Alaska Department of Environmental Conservation

Office of the State Veterinarian

Fish Monitoring Program

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Selenium in Alaska's Fish

Fish Samples collected: 2001-2017

Concentration in mg/Kg wet weight

ND = Non-detect in greater than 50% of fish samples

Visit the Fish Monitoring Program webpage for more information:
http://www.dec.alaska.gov/eh/vet/fish-monitoring-program

For State of Alaska fish consumption recommendations visit:
http://www.dhss.alaska.gov/dph/Epi/eph/Pages/fish/default.aspx

Table 1: Selenium in Marine Fish

mg/Kg wet weight

Species	Tissue	n	ND	A mean	SD	G mean	Median	Min	Max
Alaska Plaice	Fillet	31	0	1.029	0.305	0.991	0.995	0.616	2.100
Arctic Flounder	Whole Body	4	0	0.822	0.068	0.820	0.810	0.760	0.910
Arctic Sculpin	Whole Body	1	0	0.920	NA	0.920	0.920	0.920	0.920
Atka Mackerel	Fillet	4	0	0.360	0.057	0.356	0.380	0.280	0.400
Atka Mackerel	Whole Body	5	0	0.546	0.091	0.540	0.580	0.410	0.650
Big Skate	Fillet	112	0	0.332	0.078	0.319	0.340	0.063	0.686
Big Skate	Liver	20	0	1.046	0.347	0.994	0.955	0.560	1.800
Black Rockfish	Fillet	84	0	0.564	0.198	0.531	0.506	0.190	1.100
Black Rockfish	Whole Body	7	0	0.589	0.216	0.556	0.580	0.330	0.970
Blue Shark	Fillet	1	0	0.229	NA	0.229	0.229	0.229	0.229
Butter Sole	Whole Body	1	0	0.340	NA	0.340	0.340	0.340	0.340
China Rockfish	Fillet	1	0	0.780	NA	0.780	0.780	0.780	0.780
Copper Rockfish	Fillet	4	0	0.435	0.050	0.433	0.410	0.410	0.510
Dusky Rockfish	Fillet	64	0	0.451	0.091	0.442	0.452	0.230	0.790
Dusky Rockfish	Whole Body	20	0	0.618	0.122	0.608	0.605	0.410	0.940
Flathead Sole	Fillet	15	0	0.359	0.126	0.339	0.301	0.215	0.582
Fourhorn Sculpin	Whole Body	6	0	0.729	0.278	0.675	0.855	0.371	1.000
Fourhorn Sculpin	C-Whole Body	1	0	0.625	NA	0.625	0.625	0.625	0.625
Great Sculpin	Whole Body	2	0	0.395	0.035	0.394	0.395	0.370	0.420
Kelp Greenling	Fillet	1	0	0.340	NA	0.340	0.340	0.340	0.340
Kelp Greenling	Whole Body	18	0	0.337	0.081	0.326	0.365	0.180	0.430
Lingcod	Fillet	297	0	0.440	0.160	0.415	0.398	0.170	1.000
Longnose Skate	Fillet	114	0	0.320	0.045	0.317	0.320	0.220	0.440
Longnose Skate	Liver	20	0	0.662	0.306	0.599	0.540	0.300	1.200
Northernrock Sole	Fillet	20	0	0.600	0.160	0.581	0.592	0.329	0.933
Northernrock Sole	Whole Body	18	0	0.517	0.298	0.458	0.410	0.260	1.300
Pacific Cod	Fillet	172	0	0.246	0.075	0.235	0.236	0.100	0.530
Pacific Halibut	Fillet	3009	0	0.443	0.208	0.405	0.390	0.070	2.600
Quillback Rockfish	Fillet	21	0	0.600	0.201	0.574	0.520	0.380	1.200
Rock Greenling	Whole Body	16	0	0.349	0.070	0.344	0.335	0.250	0.550
Rougheye Rockfish	Fillet	72	0	0.436	0.106	0.423	0.456	0.220	0.713
Sablefish	Fillet	312	0	0.248	0.086	0.233	0.230	0.060	0.497
Sablefish	Whole Body	3	0	0.373	0.091	0.366	0.360	0.290	0.470
Salmon Shark	Fillet	109	0	0.317	0.072	0.310	0.304	0.150	0.690
Shortraker Rockfish	Fillet	8	0	0.436	0.067	0.432	0.440	0.330	0.550
Silvergray Rockfish	Fillet	10	0	0.462	0.070	0.457	0.453	0.380	0.580
Sleeper Shark	Fillet	1	0	0.300	NA	0.300	0.300	0.300	0.300
Southernrock Sole	Whole Body	1	0	0.210	NA	0.210	0.210	0.210	0.210
Spiny Dogfish	Fillet	68	0	0.254	0.130	0.231	0.198	0.146	0.670
Starry Flounder	Fillet	1	0	0.340	NA	0.340	0.340	0.340	0.340
Starry Flounder	Whole Body	1	0	0.270	NA	0.270	0.270	0.270	0.270
Starry Flounder	C-Whole Body	3	0	0.628	0.086	0.624	0.616	0.549	0.720
Walleye Pollock	Fillet	184	0	0.205	0.069	0.193	0.209	0.050	0.620
Yelloweye Rockfish	Fillet	126	0	0.555	0.141	0.539	0.531	0.280	1.118
Yellowfin Sole	Fillet	33	0	0.464	0.246	0.425	0.405	0.235	1.510

Species	Tissue	n	ND	A mean	SD	G mean	Median	Min	Max
Yellowtail Rockfish	Fillet	7	0	1.004	0.317	0.953	1.100	0.537	1.300

n = Sample Size; ND = Non Detect; A Mean = Arithmetic Mean; G Mean = Geometric Mean; SD = Standard Deviation; C = Composite of multiple individuals

Table 2: Selenium in Salmonids (Salmon, Whitefish, Grayling, Char)

mg/Kg wet weight

Species	Tissue	n	ND	A mean	SD	G mean	Median	Min	Max
Arctic Char	Fillet	13	0	0.197	0.026	0.195	0.190	0.150	0.250
Arctic Char	Whole Body	10	0	0.577	0.782	0.407	0.335	0.280	2.800
Arctic Cisco	Fillet	21	0	0.361	0.045	0.359	0.367	0.305	0.478
Arctic Cisco	Whole Body	1	0	0.850	NA	0.850	0.850	0.850	0.850
Arctic Grayling	Fillet	46	0	0.323	0.217	0.263	0.275	0.081	0.970
Arctic Grayling	Whole Body	3	0	0.333	0.113	0.321	0.293	0.245	0.460
Arctic Grayling	C-Whole Body	11	0	0.909	0.532	0.724	0.973	0.263	1.500
Bering Cisco	Fillet	5	0	0.366	0.073	0.360	0.366	0.271	0.471
Broad Whitefish	Fillet	48	0	0.392	0.380	0.323	0.270	0.190	2.300
Chum Salmon	Fillet	280	0	0.260	0.056	0.253	0.260	0.090	0.430
Chum Salmon	Whole Body	2	0	0.390	0.003	0.390	0.390	0.388	0.392
Chum Salmon	C-Juvenile	1	0	0.540	NA	0.540	0.540	0.540	0.540
Coho Salmon	Fillet	317	0	0.231	0.067	0.221	0.237	0.070	0.420
Coho Salmon	Belly	10	0	0.393	0.077	0.387	0.375	0.320	0.600
Coho Salmon	Whole Body	61	0	0.436	0.122	0.423	0.430	0.290	1.100
Coho Salmon	Eggs	20	0	2.090	0.342	2.063	2.100	1.500	2.800
Coho Salmon	Testis	6	0	0.385	0.039	0.383	0.390	0.340	0.430
Coho Salmon	Fry Whole	22	0	0.391	0.093	0.380	0.380	0.260	0.560
Coho Salmon	C-Fry	7	0	0.574	0.227	0.539	0.510	0.360	0.930
Coho Salmon	Juvenile Whole	19	0	1.344	1.336	0.801	0.390	0.320	3.650
Coho Salmon	C-Juvenile	9	0	2.562	0.869	2.284	2.820	0.440	3.410
Dolly Varden	Fillet	65	0	0.493	0.143	0.469	0.497	0.150	0.832
Dolly Varden	Whole Body	49	0	1.040	0.484	0.952	0.843	0.476	2.300
Humpback Whitefish	Fillet	110	0	0.354	0.277	0.298	0.265	0.130	2.300
Humpback Whitefish	Whole Body	24	0	0.404	0.083	0.396	0.390	0.250	0.540
King Salmon	Fillet	239	0	0.232	0.079	0.219	0.222	0.070	0.590
King Salmon	Whole Body	15	0	0.375	0.088	0.364	0.400	0.230	0.520
King Salmon	C-Fry	7	0	0.584	0.090	0.578	0.610	0.430	0.660
King Salmon	C-Juvenile	3	0	0.487	0.046	0.485	0.460	0.460	0.540
Lamprey	Whole Body	10	0	0.385	0.041	0.383	0.394	0.311	0.431
Least Cisco	Fillet	31	0	0.379	0.152	0.353	0.352	0.130	0.768
Least Cisco	Whole Body	1	0	0.640	NA	0.640	0.640	0.640	0.640
Pink Salmon	Fillet	185	0	0.245	0.111	0.225	0.225	0.060	0.710
Pygmy Whitefish	Whole Body	1	0	1.100	NA	1.100	1.100	1.100	1.100
Round Whitefish	Fillet	12	0	0.949	0.789	0.693	0.410	0.280	2.400
Sheefish	Fillet	44	0	0.384	0.123	0.361	0.430	0.140	0.570
Sheefish	Whole Body	5	0	0.562	0.050	0.560	0.530	0.520	0.630
Sheefish	Eggs	1	0	1.100	NA	1.100	1.100	1.100	1.100
Sheefish	Testis	4	0	0.978	0.416	0.924	0.785	0.740	1.600
Sheefish	Liver	5	0	1.500	0.316	1.475	1.400	1.200	2.000
Sheefish	Kidney	20	0	2.605	0.661	2.526	2.550	1.600	3.800
Sockeye Salmon	Fillet	283	0	0.266	0.109	0.246	0.244	0.090	0.554
Sockeye Salmon	Whole Body	56	0	0.846	0.397	0.777	0.835	0.300	3.000
Sockeye Salmon	Eggs	2	0	1.900	0.849	1.803	1.900	1.300	2.500
Sockeye Salmon	C-Fry	3	0	0.600	0.131	0.590	0.660	0.450	0.690

Species	Tissue	n	ND	A mean	SD	G mean	Median	Min	Max
Sockeye Salmon	C-Whole Body	1	0	0.460	NA	0.460	0.460	0.460	0.460

n = Sample Size; ND = Non Detect; A Mean = Arithmetic Mean; G Mean = Geometric Mean; SD = Standard Deviation; C = Composite of multiple individuals

Table 3: Selenium in Marine Forage Fish

mg/Kg wet weight

Species	Tissue	n	ND	A mean	SD	G mean	Median	Min	Max
Capelin	C-Whole Body	1	0	0.370	NA	0.370	0.370	0.370	0.37
Eulachon	C-Whole Body	7	0	0.169	0.023	0.167	0.170	0.140	0.21
Pacific Herring	C-Whole Body	16	0	0.616	0.267	0.569	0.485	0.340	1.10
Rainbow Smelt	Whole Body	10	0	0.449	0.077	0.443	0.425	0.340	0.58
Saffron Cod	Whole Body	22	0	0.773	0.182	0.756	0.702	0.629	1.30
Sand Lance	C-Whole Body	1	0	0.860	NA	0.860	0.860	0.860	0.86

n = Sample Size; ND = Non Detect; A Mean = Arithmetic Mean; G Mean = Geometric Mean; SD = Standard Deviation; C = Composite of multiple individuals

Table 4: Selenium in Marine Invertebrates

mg/Kg wet weight

Species	Tissue	n	ND	A mean	SD	G mean	Median	Min	Max
Blue Mussel	Invert Whole Tissue	4	0	1.327	0.666	1.209	1.200	0.660	2.250
Blue Mussel	C-Invert Whole	38	0	1.313	0.498	1.212	1.300	0.356	2.500
Butter Clam	Invert Whole Tissue	5	0	0.366	0.179	0.334	0.360	0.190	0.650
Butter Clam	C-Invert Whole	3	0	0.475	0.542	0.305	0.186	0.139	1.100
Chiton	Invert Whole Tissue	2	0	0.580	0.057	0.579	0.580	0.540	0.620
Cockle	Invert Whole Tissue	5	0	1.200	0.141	1.193	1.300	1.000	1.300
Cockle	C-Invert Whole	7	0	0.778	0.304	0.735	0.746	0.476	1.400
Decorator Crab	Invert Whole Tissue	1	0	8.600	NA	8.600	8.600	8.600	8.600
Dungeness Crab	Invert Whole Tissue	2	0	6.950	5.728	5.648	6.950	2.900	11.000
Geoduck	Invert Viscera	7	0	1.787	0.413	1.752	1.617	1.463	2.640
Hairytriton Snail	Invert Whole Tissue	1	0	2.400	NA	2.400	2.400	2.400	2.400
Hermit Crab	Invert Whole Tissue	1	0	2.800	NA	2.800	2.800	2.800	2.800
Horse Clam	C-Invert Whole	1	0	0.402	NA	0.402	0.402	0.402	0.402
Neptunea hero	Invert Whole Tissue	3	0	0.948	0.111	0.944	0.964	0.830	1.050
Oysters	Invert Whole Tissue	16	0	0.552	0.103	0.544	0.516	0.444	0.804
Razor Clam	Invert Muscle	2	0	0.525	0.054	0.524	0.525	0.487	0.563
Ribbon Worm	Invert Whole Tissue	2	0	1.600	0.141	1.597	1.600	1.500	1.700
Scallop	Invert Whole Tissue	20	0	0.906	0.271	0.866	0.860	0.500	1.300
Softshell Clam	Invert Whole Tissue	4	0	1.051	0.713	0.780	1.065	0.175	1.900
Softshell Clam	C-Invert Whole	10	0	1.211	0.890	0.955	0.970	0.293	2.900
Squid	C-Invert Whole	5	0	0.780	0.076	0.777	0.770	0.670	0.880

n = Sample Size; ND = Non Detect; A Mean = Arithmetic Mean; G Mean = Geometric Mean; SD = Standard Deviation; C = Composite of multiple individuals

Table 5: Selenium in Freshwater Fishes

mg/Kg wet weight

Species	Tissue	n	ND	A mean	SD	G mean	Median	Min	Max
Alaska Blackfish	Whole Body	3	0	0.240	0.045	0.237	0.254	0.190	0.277
Alaska Blackfish	C-Whole Body	3	0	0.381	0.165	0.355	0.391	0.211	0.540
Arctic Grayling	Fillet	46	0	0.323	0.217	0.263	0.275	0.081	0.970
Arctic Grayling	Whole Body	3	0	0.333	0.113	0.321	0.293	0.245	0.460
Arctic Grayling	C-Whole Body	11	0	0.909	0.532	0.724	0.973	0.263	1.500
Burbot	Fillet	27	0	0.378	0.190	0.340	0.304	0.140	0.880
Cutthroat Trout	Whole Body	7	0	0.387	0.106	0.372	0.426	0.208	0.477
Lake Trout	Fillet	54	0	0.347	0.139	0.321	0.298	0.100	0.680
Lake Trout	Whole Body	33	0	0.493	0.098	0.484	0.480	0.360	0.770
Longnose Sucker	Fillet	3	0	0.960	0.294	0.933	0.790	0.790	1.300
Northern Pike	Fillet	330	0	0.255	0.114	0.230	0.240	0.060	1.030
Northern Pike	Whole Body	40	0	0.368	0.157	0.344	0.320	0.210	0.940
NS Stickleback	C-Whole Body	13	0	0.437	0.175	0.410	0.390	0.240	0.851
Rainbow Trout	Fillet	59	0	0.260	0.155	0.224	0.200	0.091	0.950
Rainbow Trout	Whole Body	11	0	0.636	0.143	0.614	0.680	0.250	0.750
Slimy Sculpin	Whole Body	61	0	1.103	0.651	0.974	0.920	0.328	4.200
Slimy Sculpin	C-Whole Body	15	0	0.687	0.423	0.596	0.540	0.290	1.800
TS Stickleback	Whole Body	3	0	0.537	0.125	0.528	0.486	0.445	0.679
TS Stickleback	C-Whole Body	7	0	0.500	0.197	0.470	0.441	0.300	0.856

n = Sample Size; ND = Non Detect; A Mean = Arithmetic Mean; G Mean = Geometric Mean; SD = Standard Deviation; C = Composite of multiple individuals