

APPENDIX B

ANOVA TABLES FOR TRENDS AND LOCATION EFFECTS

## APPENDIX B

### ANOVA TABLES FOR TRENDS AND LOCATION EFFECTS

This appendix contains tables of the majority of statistical analyses performed during this study. These analyses included Analysis of Variance (ANOVA) for location effects, ANOVA associated with regression analysis of tissue concentrations over time (Model I or simple regression), and for releases by year (Model II). In some analyses, log transformation may have eliminated some negative concentrations, thereby introducing a bias into the analysis. Similar analyses with nontransformed data produced similar results as reported here (i.e., if an ANOVA was not significant with transformed data, it also was not significant with transformed data). See Data Analysis section for additional discussion.

**TABLE B.1.** Regression Analysis Tables for Trends in Log-Transformed Median <sup>137</sup>Cs Concentrations in Bass Muscle Sampled from F Slough

	DF	ANOVA Model I Regression <u>Sum of Squares</u>	<u>Mean Square</u>	<u>F-Value</u>	<u>P-Value</u>
Regression	1	0.467	0.467	12.024	0.010
Residual	7	0.272	0.039		
Total	8	0.739			

	DF	ANOVA Second-Order Regression <u>Sum of Squares</u>	<u>Mean Square</u>	<u>F-Value</u>	<u>P-Value</u>
Regression	2	0.544	0.272	8.375	0.018
Residual	6	0.195	0.240		
Total	8	0.739			

**TABLE B.2.** ANOVA for Model II Regression of Log-Transformed Median Concentrations of <sup>137</sup>Cs in Bass Muscle and Annual Releases of <sup>137</sup>Cs

	DF	ANOVA Model II Regression <u>Sum of Squares</u>	<u>Mean Square</u>	<u>F-Value</u>	<u>P-Value</u>
Regression	1	0.01436	0.01436	2.166	0.185
Residual	7	0.04639	0.00663		
Total	8	0.06075			

**TABLE B.3.** Regression Analysis Tables for Trends in Log-Transformed Median <sup>90</sup>Sr Concentrations in Bass Carcass Sampled from F Slough

	DF	ANOVA Model I Regression <u>Sum of Squares</u>	<u>Mean Square</u>	<u>F-Value</u>	<u>P-Value</u>
Regression	1	0.016	0.016	0.182	0.683
Residual	7	0.602	0.086		
Total	8	0.618			

	DF	ANOVA Second-Order Regression <u>Sum of Squares</u>	<u>Mean Square</u>	<u>F-Value</u>	<u>P-Value</u>
Regression	2	0.544	0.0851	1.142	0.380
Residual	6	0.195	0.0746		
Total	8	0.739			

**TABLE B.4.** Regression Analysis Tables for Trends in Log-Transformed Median <sup>90</sup>Sr Concentrations in Bass Carcass Sampled from F Slough and Annual Releases of <sup>90</sup>Sr

	DF	ANOVA Model I Regression <u>Sum of Squares</u>	<u>Mean Square</u>	<u>F-Value</u>	<u>P-Value</u>
Regression	1	0.0039	0.0039	0.0447	0.839
Residual	7	0.6136	0.0877		
Total	8	0.6175			

**TABLE B.5.** Regression Analysis Tables for Trends in Log-Transformed Median <sup>90</sup>Sr Concentrations in Whitefish Muscle Sampled from Priest Rapids and 100-N to 100-D Areas

	DF	ANOVA Model I Regression		F-Value	P-Value
		Sum of Squares	Mean Square		
Regression	1	0.1702	1.025	8.203	0.024
Residual	7	0.4473	0.125		
Total	8	0.6175			

  

	DF	ANOVA Second-Order Regression		F-Value	P-Value
		Sum of Squares	Mean Square		
Regression	2	1.053	0.527	3.732	0.089
Residual	6	0.847	0.141		
Total	8	1.900			

**TABLE B.6.** ANOVA for Model II Regression of Log-Transformed Median Concentrations of <sup>90</sup>Sr in Whitefish Muscle and Annual Releases of <sup>90</sup>Sr from Priest Rapids and 100-N to 100-D Areas

	DF	ANOVA Model II Regression		F-Value	P-Value
		Sum of Squares	Mean Square		
Regression	1	0.8532	0.8532	5.706	0.048
Residual	7	1.0468	0.1495		
Total	8	1.8999			

**TABLE B.7.** Regression Analysis Tables for Trends in Log-Transformed Median <sup>137</sup>Cs Concentrations in Whitefish Muscle Sampled from Priest Rapids and 100-N to 100-D Areas

	DF	ANOVA Model I Regression		F-Value	P-Value
		Sum of Squares	Mean Square		
Regression	1	0.0165	0.0165	0.530	0.485
Residual	9	0.2803	0.0311		
Total	10	0.2968			

  

	DF	ANOVA Second-Order Regression		F-Value	P-Value
		Sum of Squares	Mean Square		
Regression	2	0.0313	0.0156	0.4717	0.640
Residual	8	0.2655	0.0332		
Total	10	0.2968			

**TABLE B.8.** ANOVA for Model II Regression of Log-Transformed Median Concentrations of <sup>137</sup>Cs in Whitefish Muscle and Annual Releases of <sup>137</sup>Cs from Priest Rapids and 100-N to 100-D Areas

	DF	ANOVA Model I Regression		F-Value	P-Value
		Sum of Squares	Mean Square		
Regression	1	0.0606	0.0606	2.3089	0.163
Residual	9	0.2362	0.0264		
Total	10	0.2968			

**TABLE B.9.** Regression Analyses for Trends in Log-Transformed Median <sup>90</sup>Sr Concentrations in Whitefish Carcass Collected from Priest Rapids and 100-N to 100-D Areas

	ANOVA Model I Regression				
	<u>DF</u>	<u>Sum of Squares</u>	<u>Mean Square</u>	<u>F-Value</u>	<u>P-Value</u>
Regression	1	0.335	0.335	12.270	0.007
Residual	9	0.246	0.027		
Total	10	0.580			

  

	ANOVA Second-Order Regression				
	<u>DF</u>	<u>Sum of Squares</u>	<u>Mean Square</u>	<u>F-Value</u>	<u>P-Value</u>
Regression	2	0.449	0.224	13.623	0.003
Residual	8	0.132	0.016		
Total	10	0.580			

**TABLE B.10.** ANOVA for Model II Regression of Log-Transformed Median Concentrations of <sup>90</sup>Sr in Whitefish Carcass and Annual Releases of <sup>90</sup>Sr

	ANOVA Model II Regression				
	<u>DF</u>	<u>Sum of Squares</u>	<u>Mean Square</u>	<u>F-Value</u>	<u>P-Value</u>
Regression	1	0.341	0.341	12.831	0.006
Residual	7	0.239	0.027		
Total	8	0.580			

**TABLE B.11.** ANOVA of Log-transformed <sup>137</sup>Cs Concentrations in Bass Muscle Sampled from F Slough and Sunnyside, 1990 Through 1992

	<u>DF</u>	<u>Sum of Squares</u>	<u>Mean Square</u>	<u>F-Value</u>	<u>P-Value</u>
Location	1	0.110	0.110	0.670	0.4233
Residual	19	3.119	0.164		

**TABLE B.12.** ANOVA of Log-Transformed <sup>90</sup>Sr Concentrations in Bass Carcass Sampled from F Slough and Sunnyside, 1990 Through 1992

	<u>DF</u>	<u>Sum of Squares</u>	<u>Mean Square</u>	<u>F-Value</u>	<u>P-Value</u>
Location	1	2.331	2.331	31.002	<0.0001
Residual	27	2.030	0.075		

**TABLE B.13.** Scheffé's Comparisons of Log-Transformed Means of <sup>90</sup>Sr in Bass Carcass Collected from F Slough and Sunnyside, 1990 Through 1992

<u>Location</u>	<u>N</u>	<u>Mean pCi/g</u>	<u>Log Mean</u>	<u>Mean Difference</u>	<u>Scheffé's P-Value</u>
F Slough	10	0.025	-1.639	> 0.596	<0.0001
Sunnyside	19	0.007	-2.235		

**TABLE B.14.** ANOVA of Log-Transformed <sup>90</sup>Sr Concentrations in Bass Carcass Sampled from F Slough, 1983 Through 1992

	<u>DF</u>	<u>Sum of Squares</u>	<u>Mean Square</u>	<u>F-Value</u>	<u>P-Value</u>
Year	8	4.046	0.506	3.291	0.0064
Residual	36	5.532	0.154		

**TABLE B.15.** ANOVA of Log-Transformed <sup>137</sup>Cs Concentrations in Carp Muscle by Location, 1990 Through 1992

	<u>DF</u>	<u>Sum of Squares</u>	<u>Mean Square</u>	<u>F-Value</u>	<u>P-Value</u>
Location	2	1.243	0.622	3.462	0.0444
Residual	30	5.386	0.180		

**TABLE B.16.** ANOVA of Log-Transformed <sup>137</sup>Cs Concentrations in Carp Muscle by Year and Location, 1990 Through 1992

	<u>DF</u>	<u>Sum of Squares</u>	<u>Mean Square</u>	<u>F-Value</u>	<u>P-Value</u>
<u>Vantage</u>					
Year	1	0.002	0.002	0.007	0.9347
Residual	11	3.407	0.310		
<u>100-N to 100-D Area</u>					
Year	2	0.102	0.051	0.282	0.7612
Residual	8	1.440	0.180		
<u>300 Area</u>					
Year	1	0.039	0.039	0.696	0.4317
Residual	7	0.396	0.057		

**TABLE B.17.** ANOVA of Log-transformed <sup>90</sup>Sr Concentrations in Carp Carcass by Location, 1990 Through 1992

	<u>DF</u>	<u>Sum of Squares</u>	<u>Mean Square</u>	<u>F-Value</u>	<u>P-Value</u>
Location	2	1.289	0.644	3.734	0.0352
Residual	31	5.350	0.173		

**TABLE B.18.** ANOVA of Log-Transformed <sup>90</sup>Sr Concentrations in Carp Carcass by Year and Location, 1990 Through 1992

	<u>DF</u>	<u>Sum of Squares</u>	<u>Mean Square</u>	<u>F-Value</u>	<u>P-Value</u>
<u>Vantage</u>					
Year	1	0.094	0.094	4.408	0.0597
Residual	11	0.234	0.021		
<u>100-N to 100-D Area</u>					
Year	2	0.392	0.196	0.396	0.6853
Residual	8	3.954	0.494		
<u>300 Area</u>					
Year	1	0.061	0.061	0.788	0.4006
Residual	8	0.616	0.077		

**TABLE B.19.** ANOVA of Log-Transformed <sup>90</sup>Sr Concentrations in Whitefish Muscle by Location, 1988 Through 1992

	<u>DF</u>	<u>Sum of Squares</u>	<u>Mean Square</u>	<u>F-Value</u>	<u>P-Value</u>
Location	3	7.980	2.660	7.010	0.0003
Residual	73	27.702	0.379		

**TABLE B.20.** ANOVA of Log-Transformed <sup>90</sup>Sr Concentrations in Whitefish Muscle by Year and Location, 1982 Through 1992

	<u>DF</u>	<u>Sum of Squares</u>	<u>Mean Square</u>	<u>F-Value</u>	<u>P-Value</u>
<u>Priest Rapids</u>					
Year	8	4.077	0.510	3.442	0.0078
Residual	26	3.850	0.148		
<u>100-N to 100-D Area</u>					
Year	10	10.248	1.025	5.740	<0.0001
Residual	74	13.212	0.179		
<u>300 Area</u>					
Year	2	0.168	0.084	0.185	0.8322
Residual	22	9.970	0.453		

**TABLE B.21.** ANOVA of Log-Transformed <sup>137</sup>Cs Concentrations in Whitefish Muscle by Location, 1988 Through 1992

	<u>DF</u>	<u>Sum of Squares</u>	<u>Mean Square</u>	<u>F-Value</u>	<u>P-Value</u>
Location	3	1.087	0.362	2.571	0.061
Residual	68	9.581	0.141		

**TABLE B.22.** ANOVA of Log-Transformed  $^{137}\text{Cs}$  Concentrations in Whitefish Muscle by Year and Location, 1982 Through 1992

	<u>DF</u>	<u>Sum of Squares</u>	<u>Mean Square</u>	<u>F-Value</u>	<u>P-Value</u>
<u>Priest Rapids (1982-1990)</u>					
Year	8	1.506	0.188	0.899	0.533
Residual	25	5.239	0.210		
<u>100-N to 100-D Area (1982-1992)</u>					
Year	10	1.177	0.118	0.900	0.537
Residual	84	10.981	0.131		
<u>300 Area (1990-1992)</u>					
Year	2	0.381	0.190	1.273	0.318
Residual	11	1.645	0.150		

**TABLE B.23.** ANOVA of Log-Transformed  $^{90}\text{Sr}$  Concentrations in Whitefish Carcass by Location, 1988 Through 1992

	<u>DF</u>	<u>Sum of Squares</u>	<u>Mean Square</u>	<u>F-Value</u>	<u>P-Value</u>
Location	3	1.186	0.395	7.416	0.0003
Residual	68	3.199	0.053		

**TABLE B.24.** ANOVA of Log-Transformed  $^{90}\text{Sr}$  Concentrations in Whitefish Carcass by Year and Location, 1982 Through 1992

	<u>DF</u>	<u>Sum of Squares</u>	<u>Mean Square</u>	<u>F-Value</u>	<u>P-Value</u>
<u>Priest Rapids (1982-90)</u>					
Year	8	1.103	0.138	4.202	0.0017
Residual	31	1.017	0.033		
<u>100-N to 100-D Area (1982-91)</u>					
Year	9	4.465	0.447	11.825	<0.0001
Residual	77	3.210	0.038		
<u>300 Area (1990 and 1992)</u>					
Year	2	0.108	0.054	1.196	0.3314
Residual	14	0.634	0.045		

**TABLE B.25.** Yearly Comparison of Statistically Significant Differences by Fisher's PLSD Test of  $^{90}\text{Sr}$  in Whitefish Carcass (Log-Transformed Mean) Collected at Priest Rapids and the 100-N to 100-D Areas

		Priest Rapids								
		82	83	84	85	86	87	88	89	90
82	--									
83	>>(a)--									
84	>>> ns(b)--									
85	>>> ns ns --									
86	>> ns ns ns --									
87	> ns ns ns ns --									
88	>>> ns ns ns ns --									
89	>> ns ns ns ns ns --									
90	ns ns <(c) << ns ns << <									

  

		100-N to 100-D Area										
		82	83	84	85	86	87	88	89	90	91	92
82	--											
83	ns --											
84	ns > --											
85	>> >>> > --											
86	ns > ns ns --											
87	ns ns ns <<< < --											
88	ns ns ns <<< ns ns --											
89	<< ns <<< <<< <<< < <											
90	<<< << <<< <<< <<< <<< <<< ns --											
91	<<< <<< <<< <<< <<< <<< <<< < ns --											
92	<<< << <<< <<< <<< << << ns ns > --											

- (a) Read from top down, i.e., 1982 (column heading) was significantly less than 1983 (row heading) at  $P \leq 0.01$ .
- (b) Not Significant = ns; symbols indicate: < or > at  $P \leq 0.05$ , << or >> at  $P \leq 0.01$ , and <<< or >>> at  $P \leq 0.001$ .
- (c) Read from top down, i.e., 1984 (column heading) was significantly greater than 1990 (row heading) at  $P \leq 0.05$ .

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