

Table 3-16: Sedimentation Rates (cm/y) Determined Using Excess ^{210}Pb and ^{137}Cs . Age-Depth Relationship Based on ^{210}Pb Sedimentation Rate

Station ID	Sedimentation Rate (cm/y)		Depth 1980 (cm)	Depth 1950 (cm)	Depth 1920 (cm)
	^{210}Pb	^{137}Cs			
97-Z0-F1	ND	--	NA	NA	NA
98-Z0-F1	1.3	1.5	22	62	101
97-Z0-F5	0.21	0.24	3	9	15
97-Z0-F6	0.10	0.10	2	5	8
97-Z0-F8	0.27	--	5	13	21
97-Z1-F1	0.24	0.21	4	11	18
97-Z1-F2*	--	0.27	4	10	21
98-Z1-R3B	0.20	0.20	4	10	16
97-Z2-F1	1.3	--	22	[61]	[100]
97-Z2-F2	0.62	0.65	10	29	[48]
98-Z2-R16	0.5-0.7	0.7-0.8	--	--	--
97-Z3-F1	0.60	0.61	10	28	[37]
97-Z3-F2	0.44	0.45	7	21	[32]
98-Z4-F4	1.0 (0-20 cm)	0.84	18	34	[49]
	0.52 (20-43 cm)				

Notes:

[] = depth exceeded core length

ND = not determined, sedimentation rate too fast

NA = not applicable

*Age-depth relationship based on ^{137}Cs sedimentation rate

Table 3-17: Means and Standard Deviations for Total Organic Carbon (TOC), Sand, Silt and Clay Values for Sediment Cores from Zone 0, 1, 2, 3 and 4 in Outermost Cook Inlet and the Shelikof Strait

Station ID	TOC (%)	Sand (%)	Silt (%)	Clay (%)
97-Z0-F1	1.06 ±0.08	6.0 ±3.3	43.4 ±12.5	50.6 ±11.9
98-Z0-F1	1.04 ±0.13	13.0 ±9.6	64.7 ±7.8	22.4 ±7.6
97-Z0-F5	0.44 ±0.03	30.6 ±5.7	25.6 ±15.0	43.9 ±15.9
97-Z0-F6	0.34 ±0.04	50.5 ±6.9	17.1 ±12.5	32.4 ±11.2
98-Z0-F8	0.36 ±0.03	53.5 ±4.2	30.2 ±4.7	16.3 ±5.7
97-Z1-F1	0.62 ±0.08	35.8 ±11.0	28.0 ±16.0	36.2 ±15.0
97-Z1-F2	0.75 ±0.12	17.8 ±5.6	34.7 ±16.1	47.6 ±12.0
98-Z1-R3B	0.31 ±0.09	59.6 ±6.1	29.5 ±6.6	10.9 ±4.1
97-Z2-F1	0.78 ±0.04	3.3 ±1.3	34.8 ±10.8	61.9 ±10.8
97-Z2-F2	1.00 ±0.11	1.0 ±0.5	39.0 ±19.5	60.0 ±19.7
98-Z2-R16	0.84 ±0.04	5.1 ±1.8	66.6 ±4.4	28.3 ±5.2
97-Z3-F1	0.83 ±0.06	2.3 ±0.9	44.3 ±15.3	53.5 ±15.1
97-Z3-F2	0.81 ±0.09	1.5 ±0.8	39.3 ±10.4	59.2 ±10.6
98-Z4-F4	1.08 ±0.06	1.7 ±1.7	61.2 ±6.4	37.1 ±6.9
All Samples	0.74 ±0.27	19.5 ±21.7	40.8 ±18.6	39.7 ±19.2
Range 1997-1998	0.21-1.24	0.2-67.8	3.1-79.4	4.7-83.2

Table 3-18: Mean and Standard Deviation of Total Organic Parameters for Sediment Cores from Zones 0, 1, 2 ,3 and 4

Year	Zone	Station	Total Hydrocarbons (ug/g)	Total PAH (ug/g)	Total S&T (ug/g)	TOC (%)
1997	0	F1	46.9 ± 6.71	0.316 ± 0.047	0.082 ± 0.010	1.06± 0.081
1998	0	F1	40.5 ± 7.51	0.357 ± 0.042	0.082 ± 0.011	1.04 ± 0.135
1997	0	F5	11.0 ± 3.63	0.127 ± 0.017	0.016 ± 0.002	0.438 ± 0.026
1997	0	F6	12.1 ± 2.84	0.115 ± 0.015	0.010 ± 0.001	0.344 ± 0.043
1998	0	F8	5.71 ± 1.41	0.109 ± 0.018	0.014 ± 0.002	0.361 ± 0.035
1997	1	F1	19.5 ± 4.95	0.518 ± 0.114	0.021 ± 0.005	0.619 ± 0.081
1997	1	F2	16.6 ± 2.97	0.595 ± 0.079	0.015 ± 0.002	0.757 ± 0.116
1997	2	F1	27.1 ± 6.08	0.427 ± 0.055	0.025 ± 0.003	0.776 ± 0.041
1997	2	F2	36.1 ± 5.76	0.684 ± 0.055	0.022 ± 0.003	1.003 ± 0.114
1998	2	R16	30.6 ± 8.30	0.743 ± 0.034	0.029 ± 0.004	0.844 ± 0.038
1997	3	F1	30.8 ± 10.3	0.493 ± 0.086	0.016 ± 0.004	0.834 ± 0.081
1997	3	F2	24.6 ± 11.9	0.558 ± 0.069	0.021 ± 0.004	0.806 ± 0.086
1998	4	F4	21.3 ± 4.42	0.687 ± 0.041	0.029 ± 0.002	1.08 ± 0.061
	Range		4.3 - 56	0.074 - 0.805	0.008 - 0.100	0.28 - 1.24

Table 3-19: Means and Standard Deviations for Trace Metals, Total Organic Carbon (TOC), Sand, Silt and Clay Values for Sediment Cores from Zone 0, 1, 2, 3 and 4 in Outermost Cook Inlet and the Shelikof Strait (dry weight)

Station ID	Al (%)	Ca (%)	Fe (%)	K (%)	Mg (%)	TOC (%)	Sand (%)	Silt (%)	Clay (%)
97-Z0-F1	8.09	1.51	4.82	1.78	1.67	1.06	6.0	43.4	50.6
98-Z0-F1	7.81	--	4.77	--	--	1.04	13.0	64.7	22.4
97-Z0-F5	7.16	2.28	3.92	1.75	1.47	0.44	30.6	25.6	43.9
97-Z0-F6	7.76	2.38	3.96	1.83	1.53	0.34	50.5	17.1	32.4
98-Z0-F8	7.74	--	3.84	--	--	0.36	53.5	30.2	16.3
97-Z1-F1	7.74	2.17	4.02	1.58	1.47	0.62	35.8	28.0	36.2
97-Z1-F2	6.77	2.31	4.01	1.98	1.56	0.75	17.8	34.7	47.6
98-Z1-R3B	7.67	--	3.32	--	--	0.31	59.6	29.5	10.9
97-Z2-F1	7.43	1.97	4.34	1.63	1.74	0.78	3.3	34.8	61.9
97-Z2-F2	7.30	1.65	4.42	1.68	1.79	1.00	1.0	39.0	60.0
98-Z2-R16	7.98	--	4.48	--	--	0.84	5.1	66.6	28.3
97-Z3-F1	7.00	1.82	4.41	1.76	1.77	0.83	2.3	44.3	53.5
97-Z3-F2	7.24	1.83	4.39	1.78	1.78	0.81	1.5	39.3	59.2
98-Z4-F4	8.13	--	4.48	--	--	1.08	1.7	61.2	37.1
Mean and	7.58	1.99	4.24	1.76	1.64	0.74	19.5	40.8	39.7
Range All	5.94 - 8.50	1.19 - 2.89	2.80 - 5.14	1.35 - 2.14	1.01 - 2.01	0.21 - 1.24	0.2 - 67.8	3.1 - 79.4	4.7 - 83.2

Table 3-19: Means and Standard Deviations for Trace Metals, Total Organic Carbon (TOC), Sand, Silt and Clay Values for Sediment Cores from Zone 0, 1, 2, 3 and 4 in Outermost Cook Inlet and the Shelikof Strait

Station ID	Ag (µg/g)	As (µg/g)	Ba (µg/g)	Be (µg/g)	Cd (µg/g)	Cr (µg/g)	Cu (µg/g)	Hg (µg/g)	Mn (µg/g)
97-Z0-F1	0.13	13.6	837	1.2	0.10	92.9	51.1	0.117	836
98-Z0-F1	0.08	11.3	871	1.3	0.11	90.8	51.6	0.128	812
97-Z0-F5	0.10	7.5	904	1.4	0.12	66.5	36.6	0.057	711
97-Z0-F6	0.06	9.0	832	1.3	0.11	63.8	35.7	0.060	749
98-Z0-F8	0.04	7.5	857	1.4	0.11	65.5	31.4	0.032	753
97-Z1-F1	0.08	6.4	812	1.2	0.12	68.6	32.9	0.048	715
97-Z1-F2	0.08	8.5	806	1.1	0.16	64.2	32.4	0.038	766
98-Z1-R3B	0.06	6.1	808	1.2	0.10	51.9	22.7	0.030	627
97-Z2-F1	0.07	9.0	873	1.2	0.13	75.7	39.1	0.056	797
97-Z2-F2	0.06	8.0	841	1.1	0.19	77.6	38.2	0.063	885
98-Z2-R16	0.05	9.2	917	1.4	0.12	80.6	38.6	0.063	922
97-Z3-F1	0.09	9.7	915	1.4	0.17	75.7	38.6	0.057	938
97-Z3-F2	0.08	8.1	931	1.4	0.18	71.2	39.3	0.053	760
98-Z4-F4	0.06	8.4	880	1.3	0.17	82.2	35.0	0.065	945
Mean and	0.07	8.8	864	1.3	0.14	73.7	37.5	0.063	803
Range All	0.02 - 0.14	5.0 - 20.4	759 - 965	1.0 - 1.6	0.07 - 0.27	34.2 - 98.5	19.1 - 58.3	0.022 - 0.165	554 - 1530

Table 3-19: Means and Standard Deviations for Trace Metals, Total Organic Carbon (TOC), Sand, Silt and Clay Values for Sediment Cores from Zone 0, 1, 2, 3 and 4 in Outermost Cook Inlet and the Shelikof Strait

Station ID	Ni (µg/g)	Pb (µg/g)	Sb (µg/g)	Se (µg/g)	Sn (µg/g)	Tl (µg/g)	V (µg/g)	Zn (µg/g)
97-Z0-F1	47.7	13.4	1.52	0.34	1.78	0.43	173	122
98-Z0-F1	49.8	13.5	1.60	0.48	1.37	0.45	169	118
97-Z0-F5	34.8	12.8	1.05	0.30	1.82	0.46	127	107
97-Z0-F6	31.2	12.0	0.98	0.14	1.72	0.44	131	104
98-Z0-F8	33.1	12.0	0.90	0.21	1.54	0.44	136	93.2
97-Z1-F1	32.0	12.3	0.89	0.44	1.59	0.45	138	102
97-Z1-F2	34.5	12.6	0.90	0.56	1.73	0.42	121	104
98-Z1-R3B	24.3	10.5	0.75	0.24	1.18	0.39	105	81.2
97-Z2-F1	36.0	13.8	1.02	0.28	1.74	0.48	141	118
97-Z2-F2	35.7	14.2	1.00	0.34	1.73	0.46	142	122
98-Z2-R16	36.2	13.9	1.03	0.25	1.66	0.46	148	120
97-Z3-F1	37.6	13.9	1.24	0.24	2.00	0.49	144	125
97-Z3-F2	37.6	14.0	1.25	0.25	1.88	0.49	141	125
98-Z4-F4	41.2	14.4	1.13	0.25	1.54	0.47	151	122
Mean and	36.7	13.1	1.09	0.31	1.65	0.45	141	112
Range All	16.1 - 52.6	9.8 - 15.2	0.66 - 1.92	0.08 - 0.69	1.08 - 3.88	0.37 - 0.53	75.9 - 183	70.9 - 136

Table 3-20: Analysis of Post-1963 Shifts in Organic Indices

Parameter	R-square Associated with 1963 Intervention	Mean Shift for 1963 Fixed Effect¹	P-value for Fixed Cores Model²	Mean Shift for 1963 Random Effect¹	P-value for Random Cores Model²
Perylene	0.1035	-0.0026	0.0003	-0.0024	0.0027
Pristane	0.1161	0.0064	0.0001	0.0069	0.0058
Phytane	0.0403	-0.0005	0.0266	-0.0004	0.1537
TPHC	0.1303	2.7406	0	2.6731	0.0003
T19-Hopane	0.0049	0.0001	0.4445	0.0001	0.3604
Total PAH	0.057	-0.0157	0.0081	-0.0174	0.1631
Petrogenic PAH	0.0454	-0.0125	0.0184	-0.0154	0.1606
Pyrogenic PAH	0.0079	-0.0006	0.3295	-0.0008	0.3093
C2D/C2P	0.1021	0.0073	0.0003	0.0067	0.0011
C3D/C3P	0.082	0.0104	0.0014	0.01	0.0062
N/P	0.0019	0.0046	0.6379	0.0077	0.515
nC15+nC17	0.0141	-0.0019	0.1927	-0.0015	0.4144
nC27+nC29+nC31	0.0256	0.0148	0.0781	0.0179	0.0411
TALK	0.018	0.0377	0.1409	0.0501	0.0613
Isoprenoids	0.0457	0.0053	0.018	0.0059	0.0509
LALK	0.003	0.0066	0.552	0.015	0.4983
Phytane/Pristane	0.0266	-0.0105	0.0729	-0.0124	0.2812
Total S/T	0.0033	-0.0003	0.5312	-0.0001	0.8797
Ts/(Ts+Tm)	0.0473	0.0132	0.0161	0.0129	0.0399
Oleanane/Hopane	0.0165	-0.0244	0.1583	-0.0122	0.6038
T21/T22	0.0625	0.0144	0.0055	0.0115	0.318
nC16/(nC15+nC17)	0.0002	0.0005	0.8801	-0.0008	0.8846
CPI	0.0006	0.0155	0.7848	0.0515	0.4918
Pyro/Petro	0.0003	0.0002	0.8573	0.0002	0.8859
TOC	0.0551	0.0224	0.0109	0.0277	0.0106

Notes:

¹ Negative sign indicates parameter increases with increased depth, positive sign indicates parameter decreases with increased depth.² Significance is established at p<0.05.

Table 3-21: Analysis of Post-1963 Shifts in Iron Normalized Metals

Parameter	R-square Associated with 1963 Intervention	Mean Shift for 1963 Fixed Effect¹	P-value for Fixed Cores Model²	Mean Shift for 1963 Random Effect¹	P-value for Random Cores Model²
Aluminum	0.0204	-0.0468	0.1249	-0.0524	0.1397
Antimony	0.1875	-0.0422	0.0000	-0.0361	0.0004
Arsenic	0.0195	0.1706	0.1334	0.2325	0.1236
Barium	0.1453	-12.0139	0.0000	-10.6451	0.0032
Beryllium	0.0547	-0.0203	0.0112	-0.0085	0.4206
Cadmium	0.0677	-0.0073	0.0046	-0.0084	0.0063
Chromium	0.07	-1.9489	0.004	-1.5389	0.1461
Copper	0.1721	-1.4098	0.0000	-1.054	0.0042
Lead	0.0602	-0.1334	0.0077	-0.0695	0.3206
Manganese	0.0652	30.1483	0.0055	32.6109	0.0264
Mercury	0.0004	0.0002	0.83	-0.0004	0.8334
Nickel	0.0699	-0.8417	0.004	-0.255	0.6629
Selenium	0.0206	-0.0125	0.1225	-0.0143	0.1873
Silver	0.003	-0.0006	0.5557	0.0001	0.9367
Thallium	0.2422	-0.0118	0.0000	-0.0098	0.0018
Tin	0.0001	-0.0041	0.8999	-0.0179	0.6987
Vanadium	0.0027	0.5536	0.5752	1.1589	0.2994
Zinc	0.0249	-1.1095	0.0891	-1.031	0.3864

Notes:

¹ Negative sign indicates parameter increases with increased depth, positive sign indicates parameter decreases with increased depth.² Significance is established at $p < 0.05$.

Table 3-22: MMS Stations Where Fish Liver Tissue Samples were Collected for Chemical Analysis

Zone	Station	No. Halibut Samples	No. Arrowtooth Flounder Samples	No. Black Cod Samples	No. Pacific Cod Samples	No. Skate Samples
1997 Cruise						
0	F7a	6	ns	ns	ns	ns
2	R14a	4	1	ns	ns	ns
3	R1a	1	ns	1	ns	ns
1997 Totals		11	1	1	ns	ns
1998 Cruise						
1	R23a	4	ns	ns	4	1
2	R14a	5	1	ns	6	ns
3	R1a	3	1	1	3	1
1998 Totals		12	2	1	13	2

Notes:

ns - none sampled

The numbers indicate number of fish samples collected for analysis. In most cases these samples represented liver composites, however, individual fish samples (i.e., non-composites) were collected under circumstances where multiple individuals were not caught.

Table 3-23: Average PAH Concentrations (in µg/g dry weight) Detected in Fish Tissue Samples and Comparison to PAH Concentrations in Procedural Blanks

	Naphthalene	C1-Naphthalene	Phenanthrene	Benzo[g,h,i]perylene
1997 Cruise				
Blank 1	0.024	0.009	0.016	0.013
Blank 2	0.033	0.005	0.006	0.020
<i>Halibut</i>				
Zone 0	0.018	0.007	0.027	0.003
Zone 2	0.032	0.012	0.032	0.002
Zone 3	0.025	0.012	0.052	0.001
<i>Arrowtooth Flounder</i>				
Zone 2	0.028	ND	0.012	ND
<i>Black Cod</i>				
Zone 3	0.020	0.009	0.014	ND
1998 Cruise				
Blank 1	0.003	ND	0.002	0.013
Blank 2	0.007	0.005	0.005	0.015
Blank 3	0.010	0.005	0.002	0.014
<i>Halibut</i>				
Zone 1	0.018	0.008	0.008	0.004
Zone 2	0.018	0.009	0.011	0.007
Zone 3	0.031	0.005	0.011	0.002
<i>Pacific Cod</i>				
Zone 1	0.008	0.008	0.005	0.002
Zone 2	0.014	0.010	0.006	0.002
Zone 3	0.007	0.004	0.004	0.002
<i>Arrowtooth Flounder</i>				
Zone 2	0.012	ND	0.005	ND
Zone 3	0.014	ND	0.005	ND
<i>Skates</i>				
Zone 1	0.009	0.005	0.004	0.001
Zone 3	0.012	0.003	0.004	2.7
<i>Black Cod</i>				
Zone 3	0.014	0.006	0.007	0.001

Notes:

ND=Not Detected

Table 3-24: Mean Total PAH Concentrations (in µg/g dry weight) Detected in Fish Tissue

		Total PAH		
	n	Mean (µg/g dry weight)	SD	Range
1997 Cruise				
Blanks	2	0.063	0.002	0.062 - 0.064
<i>Halibut</i>				
Zone 0	6	0.093	0.033	0.057 - 0.136
Zone 2	4	0.149	0.073	0.059 - 0.235
Zone 3	1	0.143	NA	NA
<i>Arrowtooth Flounder</i>				
Zone 2	1	0.052	NA	NA
<i>Black Cod</i>				
Zone 3	1	0.070	NA	NA
1998 Cruise				
Blanks	3	0.031	0.007	0.023 - 0.036
<i>Halibut</i>				
Zone 1	4	0.079	0.022	0.056 - 0.110
Zone 2	5	0.106	0.042	0.060 - 0.160
Zone 3	3	0.107	0.098	0.048 - 0.220
<i>Pacific Cod</i>				
Zone 1	4	0.065	0.021	0.036 - 0.085
Zone 2	6	0.073	0.058	0.34 - 0.180
Zone 3	3	0.030	0.011	0.022 - 0.042
<i>Arrowtooth Flounder</i>				
Zone 2	1	0.028	NA	NA
Zone 3	1	0.032	NA	NA
<i>Skates</i>				
Zone 1	1	0.047	NA	NA
Zone 3	1	2.7	NA	NA
<i>Black Cod</i>				
Zone 3	1	0.048	NA	NA

Notes:

NA = not applicable since only one sample is considered

Table 3-25: Trace Metal Concentrations in Liver Composite Samples for Halibut, Arrow Flounder, Black Cod, Pacific Cod and Skate (dry weight)

	Zone	Ag (µg/g)	Al (µg/g)	As (µg/g)	Ba (µg/g)	Be (µg/g)	Cd (µg/g)	Cr (µg/g)	Cu (µg/g)	Fe (µg/g)
Halibut										
Mean Std. Dev.	0 1997 (n* = 6)	0.074 ±0.029	10.5 ±5.1	11.0 ±4.0	0.055 ±0.020	N.D.	4.1 ±1.0	0.072 ±0.036	15.9 ±3.3	169 ±71
Mean Std. Dev.	1 1998 (n* = 4)	0.073 ±0.018	6.9 ±0.6	16.8 ±5.5	0.050 ±0.026	N.D.	6.6 ±1.2	0.024 ±0.006	15.1 ±3.3	303 ±15
Mean Std. Dev.	2 1997 (n* = 4)	0.104 ±0.041	6.4 ±2.6	29.8 ±3.4	0.092 ±0.039	N.D.	5.0 ±1.1	0.045 ±0.013	12.7 ±7.1	263 ±258
Mean Std. Dev.	2 1998 (n* = 5)	0.064 ±0.017	8.2 ±2.8	15.3 ±4.8	0.084 ±0.014	N.D.	4.3 ±0.6	0.084 ±0.043	10.8 ±1.9	194 ±105
Mean	3 1997 (n* = 1)	0.100	6.2	22.0	0.082	N.D.	4.3	0.051	15.3	197
Mean Std. Dev.	3 1998 (n* = 3)	0.084 ±0.034	4.7 ±0.6	26.5 ±7.4	0.010 ±0.001	N.D.	4.3 ±0.3	0.019 ±0.006	11.6 ±4.2	163 ±52
Arrowtooth Flounder										
Mean	2 1997 (n* = 1)	0.044	5.9	21.4	0.078	N.D.	4.7	0.075	11.1	688
Mean	2 1998 (n* = 1)	0.023	2.8	32.8	0.024	N.D.	2.2	0.041	9.5	195
Mean	3 1998 (n* = 1)	0.024	1.5	22.6	0.011	N.D.	1.7	0.022	9.9	138

Table 3-25: Trace Metal Concentrations in Liver Composite Samples for Halibut, Arrow Flounder, Black Cod, Pacific Cod and Skate (dry weight) (cont.)

	Zone	Ag (µg/g)	Al (µg/g)	As (µg/g)	Ba (µg/g)	Be (µg/g)	Cd (µg/g)	Cr (µg/g)	Cu (µg/g)	Fe (µg/g)
Black Cod										
Mean	3 1997 (n* = 1)	0.029	6.1	1.7	0.080	N.D.	1.4	0.032	6.2	433
	3 1998 (n* = 1)	0.17	1.1	3.4	0.033	N.D.	0.99	0.027	4.2	337
Pacific Cod										
Mean Std. Dev.	1 1998 (n* = 4)	0.621 ±0.230	8.6 ±2.6	49.9 ±24.0	0.047 ±0.007	N.D.	0.7 ±0.2	0.107 ±0.099	20.9 ±5.0	148 ±35
Mean Std. Dev.	2 1998 (n* = 6)	0.383 ±0.238	4.1 ±1.8	54.1 ±26.5	0.085 ±0.020	N.D.	0.7 ±0.3	0.077 ±0.023	17.5 ±8.4	143 ±45
Mean Std. Dev.	3 1998 (n* = 3)	0.472 ±0.156	2.4 ±0.4	48.0 ±1.7	0.023 ±0.012	N.D.	0.4 ±0.3	0.048 ±0.015	12.9 ±0.3	136 ±22
Aleutian Skate										
Mean	1 1998 (n* = 1)	0.327	2.3	24.4	0.036	N.D.	0.8	0.019	10.3	130
Mean	3 1998 (n* = 1)	0.474	2.2	60.1	0.018	N.D.	0.6	0.025	41.3	107
Flounder+										
Mean	Atlantic (n* = 44)	0.89	N.D.	17	N.D.	N.D.	0.57	N.D.	30	660

Notes:

* n = number of samples

+ P.J. Hanson, 1997

Table 3-25: Trace Metal Concentrations in Liver Composite Samples for Halibut, Arrow Flounder, Black Cod Pacific Cod and Skate (dry weight) (cont.)

	Zone	Hg (µg/g)	Mn (µg/g)	Ni (µg/g)	Pb (µg/g)	Sb (µg/g)	Se (µg/g)	Sn (µg/g)	Tl (µg/g)	V (µg/g)	Zn (µg/g)
Halibut											
Mean Std. Dev.	0 1997 (n* = 6)	0.129 ±0.117	3.3 ±0.2	-	0.028 ±0.009	0.007 ±0.010	6.7 ±0.3	0.20 ±0.09	0.003 ±0.001	0.134 ±0.044	82.4 ±9.7
Mean Std. Dev.	1 1998 (n* = 4)	0.158 ±0.046	3.3 ±0.6	1.18 ±0.27	0.050 ±0.025	0.004 ±0.002	5.0 ±1.9	0.14 ±0.05	0.002 ±0.000	0.180 ±0.046	84.2 ±9.9
Mean Std. Dev.	2 1997 (n* = 4)	0.382 ±0.197	4.5 ±0.9	-	0.027 ±0.011	0.004 ±0.001	7.3 ±2.9	0.19 ±0.05	0.004 ±0.001	0.283 ±0.142	102.7 ±25.9
Mean Std. Dev.	2 1998 (n* = 5)	0.272 ±0.082	4.6 ±0.6	2.0 ±0.0	0.286 ±0.531	0.003 ±0.002	6.6 ±0.8	0.122 ±0.052	0.002 ±0.000	0.245 ±0.044	89.3 ±6.3
Mean	3 1997 (n* = 1)	0.181	3.7	-	0.026	0.003	6.7	0.22	0.003	0.224	83.1
Mean Std. Dev.	3 1998 (n* = 3)	0.236 ±0.071	2.9 ±0.3	1.5 ±0.2	0.034 ±0.022	0.003 ±0.001	4.5 ±0.7	0.090 ±0.057	0.001 ±0.000	0.230 ±0.024	78.7 ±4.0
Arrowtooth Flounder											
Mean	2 1997 (n* = 1)	0.096	2.9		0.012	0.003	8.1	0.31	0.002	0.169	72.6
Mean	2 1998 (n* = 1)	0.054	2.4	0.83	0.026	0.002	2.5	0.036	0.001	0.111	53.8
Mean	3 1998 (n* = 1)	0.049	1.9	1.0	0.015	0.002	1.7	0.094	0.001	0.089	51.9

Table 3-25: Trace Metal Concentrations in Liver Composite Samples for Halibut, Arrow Flounder, Black Cod Pacific Cod and Skate (dry weight) (cont.)

	Zone	Hg (µg/g)	Mn (µg/g)	Ni (µg/g)	Pb (µg/g)	Sb (µg/g)	Se (µg/g)	Sn (µg/g)	Tl (µg/g)	V (µg/g)	Zn (µg/g)
Black Cod											
Mean	3 1997 (n* = 1)	0.176	2.2	-	0.112	0.003	3.5	0.12	0.006	0.101	52.5
Mean	3 1998 (n* = 1)	0.099	2.4	1.0	0.040	0.004	2.5	0.021	0.004	0.093	46.6
Pacific Cod											
Mean Std. Dev.	1 1998 (n* = 4)	0.085 ±0.055	4.3 ±1.2	0.88 ±0.27	0.037 ±0.024	0.016 ±0.004	3.1 ±1.1	0.057 ±0.035	0.002 ±0.001	0.125 ±0.033	54.8 ±10.3
Mean Std. Dev.	2 1998 (n* = 6)	0.118 ±0.055	3.2 ±0.9	1.3 ±0.3	0.081 ±0.086	0.020 ±0.007	3.8 ±1.4	0.083 ±0.051	0.003 ±0.001	0.211 ±0.076	64.0 ±16.6
Mean Std. Dev.	3 1998 (n* = 3)	0.094 ±0.021	4.4 ±0.9	1.2 ±0.2	0.023 ±0.009	0.015 ±0.002	4.3 ±0.6	0.072 ±0.040	0.003 ±0.000	0.178 ±0.046	62.3 ±5.2
Skate											
Mean	1 1998 (n* = 1)	0.012	0.9	0.42	0.009	0.002	0.48	0.036	0.001	0.054	17.3
Mean	3 1998 (n* = 3)	0.079	1.4	0.73	0.009	0.002	0.59	0.023	0.001	0.083	24.4
Flounder+											
Mean	Atlantic (n* = 44)	0.31	4.8	0.33	1.4	N.D.	6.2	0.33	N.D.	N.D.	116

Notes:

* number of samples

+ P.J. Hanson, 1997

Table 3-26: Mercury Concentrations in Flesh (Muscle) Samples for Halibut

	Zone	Hg (µg/g, dry weight)	Hg (µg/g, wet weight)
Halibut			
Mean Std. Dev. (n* = 4)	0 1997	0.721 ±0.667	0.149 ±0.133
Range		0.128-1.63	0.028-0.326
Mean Std. Dev. (n* = 12)	1 1998	0.561 ±0.405	0.113 ±0.089
Range		0.111-1.65	0.022-0.363
Mean Std. Dev. (n* = 4)	2 1997	1.494 ±1.070	0.299 ±0.214
Range		0.345-2.43	0.069-0.486
Mean Std. Dev. (n* = 17)	2 1998	0.712 ±0.307	0.133 ±0.055
Range		0.266-1.38	0.056-0.248
Mean Std. Dev. (n* = 4)	3 1997	0.659 ±0.142	0.135 ±0.031
Range		0.478-0.927	0.096-0.164
Mean Std. Dev. (n* = 12)	3 1998	0.629 ±0.353	0.121 ±0.061
Range		0.139-1.44	0.029-0.245

Notes:

*n = number of samples

Table 3-27: CYP1A Scores in all Fish and Cell Types

1997 Cruise	ID#	Sex	Gill			Liver			Kidney	
			epithelium	pillar cells	vascular endothelium	hepatocyte	vascular endothelium	bile duct	tubules	vascular endothelium
Zone 0										
Halibut	1	F	0	0	0	9	0	0	7.5	12
	2	?	0	0	0	7.5	0	0	9	9
	3	F	0	0	0	0	0	0	1	12
	4	M	0	0	0	3	0	0	3	9
	5	F	0	0	0	1.5	0	0	6	12
	6	M	0	0	0	3	0	0	4	6
	7	M	0	0	0	1.5	0	0	4.5	12
	8	?	0	0	0	3.75	0	0	5.25	10.5
	9	F	0	0	0	3	0	0	6	12
	10	M	0	0	0	3	0	0	4	9
	11	M	0	0	0	1.5	0	0	4	6
	12	?	0	0	0	0	0	0	2	9
	13	?	0	0	0	0	0	0	4.5	6
Zone 2										
Halibut	1	F	0	0	0	0	0	0	1.5	12
	2	M	0	0	0	4.5	0	0	2	12
	3	F	0	0	0	0	0	0	4.5	6.5
	4	F	0	0	0	0.75	0	0	0.5	6
	5	M	0	0	0	0	0	0	1.5	7.5
	6	F	0	0	0	1.5	0	0	1	2
	7	F	0	0	0	0	0	0	0	2
	8	F	0	0	0	3	0	0	4	12
	9	M	0	0	0	1.5	0	0	1.5	9
	10	F	0	0	0	0	0	0	0	2
	11	M	0	0	0	0	0	0	1	6
	12	M	0	0	0	0	0	0	3	9
	13	F	0	0	0	3	0	0	1.5	9
	14	F	0	0	0	1.5	0	0	2	0
	15	M	0	0	0	3	0	0	4.5	6
Arrowtooth Flounder	1	F	0	0	0	1	0	0	7.5	0
	2	F	2	6	0	3	0	0	4	0
	3	M	0	0	0	1.5	0	0	7.5	0
	4	M	0	0	0	3	0	0	6	0
Zone 3										
Halibut	1	?	0	0	0	0.75	0	0	1	0
	2	M	0	0	0	3	0	0	6	4
	3	F	0	0	0	0	0	0	4	4
	4	M	0	2	0	3	0	0	0	3
	5	F	0	0	0	0	0	0	4.5	6
	6	M	0	0	0	4.5	0	0	9	12
	7	M	0	0	0	0.75		0	3	9
Arrowtooth Flounder	1	F	0	0	0	3	0	0	0	0
Black Cod	1	?	0	0	4	7.5	0	0	6	4
	2	?	0	0	0	0	0	0	0	0
	3	?	2	2	2	1.5	0	0	1	0
	4	?	0	2	0	10.5	6	2	10.5	2
	5	?	0	1	0	0.75	0	0	1	0

Table 3-27: CYP1A Scores in all Fish and Cell Types

1998 Cruise	ID #	Gill			Liver			Kidney		Heart
		epithelium	pillar cells	vascular endothelium	hepatocyte	vascular endothelium	bile duct	tubules	vascular endothelium	endothelium
	12		NIS	0	0	0	0	2	0	0
Halibut	13	0	0	0	0	0	0	0	0	0
	14	0	0	0	0	0	0	0	0	0
	15	0	0	0	0	0	0	0	0	0
	16	0	0	0	1.5	0	0	8	0	0
	17	0	0	0	0	0	0	0	0	0
Pacific Cod	1	3	0	0	1.5	0	0	0.5	0	5
	2	0	3	0	0	0	0	NIS	0	0
	3	0	3	0	0	0	0	NIS	0	0
	4	0	0	0	1.5	0	0	5	0	0.5
	5	0	0	0	1.5	0	0	NIS	0	0.5
	6	3	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0	0
	8	NIS	NIS	NIS	4.5	0	0	NIS	0	0
	9	NIS	NIS	NIS	1	0	0	NIS	0	0
	10	2	0	0	0	0	0	NIS	0	4
	11	0	0	0	1.5	0	0	0	0	1.5
	12	0	0	0	0	0	0	0	0	1
	13	3	0	0	0	0	0	0	0	0.5
	14	0.5	0	0	0	0	0	NIS	0	0
	15	3	0	0	0	0	0	0	0	1
	16	2	0	0	0	0	0	0	0	1
	17	2	0	0	1.5	0	0	0	0	1
	18	1.5	0	0	1.5	0	0	0	0	0
	19	1.5	0	0	0	0	0	4	0	1
	20	0	0	0	1.5	0	0	4	0	0
	21	0	0	0	1.5	0	0	0	0	0
	22	3	0	0	1.5	0	0	0	0	4
	23	4.5	0	0	1.5	0	0	0	0	0
	24	0	0	0	1.5	0	0	0	0	0
	25	1.5	0	0	1.5	0	0	0	0	1
	26	1.5	0	0	0	0	0	NIS	0	0
	27	0	0	0	3	0	0	0	0	3
	28	0	0	0	3	0	0	0	0	0
	29	1.5	0	0	1.5	0	0	4	0	1
Zone 3										
Aleutian Skate	1	3	4	0	1.5	0	0	9	0	0
Arrowtooth Flounder	1	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	5	0	0
	3	0	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	5	0	0
Black Cod	1	3	0	0	3	0	0	1	0	6
	2	3	0	0	1.5	0	0	2	0	4.5
	3	3	0	0	1.5	0	0	2	0	8
	4	3	0	0	1.5	0	0	2	0	8
Halibut	1	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0	0
	4		NIS		0	0	0	0	0	0

Table 3-27: CYP1A Scores in all Fish and Cell Types

1998 Cruise	ID #	Gill			Liver			Kidney		Heart
		epithelium	pillar cells	vascular endothelium	hepatocyte	vascular endothelium	bile duct	tubules	vascular endothelium	endothelium
	5	0	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0	0
	9	0	0	0	0	0	0	3	0	0
	10	0	0	0	0	0	0	0	0	0
	11	0	0	0	0	0	0	0	0	0
	12	0	0	0	0	0	0	0	0	0
Pacific Cod	1	0	0	0	0	0	0	1	0	0
	2	0	0	0	1.5	0	0	4	0	3
	3	3	0	0	3	0	0	4	0	4.5
	4	3	0	0	0	0	0	NIS	0	0
	5	0	0	0	0	0	0	NIS	0	0
	6	0	0	0	0	0	0	0	0	0
	7	1	0	0	0	0	0	NIS	0	0
	8	0	0	0	0	0	0	0	0	0
	9	1.5	0	0	1.5	0	0	0	0	0
	10	0	0	0	0	0	0	0	0	0
	11	0	0	0	1.5	0	0	3	0	2
	12	0	0	0	0	0	0	0	0	0
	13	2	0	0	0	0	0	0	0	0
	14	3	0	0	3	0	0	3	0	6
	15	0	0	0	0	0	0	0	0	0

Notes:

NIS - Not in Section

Table 3-28: Mean CYP1A Fish Scores in all Cell Types by Zone

1997 Cruise	Gill			Liver			Kidney	
	epithelium	pillar cells	vascular endothelium	hepatocyte	vascular endothelium	bile duct	tubules	vascular endothelium
Zone 0								
Halibut	0	0	0	2.83	0	0	4.67	9.58
Zone 2								
Halibut	0	0	0	1.25	0	0	1.9	6.73
Arrowtooth Flounder	.5	1.5	0	2.13	0	0	6.25	0
Zone 3								
Halibut	0	.29	0	1.7	0	0	3.93	5.43
Arrowtooth Flounder	0	0	0	3	0	0	0	0
Black Cod	.4	1	1.2	4.05	1.2	.4	3.7	1.2

1998 Cruise	Gill			Liver			Kidney		Heart
	epithelium	pillar cells	vascular endothelium	hepatocyte	vascular endothelium	bile duct	tubules	vascular endothelium	endothelium
Zone 1									
Halibut	0	0	0	.25	0	0	0	0	0
Long-nose Skate	0		0	1.5	0	0	6	0	0
Pacific Cod	.73	0	0	1.31	0	0	1.37	0	.69
Zone 2									
Halibut	0	0	0	.09	0	0	.66	0	0
Arrowtooth Flounder	0	0	0	0	0	0	.22	0	0
Pacific cod	1.24	.22	0	1.07	0	0	.83	0	.90
Zone 3									
Halibut	0	0	0	0	0	0	.25	0	0
Arrowtooth Flounder	0	0	0	0	0	0	2.5	0	0
Black Cod	3	0	0	1.89	0	0	1.75	0	6.63
Aleutian Skate	3	4	0	1.5	0	0	9	0	0
Pacific Cod	1.1	0	0	.7	0	0	1.25	0	1.03

Table 3-28: Mean CYP1A Scores in Pacific Halibut Cell Types by Zone

	(n)	Hepatocytes	Kidney Tubules	Kidney Vascular Endothelium
1997 Cruise				
Zone 0	9	2.44	4.31	9.63
Zone 2	15	1.25	1.9	6.73
Zone 3	7	1.71	3.93	5.43
Probability		NS	0.007	NS

Notes:

NS - not significant

Table 3-29: Transformed Percent Survival (transformed by silt) and Each Target Metal and AVS for 1997 Twenty-Station Sediment Data Analysis

Independent Variable	R-squared	P-value for Significant Increase in R-squared Due to Metal
Silt + Clay	0.588	0.000
AVS	0.659	0.078
Ag	0.618	0.262
Al	0.603	0.440
As	0.603	0.428
Ba	0.600	0.486
Be	0.646	0.113
Ca	0.588	0.968
Cd	0.641	0.133
Cr	0.589	0.861
Cu	0.588	0.908
Fe	0.618	0.266
Hg	0.614	0.302
K	0.589	0.828
Mg	0.608	0.365
Mn	0.642	0.127
Ni	0.596	0.561
Pb	0.601	0.463
Sb	0.629	0.187
Se	0.606	0.387
Sn	0.603	0.439
V	0.623	0.229
Zn	0.681	0.040