	r <sub>s</sub>
	0.0701	0.0815	<i>0.0284</i>	<i>0.0286</i>	0.6434	P
	191	191	191	175	191	N
<b>DIP</b>	-0.14066	-0.14006	-0.12059	-0.14075	-0.05054	r <sub>s</sub>
	0.0523	0.0533	0.0966	0.0632	0.4875	P
	191	191	191	175	191	N
<b>DIN</b>	0.07611	0.07199	0.1047	0.08701	-0.10422	r <sub>s</sub>
	0.2954	0.3224	0.1495	0.2522	0.1513	P
	191	191	191	175	191	N

KEY: PCT\_T2 = SAVH/Tier II area \* 100, PCT\_T3 = SAVH/Tier III area \* 100, SAVH = SAV hectares for same year as water quality data; LAGSAVH = SAV hectares for following year; CHGSAVH = change in SAV hectares from that year to next; K<sub>d</sub> = light attenuation; PLW = percent light through water column; PLL = percent light at the leaf; TSS = total suspended solids; CHLA = chlorophyll *a*; DIP = dissolved inorganic phosphorus; DIN = dissolved inorganic nitrogen; r<sub>s</sub> = Spearman rank correlation coefficient, P = statistical probability (*significant shown in italics if P < 0.05*) and N = sample size, number of segment-year combinations. Expected correlations: Negative for all parameters (more pollution, less SAV) except PLL/PLW (more light, more SAV). Correlations in bold were significant and > +/- 0.5.

**TABLE E-4.** Oligohaline Spearman rank correlations between water quality from Chesapeake Bay Program midchannel water quality stations over the spring, and measures of SAV area over Chesapeake Bay Program segments, adding half tidal range for PLW and PLL.

Parameter	Oligohaline (April-June)					KEY
	PCT_T2	PCT_T3	SAVH	LAGSAVH	CHGSAVH	
<b>K<sub>d</sub></b>	<i>-0.35803</i>	<i>-0.35839</i>	<i>-0.36803</i>	<i>-0.38156</i>	-0.10025	r <sub>s</sub>
	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	0.1734	P
	<i>186</i>	<i>186</i>	<i>186</i>	<i>170</i>	186	N
<b>PLW(1+)</b>	<i>0.41006</i>	<i>0.40926</i>	<i>0.42278</i>	<i>0.43821</i>	0.09315	r <sub>s</sub>
	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	0.2175	P
	<i>177</i>	<i>177</i>	<i>177</i>	<i>161</i>	177	N
<b>PLL(1+)</b>	<i>0.41306</i>	<i>0.41214</i>	<i>0.42422</i>	<i>0.44153</i>	0.09762	r <sub>s</sub>
	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	0.1961	P
	<i>177</i>	<i>177</i>	<i>177</i>	<i>161</i>	177	N
<b>TSS</b>	<i>-0.46473</i>	<i>-0.46895</i>	<i>-0.46911</i>	<i>-0.47071</i>	-0.09005	r <sub>s</sub>
	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	0.2333	P
	<i>177</i>	<i>177</i>	<i>177</i>	<i>161</i>	177	N
<b>CHLA</b>	-0.03517	-0.03523	-0.06136	-0.05987	0.06745	r <sub>s</sub>
	0.6337	0.6331	0.4054	0.438	0.3603	P
	186	186	186	170	186	N
<b>DIP</b>	<i>-0.21619</i>	<i>-0.2141</i>	<i>-0.20218</i>	<i>-0.18372</i>	-0.00215	r <sub>s</sub>
	<i>0.003</i>	<i>0.0033</i>	<i>0.0056</i>	<i>0.0165</i>	0.9768	P
	<i>186</i>	<i>186</i>	<i>186</i>	<i>170</i>	186	N
<b>DIN</b>	0.11433	0.11214	0.13042	0.11665	-0.05129	r <sub>s</sub>
	0.1202	0.1275	0.076	0.1298	0.4869	P
	186	186	186	170	186	N

KEY: PCT\_T2 = SAVH/Tier II area \* 100, PCT\_T3 = SAVH/Tier III area \* 100, SAVH = SAV hectares for same year as water quality data; LAGSAVH = SAV hectares for following year; CHGSAVH = change in SAV hectares from that year to next; r<sub>s</sub> = Spearman rank correlation coefficient, P = statistical probability (*significant shown in italics if P < 0.05*) and N = sample size, number of segment-year combinations. Expected correlations: Negative for all parameters (more pollution, less SAV) except PLL/PLW (more light, more SAV).

**TABLE E-5.** Mesohaline Spearman rank correlations between water quality from Chesapeake Bay Program midchannel water quality stations over the whole growing season, and measures of SAV area over Chesapeake Bay Program segments, adding half tidal range for PLW and PLL.

Parameter	Mesohaline (April-October)					KEY
	PCT_T2	PCT_T3	SAVH	LAGSAVH	CHGSAVH	
<b>K<sub>d</sub></b>	<b>-0.54526</b>	<b>-0.54944</b>	<b>-0.57505</b>	<b>-0.58657</b>	-0.09317	r <sub>s</sub>
	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	0.0872	P
	<b>329</b>	<b>329</b>	<b>338</b>	<b>309</b>	338	N
<b>PLW(1+)</b>	<b>0.51652</b>	<b>0.52111</b>	<b>0.55187</b>	<b>0.56544</b>	0.10446	r <sub>s</sub>
	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	0.0561	P
	<b>326</b>	<b>326</b>	<b>335</b>	<b>306</b>	335	N
<b>PLL(1+)</b>	<b>0.50671</b>	<b>0.51195</b>	<b>0.54913</b>	<b>0.5671</b>	0.11718	r <sub>s</sub>
	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	0.032	P
	<b>326</b>	<b>326</b>	<b>335</b>	<b>306</b>	335	N
<b>TSS</b>	<b>-0.21364</b>	<b>-0.22248</b>	<b>-0.2087</b>	<b>-0.20609</b>	-0.03407	r <sub>s</sub>
	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0003</i>	0.5343	P
	<b>326</b>	<b>326</b>	<b>335</b>	<b>306</b>	335	N
<b>CHLA</b>	<b>-0.36311</b>	<b>-0.36567</b>	<b>-0.35225</b>	<b>-0.33616</b>	-0.00415	r <sub>s</sub>
	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	0.9394	P
	<b>329</b>	<b>329</b>	<b>338</b>	<b>309</b>	338	N
<b>DIP</b>	<b>-0.3637</b>	<b>-0.37274</b>	<b>-0.41021</b>	<b>-0.41049</b>	-0.03386	r <sub>s</sub>
	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	0.535	P
	<b>329</b>	<b>329</b>	<b>338</b>	<b>309</b>	338	N
<b>DIN</b>	<b>-0.1055</b>	<b>-0.10975</b>	<b>-0.13549</b>	<b>-0.17604</b>	0.00965	r <sub>s</sub>
	<i>0.0559</i>	<i>0.0467</i>	<i>0.0127</i>	<i>0.0019</i>	0.8596	P
	<b>329</b>	<b>329</b>	<b>338</b>	<b>309</b>	338	N

KEY: PCT\_T2 = SAVH/Tier II area \* 100, PCT\_T3 = SAVH/Tier III area \* 100, SAVH = SAV hectares for same year as water quality data; LAGSAVH = SAV hectares for following year; CHGSAVH = change in SAV hectares from that year to next; K<sub>d</sub> = light attenuation; PLW = percent light through water column; PLL = percent light at the leaf; TSS = total suspended solids; CHLA = chlorophyll *a*; DIP = dissolved inorganic phosphorus; DIN = dissolved inorganic nitrogen; r<sub>s</sub> = Spearman rank correlation coefficient, P = statistical probability (*significant shown in italics if P < 0.05*) and N = sample size, number of segment-year combinations. Expected correlations: Negative for all parameters (more pollution, less SAV) except PLL/PLW (more light, more SAV). **Correlations in bold were significant and > +/- 0.5.**

**TABLE E-6.** Mesohaline Spearman rank correlations between water quality from Chesapeake Bay Program midchannel water quality stations over the spring, and measures of SAV area over Chesapeake Bay Program segments, adding half tidal range for PLW and PLL.

Parameter	Mesohaline (April-June)					KEY
	PCT_T2	PCT_T3	SAVH	LAGSAVH	CHGSAVH	
<b>K<sub>d</sub></b>	<b>-0.53585</b>	<b>-0.53914</b>	<b>-0.55853</b>	<b>-0.58494</b>	-0.07911	r <sub>s</sub>
	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	0.1467	P
	<b>329</b>	<b>329</b>	<b>338</b>	<b>309</b>	338	N
<b>PLW(1+)</b>	<b>0.50519</b>	<b>0.50852</b>	<b>0.53784</b>	<b>0.56452</b>	0.08795	r <sub>s</sub>
	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	0.1081	P
	<b>326</b>	<b>326</b>	<b>335</b>	<b>306</b>	335	N
<b>PLL(1+)</b>	<b>0.49739</b>	<b>0.50187</b>	<b>0.53661</b>	<b>0.56939</b>	0.09797	r <sub>s</sub>
	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	0.0733	P
	<b>326</b>	<b>326</b>	<b>335</b>	<b>306</b>	335	N
<b>TSS</b>	<b>-0.22213</b>	<b>-0.23046</b>	<b>-0.2184</b>	<b>-0.21714</b>	-0.04769	r <sub>s</sub>
	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	0.3842	P
	<b>326</b>	<b>326</b>	<b>335</b>	<b>306</b>	335	N
<b>CHLA</b>	<b>-0.27328</b>	<b>-0.27456</b>	<b>-0.26687</b>	<b>-0.23615</b>	-0.01718	r <sub>s</sub>
	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	0.753	P
	<b>329</b>	<b>329</b>	<b>338</b>	<b>309</b>	338	N
<b>DIP</b>	<b>-0.27689</b>	<b>-0.28757</b>	<b>-0.32356</b>	<b>-0.31739</b>	-0.01924	r <sub>s</sub>
	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	0.7245	P
	<b>329</b>	<b>329</b>	<b>338</b>	<b>309</b>	338	N
<b>DIN</b>	<b>-0.11043</b>	<b>-0.11041</b>	<b>-0.12817</b>	<b>-0.13662</b>	0.0587	r <sub>s</sub>
	<i>0.0453</i>	<i>0.0454</i>	<i>0.0184</i>	<i>0.0163</i>	0.2819	P
	<b>329</b>	<b>329</b>	<b>338</b>	<b>309</b>	338	N

KEY: PCT\_T2 = SAVH/Tier II area \* 100, PCT\_T3 = SAVH/Tier III area \* 100, SAVH = SAV hectares for same year as water quality data; LAGSAVH = SAV hectares for following year; CHGSAVH = change in SAV hectares from that year to next; K<sub>d</sub> = light attenuation; PLW = percent light through water column; PLL = percent light at the leaf; TSS = total suspended solids; CHLA = chlorophyll  $\alpha$ ; DIP = dissolved inorganic phosphorus; DIN = dissolved inorganic nitrogen; r<sub>s</sub> = Spearman rank correlation coefficient, P = statistical probability (*significant shown in italics if P < 0.05*) and N = sample size, number of segment-year combinations.

Expected correlations: Negative for all parameters (more pollution, less SAV) except PLL/PLW (more light, more SAV).  
Correlations in bold were significant and > +/- 0.5.

**TABLE E-7.** Polyhaline Spearman rank correlations between water quality from Chesapeake Bay Program midchannel water quality stations over the whole growing season, and measures of SAV area over Chesapeake Bay Program segments, adding half tidal range for PLW and PLL.

Parameter	Polyhaline (March-May, Sept.-Nov.)					KEY
	PCT_T2	PCT_T3	SAVH	LAGSAVH	CHGSAVH	
$K_d$	<i>-0.42764</i>	<i>-0.4409</i>	<b><i>-0.59332</i></b>	<b><i>-0.62176</i></b>	-0.14926	$r_s$
	<i>0.0007</i>	<i>0.0004</i>	<b><i>0.0001</i></b>	<b><i>0.0001</i></b>	0.2108	P
	60	60	72	66	72	N
PLW(1+)	<i>0.39999</i>	<i>0.41133</i>	<b><i>0.58154</i></b>	<b><i>0.59571</i></b>	0.10555	$r_s$
	<i>0.0015</i>	<i>0.0011</i>	<b><i>0.0001</i></b>	<b><i>0.0001</i></b>	0.3845	P
	60	60	70	64	70	N
PLL(1+)	<b><i>0.50034</i></b>	<b><i>0.51095</i></b>	<b><i>0.65444</i></b>	<b><i>0.671</i></b>	0.15915	$r_s$
	<b><i>0.0001</i></b>	<b><i>0.0001</i></b>	<b><i>0.0001</i></b>	<b><i>0.0001</i></b>	0.1882	P
	60	60	70	64	70	N
TSS	0.13456	0.1296	0.01667	-0.00031	0.07685	$r_s$
	0.3054	0.3237	0.8911	0.9981	0.5272	P
	60	60	70	64	70	N
CHLA	-0.03031	-0.02187	0.09341	0.14063	0.21089	$r_s$
	0.8181	0.8683	0.4351	0.2601	0.0754	P
	60	60	72	66	72	N
DIP	<b><i>-0.76875</i></b>	<b><i>-0.77338</i></b>	<b><i>-0.84381</i></b>	<b><i>-0.83783</i></b>	-0.11284	$r_s$
	<b><i>0.0001</i></b>	<b><i>0.0001</i></b>	<b><i>0.0001</i></b>	<b><i>0.0001</i></b>	0.3453	P
	60	60	72	66	72	N
DIN	<b><i>-0.6857</i></b>	<b><i>-0.68645</i></b>	<b><i>-0.77671</i></b>	<b><i>-0.81424</i></b>	-0.32777	$r_s$
	<b><i>0.0001</i></b>	<b><i>0.0001</i></b>	<b><i>0.0001</i></b>	<b><i>0.0001</i></b>	0.0049	P
	60	60	72	66	72	N

KEY: PCT\_T2 = SAVH/Tier II area \* 100, PCT\_T3 = SAVH/Tier III area \* 100, SAVH = SAV hectares for same year as water quality data; LAGSAVH = SAV hectares for following year; CHGSAVH = change in SAV hectares from that year to next;  $K_d$  = light attenuation; PLW = percent light through water column; PLL = percent light at the leaf; TSS = total suspended solids; CHLA = chlorophyll  $\alpha$ ; DIP = dissolved inorganic phosphorus; DIN = dissolved inorganic nitrogen;  $r_s$  = Spearman rank correlation coefficient, P = statistical probability (*significant shown in italics if  $P < 0.05$* ) and N = sample size, number of segment-year combinations. Expected correlations: Negative for all parameters (more pollution, less SAV) except PLL/PLW (more light, more SAV). **Correlations in bold were significant and  $> +/- 0.5$ .**

**TABLE E-8.** Polyhaline Spearman rank correlations between water quality from Chesapeake Bay Program midchannel water quality stations over the spring, and measures of SAV area over Chesapeake Bay Program segments, adding half tidal range for PLW and PLL.

Parameter	Polyhaline (March-May)					KEY
	PCT_T2	PCT_T3	SAVH	LAGSAVH	CHGSAVH	
<b>K<sub>d</sub></b>	<i>-0.48878</i>	<i>-0.49618</i>	<b><i>-0.56852</i></b>	<b><i>-0.61765</i></b>	-0.0433	r <sub>s</sub>
	<i>0.0001</i>	<i>0.0001</i>	<b><i>0.0001</i></b>	<b><i>0.0001</i></b>	0.718	P
	<i>60</i>	<i>60</i>	<b><i>72</i></b>	<b><i>66</i></b>	<i>72</i>	N
<b>PLW(1+)</b>	<i>0.40515</i>	<i>0.40959</i>	<b><i>0.50063</i></b>	<b><i>0.54172</i></b>	0.0179	r <sub>s</sub>
	<i>0.0013</i>	<i>0.0012</i>	<b><i>0.0001</i></b>	<b><i>0.0001</i></b>	0.8839	P
	<i>60</i>	<i>60</i>	<b><i>69</i></b>	<b><i>63</i></b>	<i>69</i>	N
<b>PLL(1+)</b>	<i>0.47708</i>	<i>0.48209</i>	<b><i>0.57068</i></b>	<b><i>0.6122</i></b>	0.05376	r <sub>s</sub>
	<i>0.0001</i>	<i>0.0001</i>	<b><i>0.0001</i></b>	<b><i>0.0001</i></b>	0.6608	P
	<i>60</i>	<i>60</i>	<b><i>69</i></b>	<b><i>63</i></b>	<i>69</i>	N
<b>TSS</b>	-0.14236	-0.14853	-0.20028	-0.14948	0.09456	r <sub>s</sub>
	0.2779	0.2574	0.0989	0.2423	0.4396	P
	<i>60</i>	<i>60</i>	<i>69</i>	<i>63</i>	<i>69</i>	N
<b>CHLA</b>	-0.22172	-0.21318	-0.23034	<i>-0.24705</i>	0.003	r <sub>s</sub>
	0.0915	0.105	0.0551	<i>0.0491</i>	0.9803	P
	<i>59</i>	<i>59</i>	<i>70</i>	<i>64</i>	<i>70</i>	N
<b>DIP</b>	<b><i>-0.63264</i></b>	<b><i>-0.63744</i></b>	<b><i>-0.65205</i></b>	<b><i>-0.60465</i></b>	0.00106	r <sub>s</sub>
	<b><i>0.0001</i></b>	<b><i>0.0001</i></b>	<b><i>0.0001</i></b>	<b><i>0.0001</i></b>	0.9929	P
	<b><i>60</i></b>	<b><i>60</i></b>	<b><i>72</i></b>	<b><i>66</i></b>	<i>72</i>	N
<b>DIN</b>	-0.2457	-0.24253	<i>-0.34673</i>	<i>-0.43067</i>	<i>-0.31952</i>	r <sub>s</sub>
	0.0585	0.0619	<i>0.0028</i>	<i>0.0003</i>	<i>0.0062</i>	P
	<i>60</i>	<i>60</i>	<i>72</i>	<i>66</i>	<i>72</i>	N

KEY: PCT\_T2 = SAVH/Tier II area \* 100, PCT\_T3 = SAVH/Tier III area \* 100, SAVH = SAV hectares for same year as water quality data; LAGSAVH = SAV hectares for following year; CHGSAVH = change in SAV hectares from that year to next; K<sub>d</sub> = light attenuation; PLW = percent light through water column; PLL = percent light at the leaf; TSS = total suspended solids; CHLA = chlorophyll *a*; DIP = dissolved inorganic phosphorus; DIN = dissolved inorganic nitrogen; r<sub>s</sub> = Spearman rank correlation coefficient, P = statistical probability (*significant shown in italics if P < 0.05*) and N = sample size, number of segment-year combinations. Expected correlations: Negative for all parameters (more pollution, less SAV) except PLL/PLW (more light, more SAV). **Correlations in bold were significant and > +/- 0.5.**

**TABLE E-9.** Spearman rank correlations between water quality over the whole growing season and eighted mean SAV depth and percent of SAV in depth categories for tidal fresh salinity regime, using  $Z = 1 + \text{half tidal range}$ .

Parameter	Tidal fresh (April-October)					KEY
	SAVDEP	PCT05	PCT1	PCT2	PCTGT2	
$K_d$	<i>-0.47626</i>	<i>0.47844</i>	<b><i>-0.58376</i></b>	<i>-0.42696</i>	<i>-0.42813</i>	$r_s$
	<i>0.0004</i>	<i>0.0004</i>	<b><i>0.0001</i></b>	<i>0.0018</i>	<i>0.0017</i>	P
	51	51	51	51	51	N
PLW(1+)	<i>0.49962</i>	<i>-0.48311</i>	<b><i>0.56117</i></b>	<i>0.46107</i>	<i>0.44245</i>	$r_s$
	<i>0.0002</i>	<i>0.0003</i>	<b><i>0.0001</i></b>	<i>0.0007</i>	<i>0.0011</i>	P
	51	51	51	51	51	N
PLL(1+)	<b><i>0.50518</i></b>	<i>-0.48792</i>	<b><i>0.55483</i></b>	<i>0.46906</i>	<i>0.4318</i>	$r_s$
	<b><i>0.0002</i></b>	<i>0.0003</i>	<b><i>0.0001</i></b>	<i>0.0005</i>	<i>0.0016</i>	P
	51	51	51	51	51	N
TSS	<i>-0.38127</i>	<i>0.40659</i>	<i>-0.53772</i>	<i>-0.32953</i>	<i>-0.27687</i>	$r_s$
	<i>0.0058</i>	<i>0.0031</i>	<b><i>0.0001</i></b>	<i>0.0182</i>	<i>0.0492</i>	P
	51	51	51	51	51	N
CHLA	<i>-0.21739</i>	<i>0.31774</i>	<b><i>-0.62429</i></b>	<i>-0.15157</i>	<i>-0.08892</i>	$r_s$
	<i>0.1254</i>	<i>0.0231</i>	<b><i>0.0001</i></b>	<i>0.2883</i>	<i>0.5349</i>	P
	51	51	51	51	51	N
DIP	<i>0.01297</i>	<i>-0.1085</i>	<i>0.22781</i>	<i>-0.05524</i>	<i>-0.15452</i>	$r_s$
	<i>0.928</i>	<i>0.4485</i>	<i>0.1079</i>	<i>0.7002</i>	<i>0.279</i>	P
	51	51	51	51	51	N
DIN	<i>0.42068*</i>	<i>-0.45362*</i>	<i>0.57813*</i>	<i>0.36986*</i>	<i>0.43815*</i>	$r_s$
	<i>0.0021</i>	<i>0.0008</i>	<i>0.0001</i>	<i>0.0076</i>	<i>0.0013</i>	P
	51	51	51	51	51	N

KEY: SAVDEP = weighted mean overall depth, PCT05 = % in water < 0.5 m deep, PCT1 = % in water 0.5-1 m deep, PCT2 = % in water 1-2 m deep, PCTGT2 = % in water > 2 m deep,  $K_d$  = light attenuation, PLW = percent light through water column, PLL = percent light at the leaf, TSS = total suspended solids, CHLA = chlorophyll  $a$ , DIP = dissolved inorganic phosphorus, DIN = dissolved inorganic nitrogen,  $r_s$  = Spearman rank correlation coefficient, P = statistical probability (*significant shown in italics if  $P < 0.05$* ) and N = sample size, number of segment-year combinations. \* Spurious correlations (significant but not in the expected direction). Expected correlations: Negative with all parameters except positive for PLL and PLW; opposite for PCT05, since worse water quality should yield more SAV in the shallowest category, because it can't grow in deeper water. **Correlations in bold were significant and  $> +/- 0.5$ .**

**TABLE E-10.** Spearman rank correlations between water quality over the whole growing season and weighted mean SAV depth and percent of SAV in depth categories for oligohaline salinity regime, using  $Z = 1 + \text{half tidal range}$ .

Parameter	Oligohaline (April-October)					KEY
	SAVDEP	PCT05	PCT1	PCT2	PCTGT2	
<b>K<sub>d</sub></b>	<i>-0.35629</i>	<i>0.35745</i>	<i>-0.27214</i>	<i>-0.38803</i>	<i>-0.28371</i>	<i>r<sub>s</sub></i>
	<i>0.0011</i>	<i>0.0011</i>	<i>0.014</i>	<i>0.0003</i>	<i>0.0103</i>	<i>P</i>
	<i>81</i>	<i>81</i>	<i>81</i>	<i>81</i>	<i>81</i>	<i>N</i>
<b>PLW(1+)</b>	<i>0.42664</i>	<i>-0.4328</i>	<i>0.36788</i>	<i>0.45601</i>	<i>0.35704</i>	<i>r<sub>s</sub></i>
	<i>0.0001</i>	<i>0.0001</i>	<i>0.0008</i>	<i>0.0001</i>	<i>0.0011</i>	<i>P</i>
	<i>80</i>	<i>80</i>	<i>80</i>	<i>80</i>	<i>80</i>	<i>N</i>
<b>PLL(1+)</b>	<i>0.40273</i>	<i>-0.40895</i>	<i>0.3568</i>	<i>0.43501</i>	<i>0.3061</i>	<i>r<sub>s</sub></i>
	<i>0.0002</i>	<i>0.0002</i>	<i>0.0012</i>	<i>0.0001</i>	<i>0.0058</i>	<i>P</i>
	<i>80</i>	<i>80</i>	<i>80</i>	<i>80</i>	<i>80</i>	<i>N</i>
<b>TSS</b>	<i>-0.31315</i>	<i>0.31859</i>	<i>-0.27976</i>	<i>-0.34897</i>	<i>-0.26981</i>	<i>r<sub>s</sub></i>
	<i>0.0047</i>	<i>0.004</i>	<i>0.012</i>	<i>0.0015</i>	<i>0.0155</i>	<i>P</i>
	<i>80</i>	<i>80</i>	<i>80</i>	<i>80</i>	<i>80</i>	<i>N</i>
<b>CHLA</b>	<i>-0.44713</i>	<i>0.45038</i>	<i>-0.354</i>	<i>-0.46935</i>	<i>-0.37281</i>	<i>r<sub>s</sub></i>
	<i>0.0001</i>	<i>0.0001</i>	<i>0.0012</i>	<i>0.0001</i>	<i>0.0006</i>	<i>P</i>
	<i>81</i>	<i>81</i>	<i>81</i>	<i>81</i>	<i>81</i>	<i>N</i>
<b>DIP</b>	<i>0.27848*</i>	<i>-0.28978*</i>	<i>0.27651*</i>	<i>0.26846*</i>	<i>0.46319*</i>	<i>r<sub>s</sub></i>
	<i>0.0118</i>	<i>0.0087</i>	<i>0.0125</i>	<i>0.0154</i>	<i>0.0001</i>	<i>P</i>
	<i>81</i>	<i>81</i>	<i>81</i>	<i>81</i>	<i>81</i>	<i>N</i>
<b>DIN</b>	<i>0.50124*</i>	<i>-0.51739*</i>	<i>0.47143*</i>	<i>0.46858*</i>	<i>0.34033*</i>	<i>r<sub>s</sub></i>
	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0019</i>	<i>P</i>
	<i>81</i>	<i>81</i>	<i>81</i>	<i>81</i>	<i>81</i>	<i>N</i>

KEY: SAVDEP = weighted mean overall depth, PCT05 = % in water < 0.5 m deep, PCT1 = % in water 0.5-1 m deep, PCT2 = % in water 1-2 m deep, PCTGT2 = % in water > 2 m deep, K<sub>d</sub> = light attenuation, PLW = percent light through water column, PLL = percent light at the leaf, TSS = total suspended solids, CHLA = chlorophyll *a*, DIP = dissolved inorganic phosphorus, DIN = dissolved inorganic nitrogen, r<sub>s</sub> = Spearman rank correlation coefficient, P = statistical probability (*significant shown in italics if P < 0.05*) and N = sample size, number of segment-year combinations. \* Spurious correlations (significant but not in the expected direction). Expected correlations: Negative with all parameters except positive for PLL and PLW; opposite for PCT05, since worse water quality should yield more SAV in the shallowest category, because it can't grow in deeper water.

**TABLE E-11.** Spearman rank correlations between water quality over the whole growing season and weighted mean SAV depth and percent of SAV in depth categories for mesohaline salinity regime, using  $Z = 1 + \text{half tidal range}$ .

Parameter	Mesohaline (April-October)					KEY
	SAVDEP	PCT05	PCT1	PCT2	PCTGT2	
<b>K<sub>d</sub></b>	-0.10712	0.0374	0.02493	<i>-0.33465</i>	<i>-0.33469</i>	r <sub>s</sub>
	0.1361	0.6037	0.7294	<i>0.0001</i>	<i>0.0001</i>	P
	195	195	195	195	195	N
<b>PLW(1+)</b>	0.0638	0.00419	-0.0649	<i>0.29527</i>	<i>0.34068</i>	r <sub>s</sub>
	0.3755	0.9536	0.3674	<i>0.0001</i>	<i>0.0001</i>	P
	195	195	195	195	195	N
<b>PLL(1+)</b>	0.06224	0.00508	-0.06511	<i>0.29925</i>	<i>0.33304</i>	r <sub>s</sub>
	0.3873	0.9438	0.3658	<i>0.0001</i>	<i>0.0001</i>	P
	195	195	195	195	195	N
<b>TSS</b>	<i>0.25752*</i>	<i>-0.30892*</i>	<i>0.36127*</i>	0.01639	-0.04042	r <sub>s</sub>
	<i>0.0003</i>	<i>0.0001</i>	<i>0.0001</i>	0.8201	0.5748	P
	195	195	195	195	195	N
<b>CHLA</b>	<i>-0.18377</i>	<i>0.16851</i>	<i>-0.15538</i>	<i>-0.20927</i>	<i>-0.12626</i>	r <sub>s</sub>
	<i>0.0101</i>	<i>0.0185</i>	<i>0.0301</i>	<i>0.0033</i>	0.0786	P
	195	195	195	195	195	N
<b>DIP</b>	<i>-0.18847</i>	<i>0.2013</i>	<i>-0.23045</i>	<i>-0.1571</i>	<i>-0.07433</i>	r <sub>s</sub>
	<i>0.0083</i>	<i>0.0048</i>	<i>0.0012</i>	<i>0.0283</i>	0.3018	P
	195	195	195	195	195	N
<b>DIN</b>	<i>-0.28457</i>	<i>0.30415</i>	<i>-0.32576</i>	<i>-0.1818</i>	<i>-0.20125</i>	r <sub>s</sub>
	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.011</i>	<i>0.0048</i>	P
	195	195	195	195	195	N

KEY: SAVDEP = weighted mean overall depth, PCT05 = % in water < 0.5 m deep, PCT1 = % in water 0.5-1 m deep, PCT2 = % in water 1-2 m deep, PCTGT2 = % in water > 2 m deep, r<sub>s</sub> = Spearman rank correlation coefficient, P = statistical probability (*significant shown in italics if P < 0.05*) and N = sample size, number of segment-year combinations. \* Spurious correlations (*significant but not in the expected direction*). Expected correlations: Negative with all parameters except positive for PLL and PLW; opposite for PCT05, since worse water quality should yield more SAV in the shallowest category, because it can't grow in deeper water.

**TABLE E-12.** Spearman rank correlations between water quality over the whole growing season and weighted mean SAV depth and percent of SAV in depth categories for polyhaline salinity regime, using  $Z = 1 + \text{half tidal range}$ .

Parameter	Polyhaline (March-May, September-November)					KEY
	SAVDEP	PCT05	PCT1	PCT2	PCTGT2	
$K_d$	<i>-0.40593</i>	<i>0.46252</i>	<i>-0.49876</i>	<i>-0.20957</i>	<i>-0.31768</i>	$r_s$
	<i>0.0026</i>	<i>0.0005</i>	<i>0.0001</i>	0.132	<i>0.0205</i>	P
	53	53	53	53	53	N
PLW(1+)	<i>0.39089</i>	<i>-0.46275</i>	<b><i>0.52564</i></b>	0.20059	0.21888	$r_s$
	<i>0.0038</i>	<i>0.0005</i>	<b><i>0.0001</i></b>	0.1498	0.1153	P
	53	53	<b>53</b>	53	53	N
PLL(1+)	<i>0.45614</i>	<b><i>-0.51691</i></b>	<b><i>0.57619</i></b>	0.24712	<i>0.27536</i>	$r_s$
	<i>0.0006</i>	<b><i>0.0001</i></b>	<b><i>0.0001</i></b>	0.0744	<i>0.046</i>	P
	53	<b>53</b>	<b>53</b>	53	53	N
TSS	<i>-0.04574</i>	0.09946	<i>-0.15047</i>	<i>-0.05782</i>	0.0346	$r_s$
	0.745	0.4786	0.2822	0.6809	0.8057	P
	53	53	53	53	53	N
CHLA	<i>-0.22067</i>	0.24866	<i>-0.22397</i>	<i>-0.23647</i>	<i>-0.0341</i>	$r_s$
	0.1123	0.0726	0.1069	0.0882	0.8085	P
	53	53	53	53	53	N
DIP	<b><i>-0.54431</i></b>	<i>0.49792</i>	<i>-0.48986</i>	<i>-0.42408</i>	<b><i>-0.60252</i></b>	$r_s$
	<b><i>0.0001</i></b>	<i>0.0001</i>	<i>0.0002</i>	<i>0.0016</i>	<b><i>0.0001</i></b>	P
	<b>53</b>	53	53	53	<b>53</b>	N
DIN	<b><i>-0.58385</i></b>	<i>0.49099</i>	<i>-0.42222</i>	<b><i>-0.55344</i></b>	<i>-0.55444</i>	$r_s$
	<b><i>0.0001</i></b>	<i>0.0002</i>	<i>0.0016</i>	<b><i>0.0001</i></b>	<i>0.0001</i>	P
	<b>53</b>	53	53	<b>53</b>	53	N

KEY: SAVDEP = weighted mean overall depth, PCT05 = % in water < 0.5 m deep, PCT1 = % in water 0.5-1 m deep, PCT2 = % in water 1-2 m deep, PCTGT2 = % in water > 2 m deep,  $K_d$  = light attenuation, PLW = percent light through water column, PLL = percent light at the leaf, TSS = total suspended solids, CHLA = chlorophyll  $a$ , DIP = dissolved inorganic phosphorus, DIN = dissolved inorganic nitrogen,  $r_s$  = Spearman rank correlation coefficient, P = statistical probability (significant shown in italics if  $P < 0.05$ ) and N = sample size, number of segment-year combinations. Expected correlations: Negative with all parameters except positive for PLL and PLW; opposite for PCT05, since worse water quality should yield more SAV in the shallowest category, because it can't grow in deeper water. Correlations in bold were significant and > +/- 0.5.