



## Alaska Department of Environmental Conservation

### Office of the State Veterinarian

#### Fish Monitoring Program

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## Per- and polyfluoroalkyl substances (PFAS) in Alaska's Fish

**Fish Samples collected: 2009-2010**

**Concentration in ng/g wet weight (parts per billion)**

ND = Non-detect (less than the method detection level)

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: Occurance of PFAS Compounds in Alaskan Salmon**

Species	Tissue	COMPOUND	n	Occurance(%)	Mean
Coho Salmon	Fillet	PFBA	53	0.00	
Coho Salmon	Fillet	PFDA	53	1.89	2.54
Coho Salmon	Fillet	PFDoA	53	1.89	3.24
Coho Salmon	Fillet	PFOA	53	1.89	14.10
Coho Salmon	Fillet	PFOS	53	1.89	12.30
Coho Salmon	Whole Body	PFBA	54	0.00	
Coho Salmon	Whole Body	PFDA	54	0.00	
Coho Salmon	Whole Body	PFDoA	54	0.00	
Coho Salmon	Whole Body	PFOA	54	0.00	
Coho Salmon	Whole Body	PFOS	54	0.00	
King Salmon	Fillet	PFBA	33	0.00	
King Salmon	Fillet	PFDA	33	0.00	
King Salmon	Fillet	PFDoA	33	0.00	
King Salmon	Fillet	PFOA	33	0.00	
King Salmon	Fillet	PFOS	33	3.03	9.83
King Salmon	Whole Body	PFBA	15	20.00	5.22
King Salmon	Whole Body	PFDA	15	0.00	
King Salmon	Whole Body	PFDoA	15	0.00	
King Salmon	Whole Body	PFOA	15	0.00	
King Salmon	Whole Body	PFOS	15	0.00	
Sockeye Salmon	Fillet	PFBA	13	0.00	
Sockeye Salmon	Fillet	PFDA	13	0.00	
Sockeye Salmon	Fillet	PFDoA	13	0.00	
Sockeye Salmon	Fillet	PFOA	13	0.00	
Sockeye Salmon	Fillet	PFOS	13	0.00	
Sockeye Salmon	Whole Body	PFBA	11	0.00	
Sockeye Salmon	Whole Body	PFDA	11	0.00	
Sockeye Salmon	Whole Body	PFDoA	11	0.00	
Sockeye Salmon	Whole Body	PFOA	11	0.00	
Sockeye Salmon	Whole Body	PFOS	11	0.00	

n = Sample Size; Mean = Arithmetic Mean Occurance = Percent of fish tested with detectable levels of PFAS

Table 2: PFAS in Salmon

ng/g wet weight

Species	Tissue	COMPOUND	n	Non_Detect	Mean	SD
Coho Salmon	Fillet	PFBA	53	53	ND	NA
Coho Salmon	Fillet	PFBS	53	53	ND	NA
Coho Salmon	Fillet	PFDA	53	52	2.54	NA
Coho Salmon	Fillet	PFDoA	53	52	3.24	NA
Coho Salmon	Fillet	PFHpA	53	53	ND	NA
Coho Salmon	Fillet	PFHxA	53	53	ND	NA
Coho Salmon	Fillet	PFHxS	53	53	ND	NA
Coho Salmon	Fillet	PFNA	53	53	ND	NA
Coho Salmon	Fillet	PFOA	53	52	14.1	NA
Coho Salmon	Fillet	PFOS	53	52	12.3	NA
Coho Salmon	Fillet	PFOSA	53	53	ND	NA
Coho Salmon	Fillet	PFPeA	53	53	ND	NA
Coho Salmon	Fillet	PFUnA	53	53	ND	NA
Coho Salmon	Whole Body	PFBA	54	54	ND	NA
Coho Salmon	Whole Body	PFBS	54	54	ND	NA
Coho Salmon	Whole Body	PFDA	54	54	ND	NA
Coho Salmon	Whole Body	PFDoA	54	54	ND	NA
Coho Salmon	Whole Body	PFHpA	54	54	ND	NA
Coho Salmon	Whole Body	PFHxA	54	54	ND	NA
Coho Salmon	Whole Body	PFHxS	54	54	ND	NA
Coho Salmon	Whole Body	PFNA	54	54	ND	NA
Coho Salmon	Whole Body	PFOA	54	54	ND	NA
Coho Salmon	Whole Body	PFOS	54	54	ND	NA
Coho Salmon	Whole Body	PFOSA	54	54	ND	NA
Coho Salmon	Whole Body	PFPeA	54	54	ND	NA
Coho Salmon	Whole Body	PFUnA	54	54	ND	NA
Coho Salmon	Eggs	PFBA	15	15	ND	NA
Coho Salmon	Eggs	PFBS	15	15	ND	NA
Coho Salmon	Eggs	PFDA	15	15	ND	NA
Coho Salmon	Eggs	PFDoA	15	15	ND	NA
Coho Salmon	Eggs	PFHpA	15	15	ND	NA
Coho Salmon	Eggs	PFHxA	15	15	ND	NA
Coho Salmon	Eggs	PFHxS	15	15	ND	NA
Coho Salmon	Eggs	PFNA	15	15	ND	NA
Coho Salmon	Eggs	PFOA	15	15	ND	NA
Coho Salmon	Eggs	PFOS	15	11	8.1975	2.398421
Coho Salmon	Eggs	PFOSA	15	15	ND	NA
Coho Salmon	Eggs	PFPeA	15	15	ND	NA
Coho Salmon	Eggs	PFUnA	15	9	4.583333	2.071952
Coho Salmon	C_Fry	PFBA	6	6	ND	NA
Coho Salmon	C_Fry	PFBS	6	6	ND	NA
Coho Salmon	C_Fry	PFDA	6	6	ND	NA

Species	Tissue	COMPOUND	n	Non_Detect	Mean	SD
Coho Salmon	C_Fry	PFDoA	6	6	ND	NA
Coho Salmon	C_Fry	PFHpA	6	6	ND	NA
Coho Salmon	C_Fry	PFHxA	6	6	ND	NA
Coho Salmon	C_Fry	PFHxS	6	6	ND	NA
Coho Salmon	C_Fry	PFNA	6	6	ND	NA
Coho Salmon	C_Fry	PFOA	6	6	ND	NA
Coho Salmon	C_Fry	PFOS	6	6	ND	NA
Coho Salmon	C_Fry	PFOSA	6	6	ND	NA
Coho Salmon	C_Fry	PFPeA	6	6	ND	NA
Coho Salmon	C_Fry	PFUnA	6	6	ND	NA
Coho Salmon	Juvenile_Whole	PFBA	7	7	ND	NA
Coho Salmon	Juvenile_Whole	PFBS	7	5	16.805	13.7108
Coho Salmon	Juvenile_Whole	PFDA	7	7	ND	NA
Coho Salmon	Juvenile_Whole	PFDoA	7	7	ND	NA
Coho Salmon	Juvenile_Whole	PFHpA	7	7	ND	NA
Coho Salmon	Juvenile_Whole	PFHxA	7	7	ND	NA
Coho Salmon	Juvenile_Whole	PFHxS	7	7	ND	NA
Coho Salmon	Juvenile_Whole	PFNA	7	7	ND	NA
Coho Salmon	Juvenile_Whole	PFOA	7	7	ND	NA
Coho Salmon	Juvenile_Whole	PFOS	7	7	ND	NA
Coho Salmon	Juvenile_Whole	PFOSA	7	7	ND	NA
Coho Salmon	Juvenile_Whole	PFPeA	7	7	ND	NA
Coho Salmon	Juvenile_Whole	PFUnA	7	7	ND	NA
King Salmon	Fillet	PFBA	33	33	ND	NA
King Salmon	Fillet	PFBS	33	33	ND	NA
King Salmon	Fillet	PFDA	33	33	ND	NA
King Salmon	Fillet	PFDoA	33	33	ND	NA
King Salmon	Fillet	PFHpA	33	33	ND	NA
King Salmon	Fillet	PFHxA	33	33	ND	NA
King Salmon	Fillet	PFHxS	33	33	ND	NA
King Salmon	Fillet	PFNA	33	33	ND	NA
King Salmon	Fillet	PFOA	33	33	ND	NA
King Salmon	Fillet	PFOS	33	32	9.83	NA
King Salmon	Fillet	PFOSA	33	33	ND	NA
King Salmon	Fillet	PFPeA	33	33	ND	NA
King Salmon	Fillet	PFUnA	33	33	ND	NA
King Salmon	Whole Body	PFBA	15	12	5.223333	2.901316
King Salmon	Whole Body	PFBS	15	15	ND	NA
King Salmon	Whole Body	PFDA	15	15	ND	NA
King Salmon	Whole Body	PFDoA	15	15	ND	NA
King Salmon	Whole Body	PFHpA	15	15	ND	NA
King Salmon	Whole Body	PFHxA	15	15	ND	NA
King Salmon	Whole Body	PFHxS	15	15	ND	NA
King Salmon	Whole Body	PFNA	15	15	ND	NA
King Salmon	Whole Body	PFOA	15	15	ND	NA
King Salmon	Whole Body	PFOS	15	15	ND	NA
King Salmon	Whole Body	PFOSA	15	15	ND	NA

Species	Tissue	COMPOUND	n	Non_Detect	Mean	SD
King Salmon	Whole Body	PFPeA	15	15	ND	NA
King Salmon	Whole Body	PFUnA	15	15	ND	NA
King Salmon	C_Fry	PFBA	7	7	ND	NA
King Salmon	C_Fry	PFBS	7	7	ND	NA
King Salmon	C_Fry	PFDA	7	7	ND	NA
King Salmon	C_Fry	PFDoA	7	7	ND	NA
King Salmon	C_Fry	PFHpA	7	7	ND	NA
King Salmon	C_Fry	PFHxA	7	7	ND	NA
King Salmon	C_Fry	PFHxS	7	7	ND	NA
King Salmon	C_Fry	PFNA	7	7	ND	NA
King Salmon	C_Fry	PFOA	7	7	ND	NA
King Salmon	C_Fry	PFOS	7	7	ND	NA
King Salmon	C_Fry	PFOSA	7	7	ND	NA
King Salmon	C_Fry	PFPeA	7	7	ND	NA
King Salmon	C_Fry	PFUnA	7	7	ND	NA
King Salmon	C_Juvenile	PFBA	3	3	ND	NA
King Salmon	C_Juvenile	PFBS	3	3	ND	NA
King Salmon	C_Juvenile	PFDA	3	3	ND	NA
King Salmon	C_Juvenile	PFDoA	3	3	ND	NA
King Salmon	C_Juvenile	PFHpA	3	3	ND	NA
King Salmon	C_Juvenile	PFHxA	3	3	ND	NA
King Salmon	C_Juvenile	PFHxS	3	3	ND	NA
King Salmon	C_Juvenile	PFNA	3	3	ND	NA
King Salmon	C_Juvenile	PFOA	3	3	ND	NA
King Salmon	C_Juvenile	PFOS	3	3	ND	NA
King Salmon	C_Juvenile	PFOSA	3	3	ND	NA
King Salmon	C_Juvenile	PFPeA	3	3	ND	NA
King Salmon	C_Juvenile	PFUnA	3	3	ND	NA
Sockeye Salmon	Fillet	PFBA	13	13	ND	NA
Sockeye Salmon	Fillet	PFBS	13	13	ND	NA
Sockeye Salmon	Fillet	PFDA	13	13	ND	NA
Sockeye Salmon	Fillet	PFDoA	13	13	ND	NA
Sockeye Salmon	Fillet	PFHpA	13	13	ND	NA
Sockeye Salmon	Fillet	PFHxA	13	13	ND	NA
Sockeye Salmon	Fillet	PFHxS	13	13	ND	NA
Sockeye Salmon	Fillet	PFNA	13	13	ND	NA
Sockeye Salmon	Fillet	PFOA	13	13	ND	NA
Sockeye Salmon	Fillet	PFOS	13	13	ND	NA
Sockeye Salmon	Fillet	PFOSA	13	13	ND	NA
Sockeye Salmon	Fillet	PFPeA	13	13	ND	NA
Sockeye Salmon	Fillet	PFUnA	13	13	ND	NA
Sockeye Salmon	Whole Body	PFBA	11	11	ND	NA
Sockeye Salmon	Whole Body	PFBS	11	11	ND	NA
Sockeye Salmon	Whole Body	PFDA	11	11	ND	NA
Sockeye Salmon	Whole Body	PFDoA	11	11	ND	NA
Sockeye Salmon	Whole Body	PFHpA	11	11	ND	NA
Sockeye Salmon	Whole Body	PFHxA	11	11	ND	NA

Species	Tissue	COMPOUND	n	Non_Detect	Mean	SD
Sockeye Salmon	Whole Body	PFHxS	11	11	ND	NA
Sockeye Salmon	Whole Body	PFNA	11	11	ND	NA
Sockeye Salmon	Whole Body	PFOA	11	11	ND	NA
Sockeye Salmon	Whole Body	PFOS	11	11	ND	NA
Sockeye Salmon	Whole Body	PFOSA	11	11	ND	NA
Sockeye Salmon	Whole Body	PFPeA	11	11	ND	NA
Sockeye Salmon	Whole Body	PFUnA	11	11	ND	NA
Sockeye Salmon	Eggs	PFBA	1	1	ND	NA
Sockeye Salmon	Eggs	PFBS	1	1	ND	NA
Sockeye Salmon	Eggs	PFDA	1	1	ND	NA
Sockeye Salmon	Eggs	PFDoA	1	1	ND	NA
Sockeye Salmon	Eggs	PFHpA	1	1	ND	NA
Sockeye Salmon	Eggs	PFHxA	1	1	ND	NA
Sockeye Salmon	Eggs	PFHxS	1	1	ND	NA
Sockeye Salmon	Eggs	PFNA	1	1	ND	NA
Sockeye Salmon	Eggs	PFOA	1	1	ND	NA
Sockeye Salmon	Eggs	PFOS	1	0	6.6	NA
Sockeye Salmon	Eggs	PFOSA	1	1	ND	NA
Sockeye Salmon	Eggs	PFPeA	1	1	ND	NA
Sockeye Salmon	Eggs	PFUnA	1	0	4.17	NA

n = Sample Size; Mean = Arithmetic Mean; SD = Standard Deviation; C = Composite of multiple individuals

**Table 3: PFAS Detection Limits**

ng/g wet weight

COMPOUND	Mean	SD	Median
PFBA	2.451679	0.0577171	2.46
PFBS	4.902595	0.1158119	4.93
PFDA	2.451679	0.0577171	2.46
PFDoA	2.451679	0.0577171	2.46
PFHpA	2.451679	0.0577171	2.46
PFHxA	2.451679	0.0577171	2.46
PFHxS	4.902595	0.1158119	4.93
PFNA	2.451679	0.0577171	2.46
PFOA	2.451679	0.0577171	2.46
PFOS	4.902595	0.1158119	4.93
PFOSA	2.451679	0.0577171	2.46
PFPeA	2.451679	0.0577171	2.46
PFUnA	2.451679	0.0577171	2.46

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n = Sample Size; Mean = Arithmetic Mean; SD = Standard Deviation

**Table 4: PFAS in Alaskan Marine Fish by Species and Tissue**

COMPOUND	Species	Tissue	n	Non_Detect	Mean	SD
PFBA	Eulachon	C_Whole Body	7	7	0.00	NA
PFBA	Pacific Cod	Fillet	5	5	0.00	NA
PFBA	Pacific Halibut	Fillet	20	20	0.00	NA
PFBA	Pacific Herring	C_Whole Body	10	10	0.00	NA
PFBS	Eulachon	C_Whole Body	7	7	0.00	NA
PFBS	Pacific Cod	Fillet	5	5	0.00	NA
PFBS	Pacific Halibut	Fillet	20	20	0.00	NA
PFBS	Pacific Herring	C_Whole Body	10	10	0.00	NA
PFDA	Eulachon	C_Whole Body	7	7	0.00	NA
PFDA	Pacific Cod	Fillet	5	5	0.00	NA
PFDA	Pacific Halibut	Fillet	20	20	0.00	NA
PFDA	Pacific Herring	C_Whole Body	10	10	0.00	NA
PFDoA	Eulachon	C_Whole Body	7	7	0.00	NA
PFDoA	Pacific Cod	Fillet	5	5	0.00	NA
PFDoA	Pacific Halibut	Fillet	20	20	0.00	NA
PFDoA	Pacific Herring	C_Whole Body	10	10	0.00	NA
PFHpA	Eulachon	C_Whole Body	7	7	0.00	NA
PFHpA	Pacific Cod	Fillet	5	5	0.00	NA
PFHpA	Pacific Halibut	Fillet	20	20	0.00	NA
PFHpA	Pacific Herring	C_Whole Body	10	10	0.00	NA
PFHxA	Eulachon	C_Whole Body	7	7	0.00	NA
PFHxA	Pacific Cod	Fillet	5	5	0.00	NA
PFHxA	Pacific Halibut	Fillet	20	20	0.00	NA
PFHxA	Pacific Herring	C_Whole Body	10	10	0.00	NA
PFHxS	Eulachon	C_Whole Body	7	7	0.00	NA
PFHxS	Pacific Cod	Fillet	5	5	0.00	NA
PFHxS	Pacific Halibut	Fillet	20	20	0.00	NA
PFHxS	Pacific Herring	C_Whole Body	10	10	0.00	NA
PFNA	Eulachon	C_Whole Body	7	7	0.00	NA
PFNA	Pacific Cod	Fillet	5	5	0.00	NA
PFNA	Pacific Halibut	Fillet	20	20	0.00	NA
PFNA	Pacific Herring	C_Whole Body	10	10	0.00	NA
PFOA	Eulachon	C_Whole Body	7	7	0.00	NA
PFOA	Pacific Cod	Fillet	5	5	0.00	NA
PFOA	Pacific Halibut	Fillet	20	20	0.00	NA
PFOA	Pacific Herring	C_Whole Body	10	10	0.00	NA
PFOS	Eulachon	C_Whole Body	7	7	0.00	NA
PFOS	Pacific Cod	Fillet	5	5	0.00	NA
PFOS	Pacific Halibut	Fillet	20	20	0.00	NA
PFOS	Pacific Herring	C_Whole Body	10	10	0.00	NA
PFOSA	Eulachon	C_Whole Body	7	7	0.00	NA
PFOSA	Pacific Cod	Fillet	5	5	0.00	NA
PFOSA	Pacific Halibut	Fillet	20	20	0.00	NA
PFOSA	Pacific Herring	C_Whole Body	10	10	0.00	NA
PFPeA	Eulachon	C_Whole Body	7	7	0.00	NA



COMPOUND	Species	Tissue	n	Non_Detect	Mean	SD
PFPeA	Pacific Cod	Fillet	5	5	0.00	NA
PFPeA	Pacific Halibut	Fillet	20	20	0.00	NA
PFPeA	Pacific Herring	C_Whole Body	10	10	0.00	NA
PFUnA	Eulachon	C_Whole Body	7	7	0.00	NA
PFUnA	Pacific Cod	Fillet	5	5	0.00	NA
PFUnA	Pacific Halibut	Fillet	20	20	0.00	NA
PFUnA	Pacific Herring	C_Whole Body	10	10	0.00	NA

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n = Sample Size; Mean = Arithmetic Mean; SD = Standard Deviation; C = Composite of multiple individuals