



Alaska Department of Environmental Conservation
Office of the State Veterinarian Fish Monitoring Program
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Total Arsenic in Fish and Shellfish Caught in Alaskan Waters

Fish Samples collected: 2001-2021

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: Total Arsenic in Marine Fish

Species	Tissue	n	ND	mg/Kg wet weight					
				Mean	SD	SEM	Median	Min	Max
Alaska Plaice	Fillet	31	0	11.175	5.191	0.932	9.56	4.24	22.3
Arctic Flounder	Whole Body	4	0	1.6	0.141	0.071	1.55	1.5	1.8
Arctic Sculpin	Whole Body	1	0	0.85	NA	NA	0.85	0.85	0.85
Arrowtooth Flounder	Fillet	14	0	1.87	0.741	0.198	1.64	0.668	3.19
Atka Mackerel	Fillet	4	0	0.532	0.192	0.096	0.475	0.37	0.81
Atka Mackerel	Whole Body	5	0	0.952	0.169	0.076	0.96	0.69	1.1
Big Skate	Fillet	112	0	16.998	9.782	0.924	14	1.82	49
Big Skate	Liver	20	0	5.02	2.423	0.542	4.3	3.2	14
Black Rockfish	Fillet	85	0	0.391	0.182	0.02	0.36	0.159	1.6
Black Rockfish	Whole Body	7	0	1.181	0.928	0.351	0.73	0.6	3.2
Blue Shark	Fillet	1	0	1.844	NA	NA	1.844	1.844	1.844
Butter Sole	Whole Body	1	0	1.7	NA	NA	1.7	1.7	1.7
China Rockfish	Fillet	1	0	0.61	NA	NA	0.61	0.61	0.61
Copper Rockfish	Fillet	4	0	0.775	0.13	0.065	0.775	0.64	0.91
Dusky Rockfish	Fillet	64	0	0.54	0.296	0.037	0.469	0.14	1.59
Dusky Rockfish	Whole Body	20	0	0.691	0.254	0.057	0.63	0.25	1.3
Flathead Sole	Fillet	15	0	3.968	1.131	0.292	3.82	2.6	7.16
Fourhorn Sculpin	Whole Body	6	0	0.91	0.685	0.28	1	0.092	1.8
Fourhorn Sculpin	C-Whole Body	1	0	0.542	NA	NA	0.542	0.542	0.542
Great Sculpin	Whole Body	2	0	2	1.273	0.9	2	1.1	2.9
Kelp Greenling	Fillet	1	0	0.26	NA	NA	0.26	0.26	0.26
Kelp Greenling	Whole Body	18	0	0.746	0.22	0.052	0.72	0.5	1.3
Lamprey	Whole Body	10	0	0.948	0.185	0.058	0.927	0.66	1.25
Lingcod	Fillet	301	0	0.669	0.434	0.025	0.54	0.12	2.552
Longnose Skate	Fillet	114	0	19.432	11.678	1.094	15.792	5.1	69
Longnose Skate	Liver	20	0	5.855	2.195	0.491	5.55	2.8	11
Northernrock Sole	Fillet	20	0	6.093	2.876	0.643	5.015	2.43	15.6
Northernrock Sole	Whole Body	18	0	2.428	1.341	0.316	2.15	1.1	6.4
Pacific Cod	Fillet	195	0	8.764	5.605	0.401	6.89	1.209	31.6
Pacific Halibut	Fillet	3602	1	1.729	1.235	0.021	1.416	0.098	17.457
Pacific Halibut	Comp	1	0	1.52	NA	NA	1.52	1.52	1.52
Pacific Ocean Pearch	Fillet	78	0	1.218	0.456	0.052	1.261	0.184	2.355
Quillback Rockfish	Fillet	22	0	1.38	0.899	0.192	0.97	0.27	3.4
Red Irish Lord	Whole Body	11	0	0.633	0.221	0.067	0.56	0.37	1.1
Rock Greenling	Whole Body	16	0	0.742	0.299	0.075	0.7	0.39	1.4
Rougheye Rockfish	Fillet	72	0	2.429	1.46	0.172	2.55	0.22	6.2
Sablefish	Fillet	342	2	0.877	0.481	0.026	0.794	0.1	2.84
Sablefish	Whole Body	3	0	0.867	0.146	0.085	0.89	0.71	1
Salmon Shark	Fillet	110	0	1.288	0.428	0.041	1.252	0.35	2.431
Shortraker Rockfish	Fillet	8	0	1.286	0.913	0.323	1.13	0.37	2.8
Silvergray Rockfish	Fillet	10	0	0.322	0.127	0.04	0.314	0.096	0.55

Table 1: Total Arsenic in Marine Fish (*continued*)

Species	Tissue	n	ND	mg/Kg wet weight					
				Mean	SD	SEM	Median	Min	Max
Sleeper Shark	Fillet	1	0	8.1	NA	NA	8.1	8.1	8.1
Southernrock Sole	Whole Body	1	0	1.8	NA	NA	1.8	1.8	1.8
Spiny Dogfish	Fillet	69	0	2.817	0.691	0.083	2.726	1.5	4.54
Starry Flounder	Fillet	1	0	1.4	NA	NA	1.4	1.4	1.4
Starry Flounder	Whole Body	1	0	3.1	NA	NA	3.1	3.1	3.1
Starry Flounder	C-Whole Body	3	0	0.467	0.186	0.107	0.495	0.269	0.637
Tiger Rockfish	Fillet	1	0	0.48	NA	NA	0.48	0.48	0.48
Walleye Pollock	Fillet	259	0	2.586	4.137	0.257	1.257	0.149	37.6
Walleye Pollock	Comp	5	0	1.518	0.315	0.141	1.5	1.18	1.94
Yellow Irish Lord	Fillet	2	0	0.37	0.099	0.07	0.37	0.3	0.44
Yellow Irish Lord	Whole Body	10	0	0.63	0.303	0.096	0.53	0.3	1.2
Yelloweye Rockfish	Fillet	131	0	0.942	0.886	0.077	0.71	0.157	7.14
Yellowfin Sole	Fillet	45	0	4.066	2.271	0.339	3.55	1.39	12.6
Yellowtail Rockfish	Fillet	7	0	0.786	0.284	0.107	0.76	0.471	1.3

Note:

n= sample size

ND = non-detect

Mean = arithmetic mean

SD = standard deviation

SEM = standard error

C = Composite of multiple individuals

Reporting limits: As, Cd, Cu, Pb = 0.05 mg/Kg; Se = 0.25 mg/Kg; Hg = 0.01 mg/Kg

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

Species	Tissue	n	ND	mg/Kg wet weight					
				Mean	SD	SEM	Median	Min	Max
Arctic Char	Fillet	30	8	0.385	0.444	0.081	0.119	0.025	1.24
Arctic Char	Whole Body	10	0	0.14	0.094	0.03	0.088	0.058	0.29
Arctic Cisco	Fillet	21	0	0.778	0.153	0.033	0.744	0.569	1.156
Arctic Cisco	Whole Body	1	0	1.1	NA	NA	1.1	1.1	1.1
Arctic Grayling	Fillet	120	39	0.038	0.031	0.003	0.028	0.01	0.263
Arctic Grayling	Whole Body	4	0	0.26	0.361	0.181	0.1	0.039	0.8
Arctic Grayling	C-Whole Body	11	0	0.184	0.306	0.092	0.041	0.013	1
Bering Cisco	Fillet	5	0	0.593	0.337	0.151	0.46	0.271	1.1
Broad Whitefish	Fillet	48	26	ND	NA	NA	ND	0.018	0.065
Chum Salmon	Fillet	304	14	0.244	0.118	0.007	0.218	0.083	1.103
Chum Salmon	Whole Body	2	0	0.226	0.076	0.054	0.226	0.172	0.28
Coho Salmon	Fillet	321	8	0.325	0.135	0.008	0.317	0.089	0.83
Coho Salmon	Whole Body	62	0	0.377	0.116	0.015	0.355	0.13	0.75
Coho Salmon	Eggs	20	0	0.47	0.089	0.02	0.46	0.32	0.63
Cutthroat Trout	Whole Body	7	0	0.053	0.062	0.023	0.038	0.008	0.19
Dolly Varden	Fillet	65	5	0.59	0.578	0.072	0.492	0.025	2.44
Dolly Varden	Whole Body	49	0	0.694	0.525	0.075	0.661	0.049	2.43
Humpback Whitefish	Fillet	110	29	0.15	0.229	0.022	0.064	0.025	1.1
Humpback Whitefish	Whole Body	24	1	0.121	0.041	0.008	0.125	0.025	0.19
King Salmon	Fillet	252	3	0.487	0.295	0.019	0.43	0.071	1.95
King Salmon	Whole Body	20	0	0.373	0.179	0.04	0.36	0.033	0.74
Lake Trout	Fillet	55	12	0.079	0.047	0.006	0.073	0.025	0.236
Lake Trout	Whole Body	33	2	0.115	0.055	0.01	0.12	0.025	0.28
Least Cisco	Fillet	42	2	0.513	0.449	0.069	0.609	0.02	1.817
Least Cisco	Whole Body	1	0	1.2	NA	NA	1.2	1.2	1.2
Pink Salmon	Fillet	206	25	0.269	0.134	0.009	0.259	0.025	0.845
Pygmy Whitefish	Whole Body	1	0	0.39	NA	NA	0.39	0.39	0.39
Rainbow Trout	Fillet	137	35	0.197	0.172	0.015	0.154	0.025	0.941
Rainbow Trout	Whole Body	11	0	0.198	0.101	0.03	0.18	0.08	0.45
Round Whitefish	Fillet	14	12	ND	NA	NA	ND	0.021	0.072
Round Whitefish	Whole Body	1	0	0.083	NA	NA	0.083	0.083	0.083
Sheefish	Fillet	44	0	8.941	6.49	0.978	8.6	0.128	24
Sheefish	Whole Body	5	0	9.18	4.212	1.884	8.4	4.6	16
Sheefish	Eggs	1	0	1.4	NA	NA	1.4	1.4	1.4
Sockeye Salmon	Fillet	341	18	0.296	0.126	0.007	0.281	0.051	0.95
Sockeye Salmon	Whole Body	56	0	0.416	0.166	0.022	0.392	0.12	0.878
Sockeye Salmon	Eggs	2	0	0.355	0.247	0.175	0.355	0.18	0.53
Sockeye Salmon	C-Whole Body	1	0	0.552	NA	NA	0.552	0.552	0.552

Table 2: Total Arsenic in Salmonids (Salmon, Whitefish, Grayling, Char) (*continued*)

Species	Tissue	n	ND	mg/Kg wet weight					
				Mean	SD	SEM	Median	Min	Max

Note:

n= sample size

ND = non-detect

Mean = arithmetic mean

SD = standard deviation

SEM = standard error

C = Composite of multiple individuals

Reporting limits: As, Cd, Cu, Pb = 0.05 mg/Kg; Se = 0.25 mg/Kg; Hg = 0.01 mg/Kg

Table 3: Total Arsenic in Marine Forage Fish

Species	Tissue	n	ND	mg/Kg wet weight					
				Mean	SD	SEM	Median	Min	Max
Capelin	C-Whole Body	1	0	0.82	NA	NA	0.82	0.82	0.82
Eulachon	C-Whole Body	7	0	0.933	0.039	0.015	0.92	0.87	0.98
Pacific Herring	Fillet	30	0	1.904	1.095	0.2	1.785	0.615	4.63
Pacific Herring	Eggs	1	0	1.09	NA	NA	1.09	1.09	1.09
Pacific Herring	C-Whole Body	16	0	2.045	0.901	0.225	1.95	0.213	3.6
Rainbow Smelt	Whole Body	10	0	1.358	0.561	0.178	1.25	0.68	2.3
Saffron Cod	Whole Body	22	0	4.746	2.16	0.46	4.485	0.964	8.8
Sand Lance	C-Whole Body	1	0	0.83	NA	NA	0.83	0.83	0.83

Note:

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ND = non-detect

Mean = arithmetic mean

SD = standard deviation

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Reporting limits: As, Cd, Cu, Pb = 0.05 mg/Kg; Se = 0.25 mg/Kg; Hg = 0.01 mg/Kg

Table 4: Total Arsenic in Marine Invertebrates

Species	Tissue	n	ND	mg/Kg wet weight					
				Mean	SD	SEM	Median	Min	Max
Bairdi Crab	Comp	1	0	12.4	NA	NA	12.4	12.4	12.4
Blue Mussel	Invert Whole Tissue	4	0	1.455	0.444	0.222	1.35	1.1	2.02
Blue Mussel	C-Invert Whole	38	0	1.868	0.732	0.119	1.7	1.18	5
Butter Clam	Invert Whole Tissue	5	0	1.44	0.385	0.172	1.3	1.1	1.9
Butter Clam	C-Invert Whole	4	0	2.095	0.498	0.249	2.255	1.39	2.48
Chiton	Invert Whole Tissue	2	0	1.4	0.141	0.1	1.4	1.3	1.5
Cockle	Invert Whole Tissue	5	0	1.172	0.288	0.129	1.1	0.86	1.6
Cockle	C-Invert Whole	16	0	1.758	2.306	0.577	1.125	0.814	10.3
Coonstriped Shrimp	C-Invert Whole	2	0	10.555	2.044	1.445	10.555	9.11	12
Decorator Crab	Invert Whole Tissue	1	0	5.6	NA	NA	5.6	5.6	5.6
Dungeness Crab	Invert Whole Tissue	2	0	4.65	2.475	1.75	4.65	2.9	6.4
Golden King Crab	Invert Muscle	2	0	14.05	0.778	0.55	14.05	13.5	14.6
Hairytriton Snail	Invert Whole Tissue	1	0	10	NA	NA	10	10	10
Hermit Crab	Invert Whole Tissue	1	0	1.5	NA	NA	1.5	1.5	1.5
Horse Clam	C-Invert Whole	1	0	3.95	NA	NA	3.95	3.95	3.95
Little Neck Clam	Invert Whole Tissue	4	0	3.614	0.49	0.245	3.723	2.925	4.085
Little Neck Clam	C-Invert Whole	2	0	3.095	2.128	1.505	3.095	1.59	4.6
Neptunea hero	Invert Whole Tissue	3	0	11.067	6.288	3.63	9.11	5.99	18.1
Opilio Crab	Comp	1	0	9.97	NA	NA	9.97	9.97	9.97
Opilio Crab	Invert Muscle	27	0	9.475	5.007	0.964	8.41	3.55	28.1
Oysters	Invert Whole Tissue	16	0	1.818	0.484	0.121	1.684	1.299	3.058
Razor Clam	Invert Muscle	2	0	1.328	0.071	0.05	1.328	1.278	1.379
Ribbon Worm	Invert Whole Tissue	2	0	3.2	0.707	0.5	3.2	2.7	3.7
Scallop	Invert Whole Tissue	20	0	1.009	0.131	0.029	1.05	0.78	1.2
Sea Cucumber	Invert Whole Tissue	3	0	1.8	0.624	0.361	2	1.1	2.3
Softshell Clam	Invert Whole Tissue	4	0	1.302	0.082	0.041	1.305	1.2	1.4
Softshell Clam	C-Invert Whole	10	0	13.049	23.821	7.533	2.05	1.1	66
Squid	C-Invert Whole	5	0	0.688	0.176	0.079	0.57	0.55	0.89

Note:

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Table 5: Total Arsenic in Freshwater Fishes

Species	Tissue	n	ND	mg/Kg wet weight					
				Mean	SD	SEM	Median	Min	Max
Alaska Blackfish	Whole Body	3	0	0.074	0.013	0.007	0.07	0.064	0.088
Alaska Blackfish	C-Whole Body	3	0	0.119	0.098	0.056	0.108	0.028	0.222
Burbot	Fillet	58	1	0.387	1.302	0.171	0.108	0.051	8.84
Burbot	Liver	5	0	0.618	0.28	0.125	0.566	0.345	1.06
Longnose Sucker	Fillet	3	3	ND	NA	NA	ND	0.025	0.025
Longnose Sucker	Whole Body	2	0	0.18	0.057	0.04	0.18	0.14	0.22
Northern Pike	Fillet	538	124	0.161	0.197	0.008	0.108	0.018	3.32
Northern Pike	Whole Body	40	12	0.102	0.073	0.012	0.081	0.025	0.24
NS Stickleback	C-Whole Body	13	0	0.146	0.158	0.044	0.103	0.03	0.64
Slimy Sculpin	Whole Body	66	0	0.215	0.129	0.016	0.175	0.051	0.59
Slimy Sculpin	C-Whole Body	15	5	0.162	0.202	0.052	0.12	0.025	0.77
TS Stickleback	Whole Body	3	0	0.063	0.014	0.008	0.06	0.052	0.079
TS Stickleback	C-Whole Body	8	0	0.448	0.385	0.136	0.42	0.034	1.22

Note:

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ND = non-detect

Mean = arithmetic mean

SD = standard deviation

SEM = standard error

C = Composite of multiple individuals

Reporting limits: As, Cd, Cu, Pb = 0.05 mg/Kg; Se = 0.25 mg/Kg; Hg = 0.01 mg/Kg

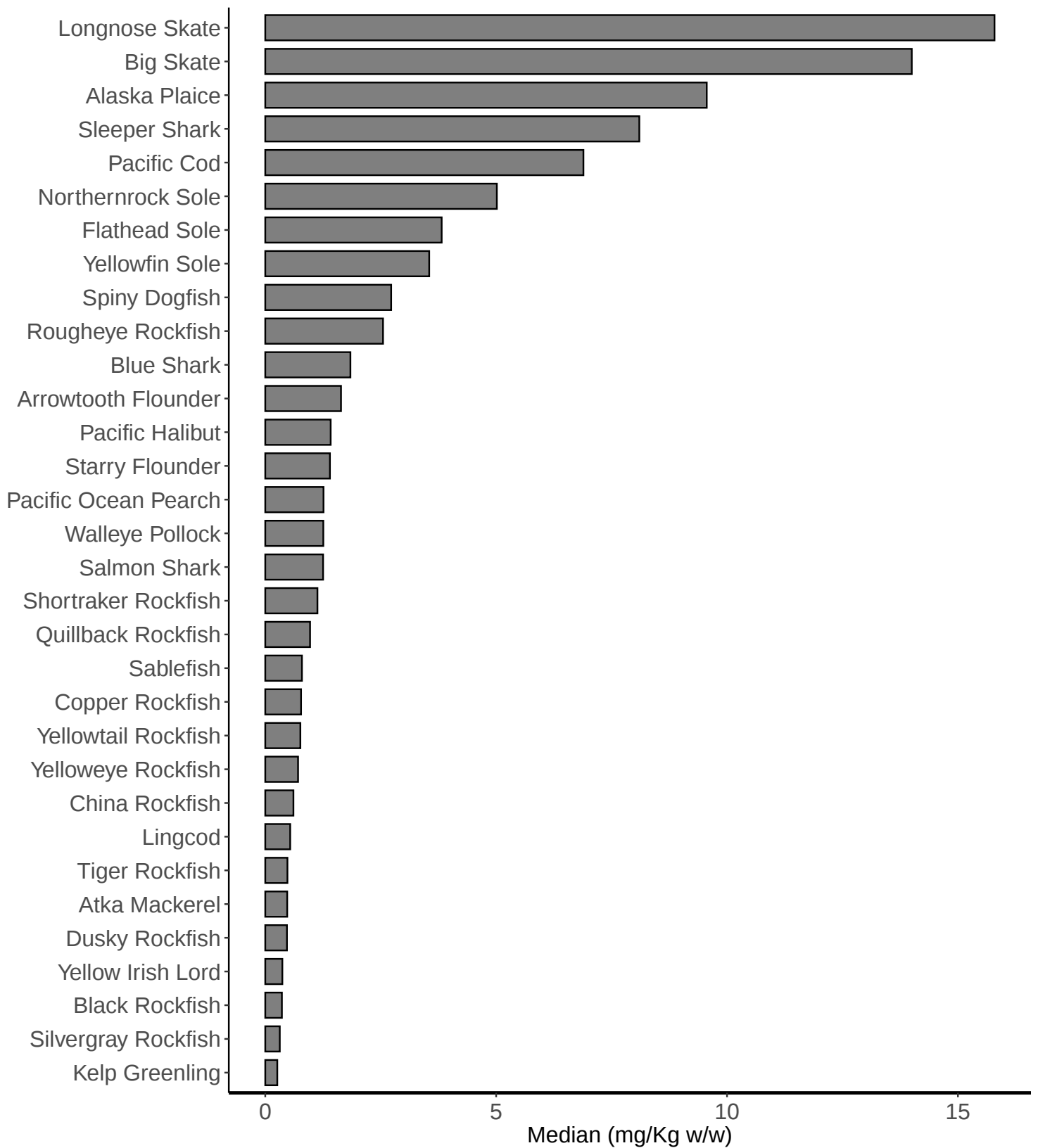


Figure 1: Total Arsenic in Marine Fish

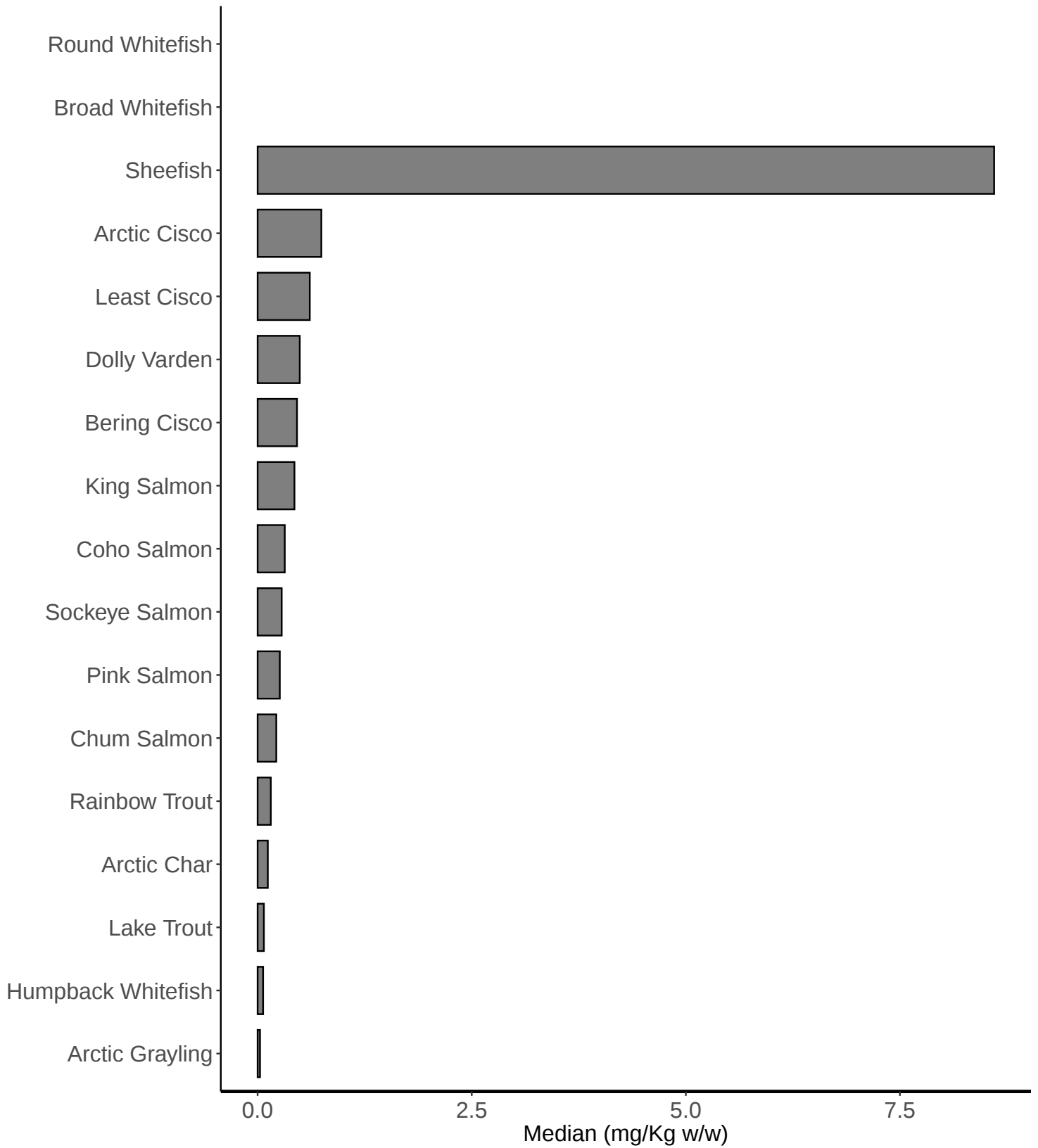


Figure 2: Total Arsenic in Salmonids

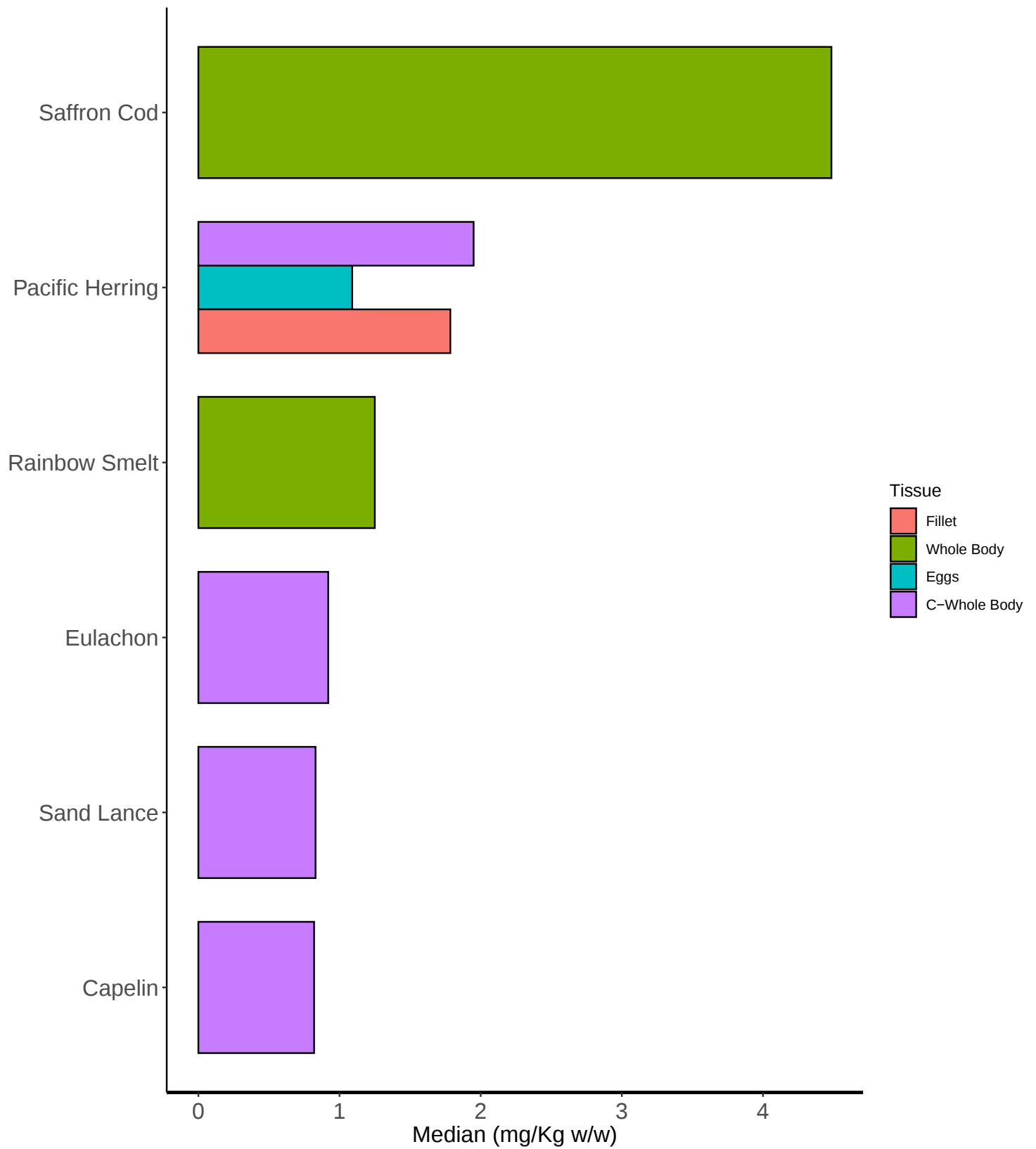


Figure 3: Total Arsenic in Forage Fish

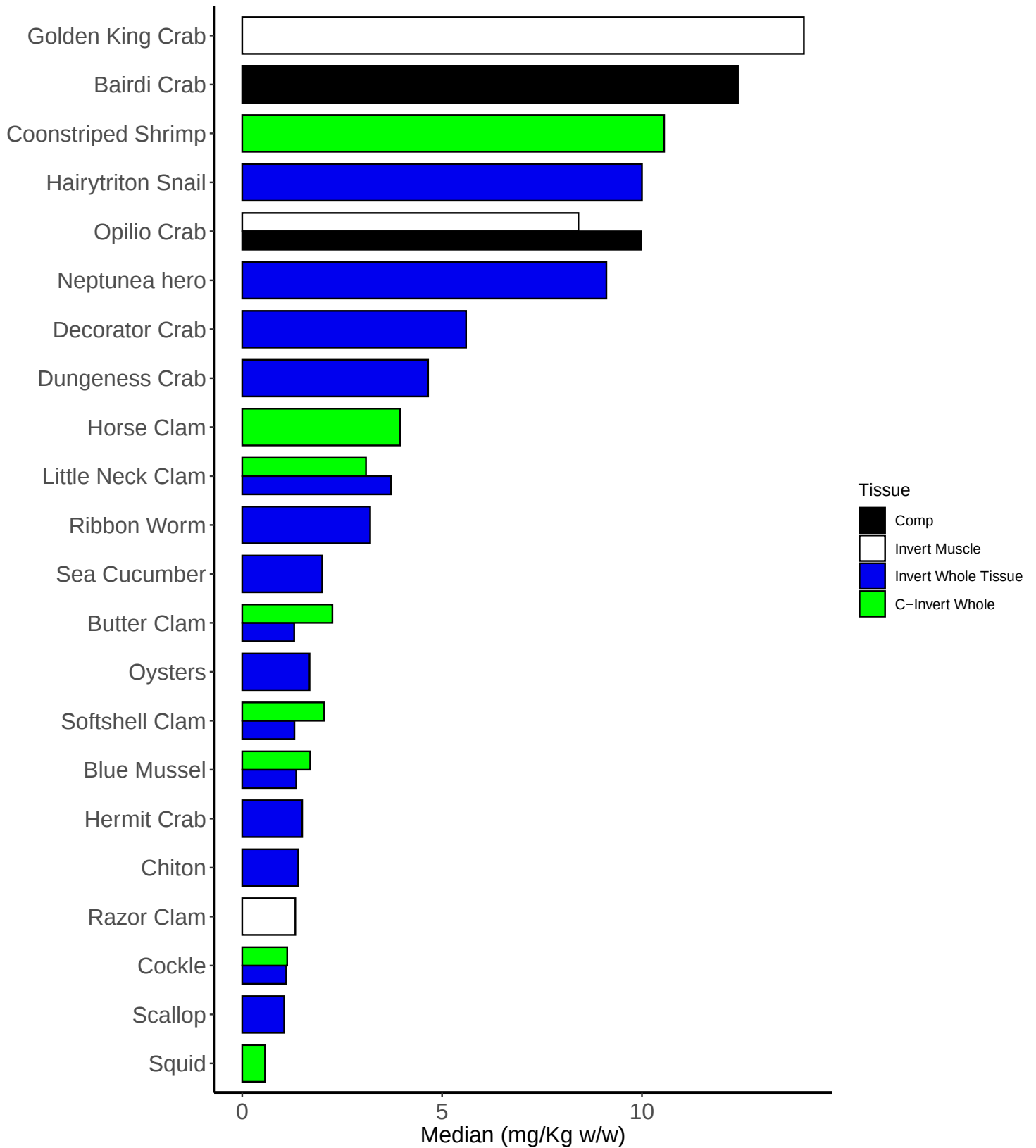


Figure 4: Total Arsenic in Marine Invertebrates

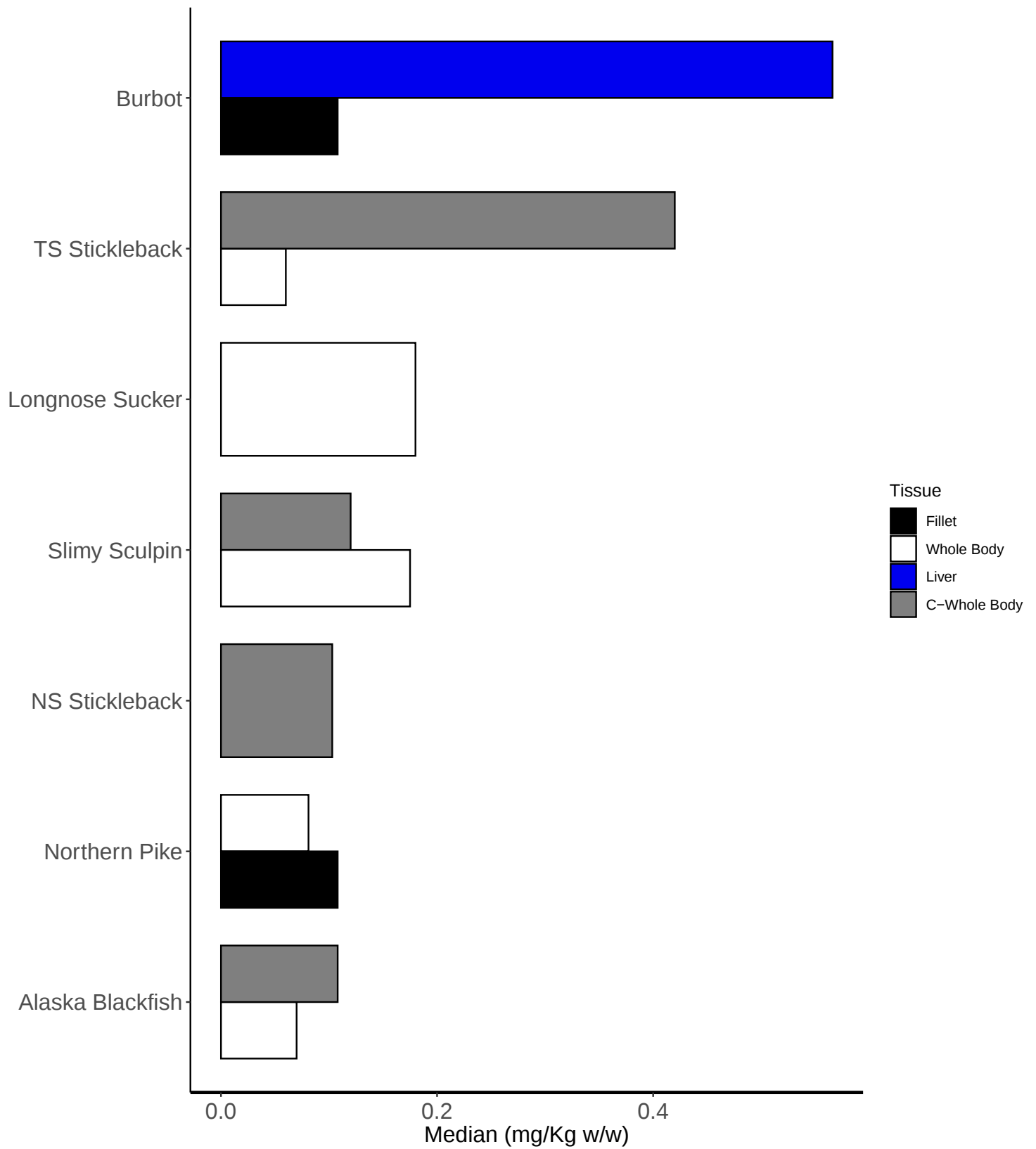


Figure 5: Total Arsenic in Freshwater Fish