

Surface Water Quality Values for Bolio Lake Located on Fort Greely (Earth Info, 1993). All values are reported as mg/l unless otherwise specified.

	7/10/74	8/10/74	6/3/75	9/10/86	Maximum Contaminant Levels - MCLs as set forth in Alaska Drinking Water Standards (18 AAC 80)
Depth (m)	--	0.5	2	8	NS
Temperature (°C)	16.5	19.0	13.5	--	NS
Dissolved oxygen	10.2	9.8	--	--	NS
pH	8.8	9.2	--	7.8	6.5 (minimum) - 8.5 (maximum) ²
Alkalinity	41	44	40	41	NS
Bicarbonate	50	45	49	51	NS
Specific conductance	97	98	98	103	NS
Nitrogen - Ammonia	--	0.12	0.04	0.03	NS
Nitrogen - Nitrate	--	0.02	0.05	0.06	10 (as Nitrogen) ¹
Nitrogen - Nitrite	--	0.02	0.05	0.06	1 (as Nitrogen) ¹
Nitrogen - Total	--	1.1	0.72	--	10 (as Nitrogen) ¹
Phosphate - Ortho	--	--	0.03	--	NS
Sodium	--	--	1.3	1.0	250 ²
Magnesium	--	--	3.0	3.6	NS
Calcium	--	--	12.0	15.0	NS
Potassium	--	--	3.0	3.0	NS
Iron	--	--	220	170	0.3 ²
Silica	--	--	0.1	0.5	NS
Dissolved solids	--	--	0.11	--	500 ²
Fecal Coliform	--	0	--	10	NS

¹ - Primary MCL. ² - Secondary MCL. NS - No set standard.

Surface Water Quality Values for the Delta River Above Jarvis Creek Near Fort Greely. Collected Water Year October 1985 to September 1986 (U.S. Geological Survey 1988).

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

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YUKON ALASKA

640114145451800 - DELTA R AB JARVIS C NR FT CREELEY AK

WATER QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

	DATE	TIME	SAMPLE LOC- ATION, CROSS SECTION (FT FM L BANK) (000009)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE WATER (DEG C) (00010)	BARO- METRIC PRES- SURE (MM OF HG) (00025)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)				
	SEP												
	09...		1845	115	212	8.00	6.5	735	11.6	97			
	09...		1846	210	213	8.00	6.0	735	--	--			
	09...		1847	270	213	8.00	6.0	735	11.6	97			
	09...		1848	310	213	8.10	6.0	735	11.6	97			
	09...		1849	350	213	8.10	6.0	735	11.5	96			
DATE	TIME	STREAM WIDTH (FT) (00004)	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	COLOR (PLAT- INUM- COBALT UNITS) (00080)	TUR- BID- ITY (NTU) (00076)	OXYGEN DEMAND, CHEM- ICAL (HIGH LEVEL) (MG/L) (00340)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCHI FECAL, KF AGAR (COLS. PER AS) (00900)	HARD- NESS WH WAT TOT FLD MG/L AS CACO3 (00902)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00915)	CALCIUM DIS- SOLVED (MG/L AS CA) (00925)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	
SEP	09...	1900	420	3960	5	110	13	K2	K7	110	39	29	8.1
DATE	TIME	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LITY WH WAT TOTAL FIELD MG/L AS CACO3 (00410)	ALKA- LITY, CARBON- ATE IT-FLD (MG/L - CACO3) (99430)	BICAR- BONATE IT-FLD (MG/L AS HCO3) (99440)	CAR- BONATE IT-FLD (MG/L AS CO3) (99445)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SiO2) (00955)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L AS N) (70301)	NITRO- GEN, SUM OF NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)
SEP	09...	2.8	2.6	67	67	81	0	41	1.1	< 0.10	4.0	130	< 0.100
DATE	TIME	PHOS- PHORUS, ORTHOS, DIS- SOLVED (MG/L AS P) (00671)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC IN BOT- TOM MA- TERIAL (UG/G AS AS) (01003)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA) (01007)	BARIUM, RECOV. FM BOT- TOM MA- TERIAL (UG/G AS BA) (01008)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD) (01027)	CADMIUM RECOV. FM BOT- TOM MA- TERIAL (UG/G AS CD) (01028)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR) (01034)	CHRO- MIUM, RECOV. FM BOT- TOM MA- TERIAL (UG/G AS CR) (01029)	COBALT, RECOV. FM BOT- TOM MA- TERIAL (UG/G AS CO) (01038)	COPPER, RECOV. FM BOT- TOM MA- TERIAL (UG/L AS CU) (01042)	COPPER, RECOV. FM BOT- TOM MA- TERIAL (UG/G AS CU) (01043)
SEP	09...	0.010	7	21	100	90	< 1	< 1	30	10	10	28	10
DATE	TIME	IRON, TOTAL RECOV- ERABLE (UG/L AS FE) (01045)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	IRON, FM BOT- TOM MA- TERIAL (UG/G AS FE) (01170)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB) (01051)	LEAD, RECOV. FM BOT- TOM MA- TERIAL (UG/G AS PB) (01052)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN) (01055)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MANGA- NESE, RECOV. FM BOT- TOM MA- TERIAL (UG/G AS MN) (01053)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG) (71900)	MERCURY RECOV. FM BOT- TOM MA- TERIAL (UG/G AS HG) (71921)	NICKEL, RECOV. FM BOT- TOM MA- TERIAL (UG/G AS NI) (01068)	NICKEL, RECOV. FM BOT- TOM MA- TERIAL (UG/G AS NI) (01068)
SEP	09...	18000	24	6600	6	< 10	340	5	280	< 0.10	0.03	20	
DATE	TIME	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN) (01092)	ZINC, FM BOT- TOM MA- TERIAL (UG/G AS ZN) (01093)	SEDI- MENT, DIS- CHARGE, SUS- PENDE (MG/L) (80154)	SEDI- MENT, DIS- CHARGE, SUS- PENDE (MG/L) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .002 MM (70337)	SED. SUSP. FALL DIAM. % FINER THAN .004 MM (70338)	SED. SUSP. FALL DIAM. % FINER THAN .008 MM (70339)	SED. SUSP. FALL DIAM. % FINER THAN .016 MM (70340)	SED. SUSP. FALL DIAM. % FINER THAN .031 MM (70341)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
SEP	09...	< 1	60	40	1080	11500	8	11	15	21	26	36	
DATE	TIME	SED. SUSP. FALL DIAM. % FINER THAN .125 MM (70343)	SED. SUSP. FALL DIAM. % FINER THAN .250 MM (70344)	SED. SUSP. FALL DIAM. % FINER THAN .500 MM (70345)	SED. SUSP. FALL DIAM. % FINER THAN 1.00 MM (70346)	GROSS ALPHA, DIS- SOLVED (UG/L AS U-NAT) (80030)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT) (80040)	GROSS BETA, DIS- SOLVED (PCI/L AS CS-137) (03515)	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137) (03516)	GROSS BETA, DIS- SOLVED (PCI/L AS SR/ YT-90) (80050)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/ YT-90) (80060)	TANNIN AND LIGNIN (MG/L) (32240)	TANNIN AND LIGNIN (MG/L) (32240)
SEP	09...	52	85	99	100	0.8	8.4	2.9	7.7	2.3	6.6	< 1.0	
K NON-IDEAL COLONY COUNT													

K NON-IDEAL COLONY COUNT

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

YUKON ALASKA--Continued

640114145451800 - DELTA R AB JARVIS C NR FT GREELEY AK--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	DI-CHLORO-BROMO-METHANE TOTAL (UG/L) (32101)	CARBON-TETRA-CHLORIDE TOTAL (UG/L) (32102)	1,2-DI-CHLORO-ETHANE TOTAL (UG/L) (32103)	BROMO-FORM TOTAL (UG/L) (32104)	CHLORO-DI-BROMO-METHANE TOTAL (UG/L) (32105)	CHLORO-FORM TOTAL (UG/L) (32106)	TOLUENE TOTAL (UG/L) (34010)	BENZENE TOTAL (UG/L) (34030)	ACE-NAPHTH-YLENE TOTAL (UG/L) (34200)	ACE-NAPHTH-YLENE BOT.MAT (UG/KG) (34203)	ACE-NAPHTH-ENE TOTAL (UG/L) (34205)	
SEP 09...	1900	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<5.0	<200	<5.0	
DATE	TIME	ACE-NAPHTH-ENE BOT.MAT (UG/KG) (34208)	ANTHRA-CENE TOTAL (UG/L) (34220)	ANTHRA-CENE BOT.MAT (UG/KG) (34223)	BENZO B FLUOR-AN-THENE TOTAL (UG/L) (34230)	BENZO B FLUOR-AN-THENE BOT.MAT (UG/KG) (34233)	BENZO K FLUOR-AN-THENE TOTAL (UG/L) (34242)	BENZO K FLUOR-AN-THENE BOT.MAT (UG/KG) (34245)	BENZO-A-PYRENE TOTAL (UG/L) (34247)	BENZO-A-PYRENE BOT.MAT (UG/KG) (34250)	BIS (2-CHLORO-ETHYL) ETHER TOTAL (UG/L) (34273)	BIS (2-CHLORO-ETHYL) ETHER BOT.MAT (UG/KG) (34276)	BIS (2-CHLORO-ETHOXY) METHANE TOTAL (UG/L) (34278)
SEP 09...	<200	<5.0	<200	<10.0	<400	<10.0	<400	<10.0	<400	<5.0	<200	<5.0	
DATE	TIME	BIS (2-CHLORO-ETHOXY) METHANE BOT.MAT (UG/KG) (34281)	BIS (2-CHLORO-ISO-PROPYL) ETHER TOTAL (UG/L) (34283)	BIS (2-CHLORO-ISO-PROPYL) ETHER BOT.MAT (UG/KG) (34286)	N-BUTYL BENZYL PHTHAL-ATE TOTAL (UG/L) (34292)	N-BUTYL BENZYL PHTHAL-ATE BOT.MAT (UG/KG) (34295)	CHLORO-BENZENE TOTAL (UG/L) (34301)	CHLORO-ETHANE TOTAL (UG/L) (34311)	CHRY-SENE TOTAL (UG/L) (34320)	CHRY-SENE BOT.MAT (UG/KG) (34323)	DIETHYL PHTHAL-ATE TOTAL (UG/L) (34336)	DIETHYL PHTHAL-ATE BOT.MAT (UG/KG) (34339)	DI-METHYL PHTHAL-ATE TOTAL (UG/L) (34341)
SEP 09...	<200	<5.0	<200	<5.0	<200	<3.0	<3.0	<10.0	<400	<5.0	<200	<5.0	
DATE	TIME	DI-METHYL PHTHAL-ATE BOT.MAT (UG/KG) (34344)	ETHYL-BENZENE TOTAL (UG/L) (34371)	FLUOR-ANTHENE TOTAL (UG/L) (34376)	FLUOR-ANTHENE BOT.MAT (UG/KG) (34379)	FLUOR-ENE TOTAL (UG/L) (34381)	FLUOR-ENE BOT.MAT (UG/L) (34384)	HEXA-CHLORO-CYCLO-PENT-ADIENE TOTAL (UG/L) (34386)	HEXA-CHLORO-CYCLO-PENT-ADIENE BOT.MAT (UG/KG) (34389)	HEXA-CHLORO-ETHANE TOTAL (UG/L) (34396)	HEXA-CHLORO-ETHANE BOT.MAT (UG/KG) (34399)	INDENO (1,2,3-CD) PYRENE TOTAL (UG/L) (34403)	INDENO (1,2,3-CD) PYRENE BOT.MAT (UG/KG) (34406)
SEP 09...	<200	<3.0	<5.0	<200	<5.0	<200	<5.0	<200	<5.0	<200	<10.0	<200	
DATE	TIME	ISO-PHORONE TOTAL (UG/L) (34408)	ISO-PHORONE BOT.MAT (UG/KG) (34411)	METHYL-BROMIDE TOTAL (UG/L) (34413)	METHYL-CHLORIDE TOTAL (UG/L) (34418)	METHYL-ENE TOTAL (UG/L) (34423)	N-NITRO-SODI-N-PROPYL-AMINE TOTAL (UG/L) (34428)	N-NITRO-SODI-N-PROPYL-AMINE BOT.MAT (UG/KG) (34431)	N-NITRO-SODI-PHENYL-LAMINE TOTAL (UG/L) (34433)	N-NITRO-SODI-PHENYL-LAMINE BOT.MAT (UG/KG) (34436)	N-NITRO-SODI-METHYL-LAMINE TOTAL (UG/L) (34438)	N-NITRO-SODI-METHYL-LAMINE BOT.MAT (UG/KG) (34441)	NAPHTH-ALENE BOT.MAT (UG/KG) (34445)
SEP 09...	<5.0	<200	<3.0	<3.0	<3.0	<3.0	<5.0	<200	<5.0	<200	<5.0	<200	
DATE	TIME	NITRO-BENZENE TOTAL (UG/L) (34447)	NITRO-BENZENE BOT.MAT (UG/KG) (34450)	PARA-CHLORO-META-CRESOL TOTAL (UG/L) (34452)	PARA-CHLORO-META-CRESOL BOT.MAT (UG/KG) (34455)	PHENAN-THRENE TOTAL (UG/L) (34461)	PHENAN-THRENE BOT.MAT (UG/KG) (34464)	PYRENE TOTAL (UG/L) (34469)	PYRENE BOT.MAT (UG/KG) (34472)	TETRA-CHLORO-ETHYL-ENE TOTAL (UG/L) (34475)	TRI-CHLORO-FLUORO-METHANE TOTAL (UG/L) (34488)	1,1-DI-CHLORO-ETHANE TOTAL (UG/L) (34496)	1,1-DI-CHLORO-ETHYL-ENE TOTAL (UG/L) (34501)
SEP 09...	<5.0	<200	<5.0	<600	<5.0	<200	<5.0	<200	<3.0	<3.0	<3.0	<3.0	
DATE	TIME	1,1,1-TRI-CHLORO-ETHANE TOTAL (UG/L) (34506)	1,1,2-TRI-CHLORO-ETHANE TOTAL (UG/L) (34511)	1,1,2,2-TETRA-CHLORO-ETHANE TOTAL (UG/L) (34516)	BENZOGH I PERYL EN-1,12-BENZOP-ERYLENE TOTAL (UG/L) (34521)	BENZOGH I PERYL EN-1,12-BENZOP-ERYLENE BOT.MAT (UG/KG) (34524)	BENZO A ANTHRAC-ENE1,2-BENZANTHRACENE TOTAL (UG/L) (34526)	BENZO A ANTHRAC-ENE1,2-BENZANTHRACENE BOT.MAT (UG/KG) (34529)	1,2-DI-CHLORO-BENZENE TOTAL (UG/L) (34536)	1,2-DI-CHLORO-BENZENE BOT.MAT (UG/KG) (34539)	1,2-DI-CHLORO-PROPANE TOTAL (UG/L) (34541)	1,2-TRANSDI-CHLORO-ETHYL-ENE TOTAL (UG/L) (34546)	1,2,4-TRI-CHLORO-BENZENE TOTAL (UG/L) (34551)
SEP 09...	<3.0	<3.0	<3.0	<3.0	<10.0	<400	<10.0	<200	<3.0	<200	<3.0	<3.0	<5.0
DATE	TIME	1,2,4-TRI-CHLORO-BENZENE BOT.MAT (UG/KG) (34554)	1,2,5,6-DIBENZ-ANTHRA-CENE TOTAL (UG/L) (34556)	1,2,5,6-DIBENZ-ANTHRA-CENE BOT.MAT (UG/KG) (34559)	1,3-DI-CHLORO-PROPANE TOTAL (UG/L) (34561)	1,3-DI-CHLORO-BENZENE TOTAL (UG/L) (34566)	1,3-DI-CHLORO-BENZENE BOT.MAT (UG/KG) (34569)	1,4-DI-CHLORO-BENZENE TOTAL (UG/L) (34571)	1,4-DI-CHLORO-BENZENE BOT.MAT (UG/KG) (34574)	2-CHLORO-ETHYL-VINYL-ETHER TOTAL (UG/L) (34576)	2-CHLORO-NAPH-THALENE TOTAL (UG/L) (34581)	2-CHLORO-NAPH-THALENE BOT.MAT (UG/KG) (34584)	2-CHLORO-PHENOL TOTAL (UG/L) (34586)
SEP 09...	<200	<10.0	<400	<3.0	<3.0	<3.0	<200	<3.0	<200	<3.0	<5.0	<200	<6.0

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

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YUKON ALASKA--Continued

640114145451800 - DELTA R AB JARVIS C NR FT GREELEY AK--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	2-CHLORO-PHENOL BOT.MAT (UG/KG) (34589)	2-NITRO-PHENOL TOTAL (UG/L) (34591)	2-NITRO-PHENOL BOT.MAT (UG/KG) (34594)	DI-N-OCTYL-PHTHAL-ATE TOTAL (UG/L) (34596)	DI-N-OCTYL-PHTHAL-ATE BOT.MAT (UG/KG) (34599)	2,4-DI-CHLORO-PHENOL TOTAL (UG/L) (34601)	2,4-DI-CHLORO-PHENOL BOT.MAT (UG/KG) (34604)	2,4-DI-METHYL-PHENOL TOTAL (UG/L) (34606)	2,4-DP, IN BOT.MAT (UG/KG) (34609)	2,4-DI-NITRO-TOLUENE TOTAL (UG/L) (34611)	2,4-DI-NITRO-TOLUENE BOT.MAT (UG/KG) (34614)	2,4-DI-NITRO-PHENOL TOTAL (UG/L) (34616)
SEP 09...	<200	<6.0	<200	<10.0	<400	<6.0	<200	<6.0	<200	<5.0	<200	<20.0
DATE	2,4-DI-NITRO-PHENOL BOT.MAT (UG/KG) (34619)	2,4,6-TRI-CHLORO-PHENOL TOTAL (UG/L) (34621)	2,4,6-TRI-CHLORO-PHENOL BOT.MAT (UG/KG) (34624)	2,6-DI-NITRO-TOLUENE TOTAL (UG/L) (34626)	2,6-DI-NITRO-TOLUENE BOT.MAT (UG/KG) (34629)	4-BROMO-PHENYL ETHER TOTAL (UG/L) (34636)	4-BROMO-PHENYL ETHER BOT.MAT (UG/KG) (34639)	4-CHLORO-PHENYL ETHER TOTAL (UG/L) (34641)	4-NITRO-PHENOL TOTAL (UG/L) (34646)	4-NITRO-PHENOL BOT.MAT (UG/KG) (34649)	4,6-DINITRO-ORTHOCRESOL TOTAL (UG/L) (34657)	4,6-DINITRO-ORTHOCRESOL BOT.MAT (UG/KG) (34660)
SEP 09...	<600	<5.0	<600	<5.0	<200	<5.0	<200	<200	<30.0	<600	<30.0	<600
DATE	DI-CHLORO-DI-FLUORO-METHANE TOTAL (UG/L) (34668)	PHENOL (C6H-5OH) TOTAL (UG/L) (34694)	PHENOL (C6H-5OH) BOT.MAT (UG/KG) (34695)	NAPHTH-ALENE TOTAL (UG/L) (34696)	TRANS-1,3-DI-CHLORO-PROPENE TOTAL (UG/L) (34699)	CIS-1,3-DI-CHLORO-PROPENE TOTAL (UG/L) (34704)	DI-SYSTON TOTAL (UG/L) (39011)	PHORATE OTAL (UG/L) (39023)	PENTA-CHLORO-PHENOL TOTAL (UG/L) (39032)	PER-THANE TOTAL (UG/L) (39034)	PENTA-CHLORO-PHENOL BOT.MAT (UG/KG) (39061)	1,2-DIBROMO-ETHYLENE TOTAL (UG/L) (39082)
SEP 09...	<3.0	<6.0	<200	<5.0	<3.0	<3.0	<0.01	<0.01	<30.0	<0.1	<600	<3.0
DATE	BIS(2-ETHYL-HEXYL)PHTHAL-ATE TOTAL (UG/L) (39100)	BIS(2-ETHYL-HEXYL)PHTHAL-ATE BOT.MAT (UG/KG) (39102)	DI-N-BUTYL-PHTHAL-ATE TOTAL (UG/L) (39110)	DI-N-BUTYL-PHTHAL-ATE BOT.MAT (UG/KG) (39112)	VINYL-CHLO-RIDE TOTAL (UG/L) (39175)	TRI-CHLORO-ETHYLENE TOTAL (UG/L) (39180)	NAPH-THA-LENES, POLY-CHLOR. TOTAL (UG/L) (39250)	ALDRIN, TOTAL (UG/L) (39330)	LINDANE TOTAL (UG/L) (39340)	CHLOR-DANE, TOTAL (UG/L) (39350)	DDD, TOTAL (UG/L) (39360)	DDE, TOTAL (UG/L) (39365)
SEP 09...	<5.0	<200	<5.0	<200	<3.0	<3.0	<0.10	<0.010	<0.010	<0.1	<0.010	<0.010
DATE	DDT, TOTAL (UG/L) (39370)	DI-ELDRIN TOTAL (UG/L) (39380)	ENDO-SULFAN, TOTAL (UG/L) (39388)	ENDRIN, TOTAL (UG/L) (39390)	ETHION, TOTAL (UG/L) (39398)	TOX-APHENE, TOTAL (UG/L) (39400)	HEPTA-CHLOR, TOTAL (UG/L) (39410)	HEPTA-CHLOR EPOXIDE TOTAL (UG/L) (39420)	METH-OXY-CHLOR, TOTAL (UG/L) (39480)	PCB, TOTAL (UG/L) (39516)	MALA-THION, TOTAL (UG/L) (39530)	PARA-THION, TOTAL (UG/L) (39540)
SEP 09...	<0.010	<0.010	<0.010	<0.010	<0.01	<1	<0.010	<0.010	<0.01	<0.1	<0.01	<0.01
DATE	DI-AZINON, TOTAL (UG/L) (39570)	METHYL-PARA-THION, TOTAL (UG/L) (39600)	HEXA-CHLORO-BENZENE TOTAL (UG/L) (39700)	HEXA-CHLORO-BENZENE TOT. IN BOTTOM MATL. (UG/KG) (39701)	HEXA-CHLORO-BUT-ADIENE TOTAL (UG/L) (39702)	HEXA-CHLORO-BUT-ADIENE BOT.MAT (UG/KG) (39705)	MIREX, TOTAL (UG/L) (39755)	TOTAL TRI-THION (UG/L) (39786)	METHYL TRI-THION, TOTAL (UG/L) (39790)	STYRENE TOTAL (UG/L) (77128)	TNT TOTAL (UG/L) (81360)	RDX TOTAL (UG/L) (81364)
SEP 09...	<0.01	<0.01	<5.0	<200	<5.0	<200	<0.01	<0.01	<0.01	<3.0	<2.0	<2.0

Surface Water Quality Values for Bolio Lake Near Delta Junction. Collected Water Year October 1985 to September 1986 (U.S. Geological Survey 1988).

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ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS LAKE SITES

YUKON ALASKA

635342145503000 - BOLIO LK NR DELTA JUNCTION AK

WATER QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)				PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE WATER (DEG C) (00010)	BARO- METRIC PRES- SURE (MM OF HG) (00025)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)			
DATE	TIME	SAM- PLING DEPTH (FEET) (00003)						OXYGEN, DIS- SOLVED (MG/L) (00300)				
SEP												
10...	1115	0.50			100	7.60	10.5	735	9.6 89			
10...	1117	2.00			99	7.60	10.5	735	9.4 87			
10...	1119	3.00			99	7.60	10.0	735	9.4 87			
10...	1121	4.50			99	7.60	10.0	735	9.3 86			
10...	1123	6.00			99	7.60	10.0	735	9.2 85			
10...	1125	7.50			99	7.60	10.0	735	9.2 85			
10...	1127	9.00			99	7.60	10.0	735	9.3 86			
10...	1129	10.5			98	7.60	10.0	735	9.3 85			
10...	1131	12.0			98	7.70	10.0	735	9.2 85			
10...	1133	12.8			99	7.70	10.0	735	9.2 85			
DATE	TIME	SAM- PLING DEPTH (FEET) (00003)	COLOR (PLAT- INUM- COBALT UNITS) (00080)	TUR- BID- ITY (NTU) (00076)	OXYGEN DEMAND, CHEM- ICAL (HIGH LEVEL) (00340)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCGI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	HARD- NESS WH WAT MG/L AS CACO3 (00900)	HARD- NESS NONCARB TOT FLD MG/L AS CACO3 (00902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	
SEP 10...	1200	8.00	30	1.1	44	K10	<1	52	10	15	3.6	
DATE		SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY WH WAT MG/L AS CACO3 (00410)	ALKA- LINITY WH WAT MG/L AS CACO3 (00417)	ALKA- LINITY, CARBON- ATE IT-FLD (MG/L - CACO3) (99430)	BICAR- BONATE IT-FLD (MG/L AS HCO3) (99440)	CAR- BONATE IT-FLD (MG/L AS CO3) (99445)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)
SEP 10...	1.0	3.0	41	44	42	51	0	9.2	0.90	<0.10	0.5	
DATE		SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00630)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO- GEN, TOTAL (MG/L AS P) (00600)	PHOS- PHORUS, TOTAL (MG/L AS P) (00665)	PHOS- PHORUS, ORTHOPHOS- PHORUS, TOTAL (MG/L AS P) (00671)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC TOTAL IN BOT- TOM MA- TERIAL (UG/L AS AS) (01003)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA) (01007)
SEP 10...	59	0.058	0.064	0.034	0.80	0.86	0.016	0.004	1	8	<100	
DATE		BARIUM, RECOV- FM BOT- TOM MA- TERIAL (UG/G AS BA) (01008)	CADMIUM RECOV- FM BOT- TOM MA- TERIAL (UG/L AS CD) (01027)	CADMIUM RECOV- FM BOT- TOM MA- TERIAL (UG/G AS CD) (01028)	CHRO- MIUM, RECOV- FM BOT- TOM MA- TERIAL (UG/G) (01029)	COBALT, RECOV- FM BOT- TOM MA- TERIAL (UG/G AS CO) (01038)	COPPER, RECOV- FM BOT- TOM MA- TERIAL (UG/L AS CU) (01042)	COPPER, RECOV- FM BOT- TOM MA- TERIAL (UG/G AS CU) (01043)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE) (01045)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	IRON, RECOV- FM BOT- TOM MA- TERIAL (UG/G AS FE) (01170)	
SEP 10...	70	<1	1	10	20	7	3	240	170	7600		
DATE		LEAD, TOTAL RECOV- ERABLE (UG/L AS PB) (01051)	LEAD, RECOV- FM BOT- TOM MA- TERIAL (UG/G AS PB) (01052)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN) (01055)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MANGA- NESE, RECOV- FM BOT- TOM MA- TERIAL (UG/G) (01053)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG) (71900)	MERCURY RECOV- FM BOT- TOM MA- TERIAL (UG/G AS HG) (71921)	NICKEL, RECOV- FM BOT- TOM MA- TERIAL (UG/G AS NI) (01068)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN) (01092)	
SEP 10...	<5	10	20	9	140	<0.10	0.34	20	1	10		
K NON-IDEAL COLONY COUNT												

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS LAKE SITES

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YUKON ALASKA--Continued

635342145503000 - BOLIO LK NR DELTA JUNCTION AK--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		ZINC, RECOV. FM BOT- TOM MA- TERIAL (UG/G AS 2N) (01093)	GROSS ALPHA, DIS- SOLVED (UG/L AS U-NAT) (80030)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT) (80040)	GROSS BETA, DIS- SOLVED (PCI/L AS CS-137) (03515)	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137) (03516)	GROSS BETA, DIS- SOLVED (PCI/L AS YT-90) (80050)	GROSS BETA, SUSP. TOTAL (PCI/L AS YT-90) (80060)	TANNIN AND LIGNIN (MG/L) (32240)	CHLOR-A PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70954)		
SEP 10...		80	< 0.4	< 0.4	4.3	< 0.4	3.7	< 0.4	1.1	5.40	0.300		
DATE	TIME	DI- CHLORO- BROMO- METHANE TOTAL (UG/L) (32101)	CARBON- TETRA- CHLO- RIDE TOTAL (UG/L) (32102)	1,2-DI- CHLORO- ETHANE TOTAL (UG/L) (32103)	BROMO- FORM TOTAL (UG/L) (32104)	CHLORO- DI- BROMO- METHANE TOTAL (UG/L) (32105)	CHLORO- FORM TOTAL (UG/L) (32106)	TOLUENE TOTAL (UG/L) (34010)	BENZENE TOTAL (UG/L) (34030)	ACE- NAPHTH- YLENE TOTAL (UG/L) (34200)	ACE- NAPHTH- YLENE BOT. MAT (UG/KG) (34203)	ACE- NAPHTH- ENE TOTAL (UG/L) (34205)	
SEP 10...	1200	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 5.0	< 200	< 5.0	
DATE		ACE- NAPHTH- ENE BOT. MAT (UG/KG) (34208)	ANTHRA- CENE TOTAL (UG/L) (34220)	ANTHRA- CENE BOT. MAT (UG/KG) (34223)	BENZO B FLUOR- AN- THENE TOTAL (UG/L) (34230)	BENZO B FLUOR- AN- THENE BOT. MAT (UG/KG) (34233)	BENZO K FLUOR- AN- THENE TOTAL (UG/L) (34242)	BENZO K FLUOR- AN- THENE BOT. MAT (UG/L) (34245)	BENZO- A- PYRENE TOTAL (UG/L) (34247)	BENZO- A- PYRENE BOT. MAT (UG/KG) (34250)	BIS 2- CHLORO- ETHYL ETHER TOTAL (UG/L) (34273)	BIS 2- CHLORO- ETHYL ETHER BOT. MAT (UG/KG) (34276)	BIS 2- CHLORO- ETHOXY) METHANE TOTAL (UG/L) (34278)
SEP 10...	< 200	< 5.0	< 200	< 10.0	< 400	< 10.0	< 400	< 10.0	< 400	< 5.0	< 200	< 5.0	
DATE		BIS (2- CHLORO- ETHOXY) METHANE BOT. MAT (UG/KG) (34281)	BIS (2- CHLORO- ISO- PROPYL) ETHER TOTAL (UG/L) (34283)	BIS (2- CHLORO- ISO- PROPYL) ETHER BOT. MAT (UG/KG) (34286)	N-BUTYL BENZYL PHTHAL- ATE TOTAL (UG/L) (34292)	N-BUTYL BENZYL PHTHAL- ATE BOT. MAT (UG/KG) (34295)	CHLORO- BENZENE TOTAL (UG/L) (34301)	CHLORO- ETHANE TOTAL (UG/L) (34311)	CHRY- SENE TOTAL (UG/L) (34320)	CHRY- SENE BOT. MAT (UG/KG) (34323)	DIETHYL PHTHAL- ATE TOTAL (UG/L) (34336)	DIETHYL PHTHAL- ATE BOT. MAT (UG/KG) (34339)	DI- METHYL PHTHAL- ATE TOTAL (UG/L) (34341)
SEP 10...	< 200	< 5.0	< 200	< 5.0	< 200	< 3.0	< 3.0	< 10.0	< 400	< 5.0	< 200	< 5.0	
DATE		DI- METHYL PHTHAL- ATE BOT. MAT (UG/KG) (34344)	ETHYL- BENZENE TOTAL (UG/L) (34371)	FLUOR- ANTHENE TOTAL (UG/L) (34376)	FLUOR- ANTHENE BOT. MAT (UG/KG) (34379)	FLUOR- ENE TOTAL (UG/L) (34381)	FLUOR- ENE BOT. MAT (UG/L) (34384)	HEXA- CHLORO- CYCLO- PENT- ADIENE TOTAL (UG/L) (34386)	HEXA- CHLORO- CYCLO- PENT- ADIENE BOT. MAT (UG/KG) (34389)	HEXA- CHLORO- ETHANE TOTAL (UG/L) (34396)	INDENO (1,2,3- CD) PYRENE TOTAL (UG/L) (34399)	INDENO (1,2,3- CD) PYRENE BOT. MAT (UG/KG) (34403)	INDENO (1,2,3- CD) PYRENE BOT. MAT (UG/KG) (34406)
SEP 10...	< 200	< 3.0	< 5.0	< 200	< 5.0	< 200	< 5.0	< 200	< 5.0	< 200	< 10.0	< 200	
DATE		ISO- PHORONE TOTAL (UG/L) (34408)	ISO- PHORONE BOT. MAT (UG/KG) (34411)	METHYL- BROMIDE TOTAL (UG/L) (34413)	METHYL- CHLO- RIDE TOTAL (UG/L) (34418)	METHYL- ENE CHLO- RIDE TOTAL (UG/L) (34423)	N- NITRO- SODI-N- PROPYL- AMINE TOTAL (UG/L) (34428)	N- NITRO- SODI-N- PROPYL- AMINE BOT. MAT (UG/KG) (34431)	N-NITRO -SODI- -PHENY- LAMINE TOTAL (UG/L) (34433)	N-NITRO -SODI- -PHENY- LAMINE BOT. MAT (UG/KG) (34436)	N-NITRO -SODI- -METHY- LAMINE TOTAL (UG/L) (34438)	N-NITRO -SODI- -METHY- LAMINE BOT. MAT (UG/KG) (34441)	NAPHTH- ALENE BOT. MAT (UG/KG) (34445)
SEP 10...	< 5.0	< 200	< 3.0	< 3.0	< 3.0	< 5.0	< 200	< 5.0	< 200	< 5.0	< 200	< 200	
DATE		NITRO- BENZENE TOTAL (UG/L) (34447)	NITRO- BENZENE BOT. MAT (UG/KG) (34450)	PARA- CHLORO- META CRESOL TOTAL (UG/L) (34452)	PARA- CHLORO- META CRESOL BOT. MAT (UG/KG) (34455)	PHENAN- THRENE TOTAL (UG/L) (34461)	PHENAN- THRENE BOT. MAT (UG/KG) (34464)	PYRENE TOTAL (UG/L) (34469)	PYRENE BOT. MAT (UG/KG) (34472)	TETRA- CHLORO- ETHYL- ENE TOTAL (UG/L) (34475)	TRI- CHLORO- FLUORO- METHANE TOTAL (UG/L) (34488)	1,1-DI- CHLORO- ETHANE TOTAL (UG/L) (34496)	1,1-DI- CHLORO- ETHYL- ENE TOTAL (UG/L) (34501)
SEP 10...	< 5.0	< 200	< 5.0	< 600	< 5.0	< 200	< 5.0	< 200	< 3.0	< 3.0	< 3.0	< 3.0	

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS LAKE SITES

YUKON ALASKA--Continued

635342145503000 - BOLIO LK NR DELTA JUNCTION AK--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	1,1,1-TRI-CHLORO-ETHANE TOTAL (UG/L) (34506)	1,1,2-TRI-CHLORO-ETHANE TOTAL (UG/L) (34511)	1,1,2,2-TETRA-CHLORO-ETHANE TOTAL (UG/L) (34516)	BENZOGH I PERYL-ENE1,12-BENZOP-ERYLENE TOTAL (UG/L) (34521)	BENZOGH I PERYL-ENE1,12-BENZOP-ERYLENE BOT.MAT (UG/KG) (34524)	BENZO A ANTHRAC-ENE1,2-BENZANT-HRACENE TOTAL (UG/L) (34526)	BENZO A ANTHRAC-ENE1,2-BENZANT-HRACENE BOT.MAT (UG/KG) (34529)	1,2-DI-CHLORO-BENZENE TOTAL (UG/L) (34536)	1,2-DI-CHLORO-BENZENE BOT.MAT (UG/KG) (34539)	1,2-DI-CHLORO-PROPANE TOTAL (UG/L) (34541)	1,2-TRANSDI-CHLORO-ETHYL-ENE TOTAL (UG/L) (34546)	1,2,4-TRI-CHLORO-BENZENE TOTAL (UG/L) (34551)
SEP 10...	< 3.0	< 3.0	< 3.0	< 10.0	< 400	< 10.0	< 200	< 3.0	< 200	< 3.0	< 3.0	< 5.0
DATE	1,2,4-TRI-CHLORO-BENZENE BOT.MAT (UG/KG) (34554)	1,2,5,6-DIBENZ-ANTHRA-CENE TOTAL (UG/L) (34556)	1,2,5,6-DIBENZ-ANTHRA-CENE BOT.MAT (UG/KG) (34559)	1,3-DI-CHLORO-PROPANE TOTAL (UG/L) (34561)	1,3-DI-CHLORO-BENZENE TOTAL (UG/L) (34566)	1,3-DI-CHLORO-BENZENE BOT.MAT (UG/KG) (34569)	1,4-DI-CHLORO-BENZENE TOTAL (UG/L) (34571)	1,4-DI-CHLORO-BENZENE BOT.MAT (UG/KG) (34574)	2-CHLORO-ETHYL-VINYL-ETHER TOTAL (UG/L) (34576)	2-CHLORO-NAPH-THALENE TOTAL (UG/L) (34581)	2-CHLORO-NAPH-THALENE BOT.MAT (UG/KG) (34584)	2-CHLORO-PHENOL TOTAL (UG/L) (34586)
SEP 10...	< 200	< 10.0	< 400	< 3.0	< 3.0	< 200	< 3.0	< 200	< 3.0	< 5.0	< 200	< 6.0
DATE	2-CHLORO-PHENOL BOT.MAT (UG/KG) (34589)	2-NITRO-PHENOL TOTAL (UG/L) (34591)	2-NITRO-PHENOL BOT.MAT (UG/KG) (34594)	DI-N-OCTYL-PHTHAL-ATE TOTAL (UG/L) (34596)	DI-N-OCTYL-PHTHAL-ATE BOT.MAT (UG/KG) (34599)	2,4-DI-CHLORO-PHENOL TOTAL (UG/L) (34601)	2,4-DI-CHLORO-PHENOL BOT.MAT (UG/KG) (34604)	2,4-DI-METHYL-PHENOL TOTAL (UG/L) (34606)	2,4-DP-IN-BOTTOM MAT. TOTAL (UG/KG) (34609)	2,4-DI-NITRO-TOLUENE TOTAL (UG/L) (34611)	2,4-DI-NITRO-TOLUENE BOT.MAT (UG/KG) (34614)	2,4-DI-NITRO-PHENOL TOTAL (UG/L) (34616)
SEP 10...	< 200	< 6.0	< 200	< 10.0	< 400	< 6.0	< 200	< 6.0	< 200	< 5.0	< 200	< 20.0
DATE	2,4-DI-NITRO-PHENOL BOT.MAT (UG/KG) (34619)	2,4,6-TRI-CHLORO-PHENOL TOTAL (UG/L) (34621)	2,4,6-TRI-CHLORO-PHENOL BOT.MAT (UG/KG) (34624)	2,6-DI-NITRO-TOLUENE TOTAL (UG/L) (34626)	2,6-DI-NITRO-TOLUENE BOT.MAT (UG/KG) (34629)	4-BROMO-PHENYL-ETHER TOTAL (UG/L) (34636)	4-BROMO-PHENYL-ETHER BOT.MAT (UG/KG) (34639)	4-CHLORO-PHENYL-ETHER TOTAL (UG/L) (34641)	4-NITRO-PHENOL TOTAL (UG/L) (34646)	4-NITRO-PHENOL BOT.MAT (UG/KG) (34649)	4,6-DINITRO-ORTHO-CRESOL TOTAL (UG/L) (34657)	4,6-DINITRO-ORTHO-CRESOL BOT.MAT (UG/KG) (34660)
SEP 10...	< 600	< 5.0	< 600	< 5.0	< 200	< 5.0	< 200	< 200	< 30.0	< 600	< 30.0	< 600
DATE	DI-CHLORO-DI-FLUORO-METHANE TOTAL (UG/L) (34668)	PHENOL (C6H-5OH) TOTAL (UG/L) (34694)	PHENOL (C6H-5OH) BOT.MAT (UG/KG) (34695)	NAPHTH-ALENE TOTAL (UG/L) (34696)	TRANS-1,3-DI-CHLORO-PROPENE TOTAL (UG/L) (34699)	CIS-1,3-DI-CHLORO-PROPENE TOTAL (UG/L) (34704)	PENTA-CHLORO-PHENOL TOTAL (UG/L) (39032)	PER-TIANE TOTAL (UG/L) (39034)	PENTA-CHLORO-PHENOL BOT.MAT (UG/KG) (39061)	1,2-DIBROMO-ETHYL-ENE TOTAL (UG/L) (39082)	BIS(2-ETHYL-HEXYL)-PHTHAL-ATE TOTAL (UG/L) (39100)	BIS(2-ETHYL-HEXYL)-PHTHAL-ATE BOT.MAT (UG/KG) (39102)
SEP 10...	< 3.0	< 6.0	< 200	< 5.0	< 3.0	< 3.0	< 30.0	< 0.1	< 600	< 3.0	< 5.0	< 200
DATE	DI-N-BUTYL-PHTHAL-ATE TOTAL (UG/L) (39110)	DI-N-BUTYL-PHTHAL-ATE BOT.MAT (UG/KG) (39112)	VINYL-CHLO-RIDE TOTAL (UG/L) (39175)	TRI-CHLORO-ETHYL-ENE TOTAL (UG/L) (39180)	NAPH-THA-LENES, POLY-CHLOR. TOTAL (UG/L) (39250)	ALDRIN TOTAL (UG/L) (39330)	LINDANE TOTAL (UG/L) (39340)	CHLOR-DANE TOTAL (UG/L) (39350)	DDD TOTAL (UG/L) (39360)	DDE TOTAL (UG/L) (39365)	DDT TOTAL (UG/L) (39370)	DI-ELDRIN TOTAL (UG/L) (39380)
SEP 10...	< 5.0	< 200	< 3.0	< 3.0	< 0.10	< 0.010	< 0.010	< 0.1	< 0.010	< 0.010	< 0.010	< 0.010
DATE	ENDO-SULFAN, TOTAL (UG/L) (39388)	ENDRIN, TOTAL (UG/L) (39390)	ETHION, TOTAL (UG/L) (39398)	TOX-APHENE, TOTAL (UG/L) (39400)	HEPTA-CHLOR, TOTAL (UG/L) (39410)	HEPTA-CHLOR-EPOXIDE TOTAL (UG/L) (39420)	METH-OXY-CHLOR, TOTAL (UG/L) (39480)	PCB, TOTAL (UG/L) (39516)	MALA-THION, TOTAL (UG/L) (39530)	PARA-THION, TOTAL (UG/L) (39540)	DI-AZINON, TOTAL (UG/L) (39570)	
SEP 10...	< 0.010	< 0.010	< 0.01	< 1	< 0.010	< 0.010	< 0.01	< 0.1	< 0.01	< 0.01	< 0.01	
DATE	METHYL-PARA-THION, TOTAL (UG/L) (39600)	HEXA-CHLORO-BENZENE TOTAL (UG/L) (39700)	HEXA-CHLORO-TOT. IN BOTTOM MATL. TOTAL (UG/KG) (39701)	HEXA-CHLORO-ADIENE TOTAL (UG/L) (39702)	HEXA-CHLORO-BUT-ADIENE BOT.MAT (UG/KG) (39705)	MIREX, TOTAL (UG/L) (39755)	TOTAL TRI-THION TOTAL (UG/L) (39786)	METHYL TRI-THION, TOTAL (UG/L) (39790)	STYRENE TOTAL (UG/L) (77128)	TNT TOTAL (UG/L) (81360)	RDX TOTAL (UG/L) (81364)	
SEP 10...	< 0.01	< 5.0	< 200	< 5.0	< 200	< 0.01	< 0.01	< 0.01	< 3.0	< 2.0	< 2.0	

Primary Maximum Contaminant Levels (MCLs) for Inorganic Chemical Contaminants for a Public Water System (Alaska Drinking Water Standards (18 AAC 80)). MCL refers to the maximum permissible level of a contaminant in water that is delivered to any user of a public water system.

Parameter	Maximum Contaminant Level (mg/l)
Antimony	0.006
Arsenic	0.05
Asbestos	7 Million Fibers/liter
Barium	2
Beryllium	0.004
Cadmium	0.005
Chromium	0.1
Cyanide (as free cyanide)	0.2
Fluoride	4.0
Mercury	0.002
Nickel	0.1
Nitrate	10 (as Nitrogen)
Nitrite	1 (as Nitrogen)
Total Nitrate and Nitrite	10 (as Nitrogen)
Selenium	0.05
Thallium	0.002

Secondary Maximum Contaminant Levels (MCLs) for a Public Water System (Alaska Drinking Water Standards (18 AAC 80)).

Parameter	Maximum Contaminant Level (mg/l)
Aluminum	0.2
Chloride	250
Color	15 color units
Copper	1.0
Corrosivity	Noncorrosive
Fluoride	2.0
Foaming Agents	0.5
Iron	0.3
Manganese	0.05
Odor	3 threshold odor number
pH	6.5 (minimum) - 8.5 (maximum)
Silver	0.1
Sodium	250
Sulfate	250
Total Dissolved Solids	500
Zinc	5

Available Water Quality Data for Streams In or Near the Withdrawal Areas As Collected By the U.S. Geological Survey.

Stream	Water Quality Records By Year		
	Chemical	Sediment	Biological
Delta River at Black Rapids	1949; 1951-53; 1955-58; 1974-75	None	1975
Delta River above Jarvis Creek near Fort Greely	1986	1986	1986
Jarvis Creek near Delta Junction	1949; 1951; 1953-56; 1974-75; 1978-79	1955	1974-75
Delta River near Big Delta	1955-58; 1966; 1975; 1978-79	None	1975
Little Gerstle River near Big Delta	1949; 1951-53; 1955-58	None	None
Gerstle River near Big Delta	1949; 1951-58; 1966; 1978-79	None	None
Tanana River 18 miles above Gerstle River near Delta Junction	1978-79	None	None
Tanana River at Big Delta	1948-52; 1953; 1955-58; 1971; 1975; 1978-79	None	None
Chena River Site 1 near North Pole	1973	None	1973
Chena River Site 2 near North Pole	1973	None	1973
Chena River Site 3 near North Pole	1973	None	1973
Chena River Site 4 near North Pole	1973	None	1973
Chena River Site 5 near North Pole	1973	None	1973
Chena River Site 6 near North Pole	1973	None	1973
Chena River Site 7 near North Pole	1972-73	None	1973
Chena River Site 8 near North Pole	1973	None	1973
Chena River Site 9 near North Pole	1973	None	1973
Chena River Site 10 near North Pole	1973	None	1973
Chena River Site 11 near North Pole	1973	None	1973
Chena River Site 12 near North Pole	1973	None	1973
Chena River Near North Pole	1972-75	1972-75	1973
Chena River below Mullen Slough near Eielson AFB	1973	None	1973
Little Chena River near Fairbanks	1961-62; 1967-68; 1971-74; 1979	1962; 1967-68; 1972-74	1973

Available Water Quality Data for Streams In or Near the Withdrawal Areas As Collected By the U.S. Geological Survey.

Stream	Water Quality Records By Year		
	Chemical	Sediment	Biological
Chena River above Chena Slough near Fairbanks	1971-72	None	1971
Chena River near Fairbanks	1970-71	None	1970-71
Salcha River near Salchaket	1948-58; 1967-68; 1970-72; 1974-76	1963; 1967-68; 1970-72; 1974-76	None
Little Salcha River near Salchaket	1951-53; 1955-56	None	None
Tanana River at Fairbanks	1974-76	1975; 1977-82	None
Chena River at Fort Wainwright	1958-60	None	None
Chena River at Fairbanks	1948-52; 1953; 1954-58; 1963-64; 1967-72; 1974-76; 1983-84	1954-56; 1962-71; 1972	None

Significance of Water Quality Parameters Measured at Fort Wainwright Yukon Training Area and Fort Greely West and East Training Areas

Chemical Analysis

PH is one of the primary indicators used for evaluation of surface water quality. Most aquatic biota are sensitive to pH variations. Fish kills and reduction and change of other species result when the pH is altered outside their tolerance limit. Most of the aquatic species prefer a pH near neutral but can withstand a pH in the range of about 6 to 8.5 (Novotny and Olem 1994).

Water quality investigations and toxicity studies indicate that the dissolved oxygen content is the most important parameter for protecting fish and aquatic biota. The level of protection can be classified into three groups. The first level of oxygen concentration would just permit the fish to live (prevention of fish kills). The second level would permit the fish or aquatic organisms to be active to a specified degree. The third level would allow the organisms to live, grow, and reproduce in a given area. Typically, fish kills occur when fish are exposed for a certain period of time (a few hours) to dissolved oxygen concentrations of less than 3 milligrams per liter (mg/l). Present standards provide, however, the third level of protection (Krenkel and Novotny 1980 *in* Novotny and Olem 1994).

For the general well-being of trout, salmon, and associated cold-water biota, the dissolved oxygen concentration should not be below 6.5 mg/l. Under extreme conditions, the concentration may range between 5 mg/l and 6 mg/l (second level of protection), provided that all other water quality parameters are within acceptable ranges (Novotny and Olem 1994).

Samples collected from the Chena River (Appendix 3.8.A) indicate that biological oxygen demand (BOD) and chemical oxygen demand (COD) would also be expected to be low in streams of Fort Wainwright Yukon Training Area. Most BOD values are below 1.0 mg/l and COD values range from 3 mg/l to 46 mg/l. These parameters are important to the assessment of the strength of domestic and industrial wastes discharged into natural water courses. BOD and COD also play an important role in the dissolved oxygen balance of streams (Novotny and Olem 1994).

Phosphate may be the limiting organic nutrient for phytoplankton (photosynthetic organisms of small size that drift on the water) production (U.S. Dept. of Interior and U.S. Dept. of Defense 1994a and 1994b). A study of biological data from the Chena River suggests that primary and secondary production are low (McCoy 1974). This is reflected by the presence of a large and diverse number of groups of aquatic insects and other benthic invertebrates that are typical of streams high in dissolved oxygen and low in productivity (the overall rate of organic matter production of a body of water). The most abundant benthic invertebrates are *Chironomidae* (midges), *Plecoptera* (stoneflies), *Ephemeroptera* (mayflies),

Trichoptera (caddis flies), *Simuliidae* (blackflies); Aquatic *Acari* (water mites) were common but less abundant components of the benthic fauna (McCoy 1974). Benthic invertebrates are important to the study of effects of pollution on a water body. Their occurrence and abundance reflects the biochemical-ecological status of the body of water (Novotny and Olem 1994).

Sediment Analysis

The effects of excessive sediment loading on receiving waters include the deterioration or destruction of aquatic habitat, deterioration of aesthetic value, and accumulation of bottom deposits that inhibit normal biological life. Sediment can destroy spawning areas and food sources, as well as directly harming fish, and other aquatic wildlife. Nutrients carried by the sediment can stimulate algal growths and, consequently, accelerate the process of eutrophication. Eutrophication refers to the natural and artificial addition of nutrients to bodies of water and to the effect of these added nutrients on water quality (Rohlich 1969 in Novotny and Olem 1994).

Sediment can be considered a major pollutant of bodies of water. Furthermore, sediment, especially its fine fractions, is a primary carrier of other pollutants such as organic components, metals, ammonium ions, phosphates, and many organic toxic compounds (Novotny and Olem 1994).

Appendix 3.8.E

Ice Bridge Permits

Permits from State of Alaska for Construction of Ice Bridges on Fort Wainwright and Fort Greely. Construction and use of the sites will occur during the months of November through March of each year.

Permit Name and Responsible Agency	Agency Permit Reference Number	Department of Army Reference Number	Valid Term
Fish Habitat Permit - Title 16 - State of Alaska Department of Fish and Game	FG94-III-0213	DACA85-9-95-19	10/20/94 - 3/30/99
Land Use Permit - State of Alaska Department of Natural Resources Division of Land	LAS 19277	DACA85-9-95-20	11/15/94 - 3/15/99
Fairbanks North Star Borough Land Use Permit - Division of Land Management	UA 91-012	DACA85-9-96-11	12/1/95 - 3/15/00
Temporary Water Use Permit - State of Alaska Department of Natural Resources Division of Mining and Water	LAS 13965 Amended	DACA85-9-93-13 Amendment #1	12/24/97 - 12/24/02

APPENDIX 3.9
Groundwater

Groundwater Quality at Fort Wainwright (Anderson 1970). All analyses were for dissolved constituents and are reported in milligrams per liter, except where noted.

	G-14 Eielson Air Force Base	G-15 Main Post Fort Wainwright	G-16 Between Chena River and Chena Hot Springs Road	Maximum Contaminant Levels - MCLs (18 AAC 80)
	9/7/65	5/2/62	9/27/66	11/10/94
Major aquifer	gravel	gravel	weathered bedrock	NS
Well depth	115.0	105.0	200.0	NS
Silica	28.0	19.0	35.0	NS
Iron	7.11	12.0	25.0	0.3 ²
Calcium	38.0	61.0	83.0	NS
Magnesium	9.7	11.0	30.0	NS
Sodium	7.5	5.2	15.0	250 ²
Potassium	0.8	3.4	2.6	NS
Bicarbonate	166.0	229.0	484.0	NS
Sulfate	15.0	19.0	0.0	250 ²
Chloride	4.6	3.5	0.0	250 ²
Fluoride	0.1	0.0	0.4	4 ¹
Nitrate	0.0	0.3	0.2	10 ²
Dissolved Solids	135.0	197.0	429.0	500 ²
Carbonate hardness (CaCO ₃)	135.0	188.0	332.0	NS
Noncarbonate hardness (CaCO ₃)	0.0	9.0	--	NS
Specific conductance	290.0	382.0	649.0	NS
pH	7.5	7.4	7.8	6.5-8.5
Color	15.0	5.0	10.0	NS

¹ - Primary MCL. ² - Secondary MCL. NS - No set standard.

**Groundwater Quality Data for Selected Well Sites Near Fort Greely
East Training Area (Anderson, 1970).** All analyses were for dissolved

constituents and are reported in milligrams per liter, except where noted.

	G-10 Donnelly Flats Air Force Base	G-11 U.S. Army Black Rapids Training Area	G-12 Fort Greely	G-13 Near Delta Junction	Maximum Contaminant Levels - MCLs as set forth in Alaska Drinking Water Standards (18 AAC 80)
	7/21/65	2/20/61	9/29/48	7/26/51	11/10/94
Specific conductance (micromhos per centimeter at 25°C)	377.0	312.0	313.0	248.0	NS
pH (standards units)	8.0	7.5	--	7.1	6.5-8.5 ²
Hardness (total)	197.0	154.0	156.0	116.0	NS
Hardness (noncarbonate)	25.0	52.0	36.0	--	NS
Calcium	46.0	35.0	46.0	31.0	NS
Magnesium	20.0	16.0	10.0	9.4	NS
Sodium	5.1	3.2	4.4	7.4	250 ²
Potassium	1.9	2.3	--	--	NS
Bicarbonate	210.0	124.0	146.0	112.0	NS
Sulfate	31.0	59.0	36.0	33.0	250 ²
Chloride	5.3	2.5	2.8	3.5	250 ²
Fluoride	0.3	0.2	0.1	--	4 ¹
Silica	11.0	4.3	10.0	13.0	NS
Nitrate as N	1.3	0.0	4.8	0.9	10 ²
Iron	0.02	0.02	0.04	--	0.3 ²
Major Aquifer	sandy-gravel	sandy-gravel	sandy-gravel	bedrock	NS
Well depth (feet)	102.0	110.0	198.0	230.0	NS

Groundwater Quality Data for Selected Well Sites Near Fort Greely East Training Area (Anderson, 1970). All analyses were for dissolved constituents and are reported in milligrams per liter, except where noted.

	G-10 Donnelly Flats Air Force Base	G-11 U.S. Army Black Rapids Training Area	G-12 Fort Greely	G-13 Near Delta Junction	Maximum Contaminant Levels - MCLs as set forth in Alaska Drinking Water Standards (18 AAC 80)
	7/21/65	2/20/61	9/29/48	7/26/51	11/10/94
Dissolved solids (residue on evaporation at 180°C)	225.0	184.0	186.0	153.0	500 ²

¹ - Primary MCL. ² - Secondary MCL. NS - No set standard.

APPENDIX 3.10
Wetlands

Areal Extent and Individual Wetland Types Identified by the USFWS Within the Fort Wainwright Yukon Training Area. A majority of the wetlands found within the Fort Wainwright Yukon Training Area are located along interior stream corridors and the Chena River-French-Moose Creek floodplain area.

NWI SYMBOL	DEFINITION					% OF MAPPED AREA
	System	Sub system	Class	Subclass	Water Regime	
L1UBH	Lacustrine	Limnetic	unconsolidated bottom	--	permanently flooded	<1%
L2AB3H	Lacustrine	Littoral	aquatic bed	rooted vascular	permanently flooded	<1%
P(FO/SS)4B	Palustrine	--	forested/scrub-shrub	needle-leaved evergreen	saturated	<1%
P(SS/EM)1B	Palustrine	--	scrub-shrub/emergent	broad-leaved deciduous/persistent	saturated	<1%
P(SS/EM)1C	Palustrine	--	scrub-shrub/emergent	broad-leaved deciduous/persistent	seasonally flooded	<1%
PAB3H	Palustrine	--	aquatic bed	rooted vascular	permanently flooded	<1%
PEM1C	Palustrine	--	emergent	persistent	seasonally flooded	<1%
PEM1F	Palustrine	--	emergent	persistent	semi-permanently flooded	<1%
PFO1A	Palustrine	--	forested	broad-leaved deciduous	temporarily flooded	<1%
PFO4/1B	Palustrine	--	forested	needle-leaved evergreen/broad-leaved deciduous	saturated	1%
PFO4/2B	Palustrine	--	forested	needle-leaved evergreen/needle-leaved deciduous	saturated	<1%
PFO4B	Palustrine	--	forested	needle-leaved evergreen	saturated	2%
PSS1/4B	Palustrine	--	scrub-shrub	broad-leaved deciduous/needle-leaved evergreen	saturated	<1%
PSS1A	Palustrine	--	scrub-shrub	broad-leaved deciduous	temporarily flooded	<1%
PSS1B	Palustrine	--	scrub-shrub	broad-leaved deciduous	saturated	6%

Areal Extent and Individual Wetland Types Identified by the USFWS Within the Fort Wainwright Yukon Training Area. A majority of the wetlands found within the Fort Wainwright Yukon Training Area are located along interior stream corridors and the Chena River-French-Moose Creek floodplain area.

NWI SYMBOL	DEFINITION					% OF MAPPED AREA
	System	Sub system	Class	Subclass	Water Regime	
PSS4/1B	Palustrine	--	scrub-shrub	needle-leaved evergreen/ broad-leaved deciduous	saturated	<0.1%
PSS4/2B	Palustrine	--	scrub-shrub	needle-leaved evergreen/ needle-leaved deciduous	saturated	6%
PSS4B	Palustrine	--	scrub-shrub	needle-leaved evergreen	saturated	6%
PUBH	Palustrine	--	unconsolidated bottom	--	semi- permanently flooded	<1%
R5UBH	Riverine	unknown perennial	unconsolidated bottom	---	permanently flooded	<1%
U	Upland					72%
NO NWI DATA						5%

Areal Extent and Individual Wetland Types Identified by the USFWS at Fort Greely. Even though a majority of the impact area, 54%, was not inventoried, it is likely that wetlands are dominant throughout the Lakes impact area.

NWI SYMBOL	DEFINITION					% OF MAPPED AREA
	System	Sub system	Class	Subclass	Water Regime	
L1UBH	Lacustrine	Limnetic	unconsolidated bottom	--	permanently flooded	<1%
L2AB3H	Lacustrine	Littoral	aquatic bed	rooted vascular	permanently flooded	<1%
L2USC	Lacustrine	Littoral	unconsolidated shore	--	seasonally flooded	<1%
P(SS/EM)1A	Palustrine	--	scrub-shrub/emergent	broad-leaved deciduous/persistent	temporarily flooded	1%
P(SS/EM)1B	Palustrine	--	scrub-shrub/emergent	broad-leaved deciduous/persistent	saturated	3%
P(SS/EM)1C	Palustrine	--	scrub-shrub/emergent	broad-leaved deciduous/persistent	seasonally flooded	1%
PAB3H	Palustrine	--	aquatic bed	rooted vascular	permanently flooded	<1%
PAB4H	Palustrine	--	aquatic bed	floating-leaved vascular	permanently flooded	<1%
PEM1B	Palustrine	--	emergent	persistent	saturated	<1%
PEM1C	Palustrine	--	emergent	persistent	seasonally flooded	<1%
PEM1F	Palustrine	--	emergent	persistent	semi-permanently flooded	<1%
PEM1H	Palustrine	--	emergent	persistent	permanently flooded	<1%
PFO1A	Palustrine	--	forested	broad-leaved deciduous	temporarily flooded	<1%
PFO2B	Palustrine	--	forested	needle-leaved deciduous	saturated	<1%
PFO4/1A	Palustrine	--	forested	needle-leaved evergreen/broad-leaved deciduous	temporarily flooded	<1%
PFO4/1B	Palustrine	--	forested	needle-leaved evergreen/broad-leaved deciduous	saturated	1%

Areal Extent and Individual Wetland Types Identified by the USFWS at Fort Greely. Even though a majority of the impact area, 54%, was not inventoried, it is likely that wetlands are dominant throughout the Lakes impact area.

NWI SYMBOL	DEFINITION					% OF MAPPED AREA
	System	Sub system	Class	Subclass	Water Regime	
PFO4/2B	Palustrine	--	forested	needle-leaved evergreen/ needle-leaved deciduous	saturated	<1%
PFO4B	Palustrine	--	forested	needle-leaved evergreen	saturated	5%
PSS1/4B	Palustrine	--	scrub-shrub	broad-leaved deciduous/ needle-leaved evergreen	saturated	<1%
PSS1A	Palustrine	--	scrub-shrub	broad-leaved deciduous	temporarily flooded	<1%
PSS1B	Palustrine	--	scrub-shrub	broad-leaved deciduous	saturated	5%
PSS2B	Palustrine	--	scrub-shrub	needle-leaved deciduous	saturated	<1%
PSS4/1B	Palustrine	--	scrub-shrub	needle-leaved evergreen/ broad-leaved deciduous	saturated	1%
PSS4B	Palustrine	--	scrub-shrub	needle-leaved evergreen	saturated	3%
PUBH	Palustrine	--	unconsolidated bottom	--	semi- permanently flooded	<1%
R5OWH	Riverine	unknown perennial	open water/unknown bottom	--	permanently flooded	<1%
R5UBH	Riverine	unknown perennial	unconsolidated bottom	--	permanently flooded	1%
R5USC	Riverine	unknown perennial	unconsolidated shore	--	seasonally flooded	2%
U	Upland					21%
NO NWI DATA						54%

A Description of the Hierarchical Wetland System Used by the U.S. Fish and Wildlife Service (Cowardin et al. 1979). Only three systems, palustrine, lacustrine, and riverine, out of five were identified in the Fort Wainwright Yukon Training Area and Fort Greely withdrawal area with a majority of wetlands in the area classified as palustrine.

Class	Definition	Description	Sub class	Definition	Plant/Animal species
Lacustrine - Nontidal and tidal-freshwater wetlands within an intermittently to permanently flooded lake or reservoir larger than 20 acres and (or) deeper than 6.6 feet. Vegetation, when present, is predominantly nonpersistent emergent plants and (or) floating plants.					
unconsolidated bottom	Includes all wetlands and deepwater habitats with at least 25% cover of particles smaller than stones, and a vegetative cover less than 30%.	Characterized by the lack of large stable surfaces for plant and animal attachment. They are usually found in areas with low energy and may be very unstable. There is usually a high correlation between the nature of the substrate and the number of species and individuals.			macroalgae, Macoma and the amphipod Melita; polychaete worm Chaetopterus
aquatic bed	Includes wetlands and deepwater habitats dominated by plants that grow principally on or below the surface of water for most of the growing season.	Represents a diverse group of plant communities that requires surface water for optimum growth and reproduction. They develop in areas with relatively permanent water or under conditions of repeated flooding.	rooted vascular	Rooted vascular plants occur at all depths within the photic zone, typically in areas where there is little water movement.	Pondweeds, horned pondweed (Zannichellia palustris), ditch grasses (Ruppia), wild celery, and waterweed (Elodea), riverweed (Postostemum ceratophyllum)
unconsolidated shore	Includes all wetland habitats that have three characteristics: (1) unconsolidated substrates with less than 75% areal cover of stones, boulders, or bedrock; (2) less than 30% areal cover of vegetation other than pioneering plants; and (3) seasonally flooded.	Characterized by substrates lacking vegetation except for pioneering plants. Erosion and deposition by waves and currents produce beaches, bars, and flats and are found adjacent to unconsolidated bottoms. The particle size of the substrate and the water regime determine types of plant and animal communities present.			
Palustrine - Nontidal and tidal-freshwater wetlands within intermittently to permanently flooded open-water bodies of less than 20 acres in which water is less than 6.6 feet deep. Vegetation is predominantly trees; shrubs; persistent or nonpersistent emergent, erect, rooted herbaceous plants; mosses and lichens; or submersed and floating plants.					

A Description of the Hierarchical Wetland System Used by the U.S. Fish and Wildlife Service (Cowardin et al. 1979). Only three systems, palustrine, lacustrine, and riverine, out of five were identified in the Fort Wainwright Yukon Training Area and Fort Greely withdrawal area with a majority of wetlands in the area classified as palustrine.

Class	Definition	Description	Sub class	Definition	Plant/Animal species
scrub-shrub	Includes areas dominated by woody vegetation less than 6 m tall. The species include true shrubs, young trees, and trees or shrubs that are small or stunted.	May represent a successional stage leading to a forested wetland or may be stable communities.	broad-leaved deciduous	Wetlands where trees and shrubs are predominantly deciduous and broad-leaved.	alders (<i>Alnus</i> spp.), willows (<i>Salix</i> spp.), buttonbush (<i>Cephalanthus occidentalis</i>), red osier dogwood (<i>Cornus stolonifera</i>), honeysuckle (<i>Zenobia pulverulenta</i>), spirea (<i>Spiraea douglasii</i>), bog birch (<i>Betula pumila</i>), and young red maple (<i>Acer rubrum</i>) or black spruce (<i>Picea mariana</i>).
			needle-leaved evergreen	young or stunted trees	black spruce or pond pine (<i>Pinus serotina</i>)
			needle-leaved deciduous	Wetlands where trees and shrubs are predominantly young or stunted deciduous and needle-leaved	tamarack or bald cypress (<i>Taxodium distichum</i>)
emergent	Characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens, which is present for most of the growing season. They are dominated by perennial plants.	Appearance remains constant in areas with stable climatic conditions. They are also known as marsh, meadow, fen, prairie pothole, and slough.	persistent	Dominated by species that normally remain standing at least until the beginning of the next growing season.	grasslike plants such as cattails (<i>Ilypha</i> spp.), bulrushes (<i>Scirpus</i> spp.), saw grass (<i>Cladium jamaicense</i>), sedges (<i>Carex</i> spp.); and true grasses such as reed (<i>Phragmites australis</i>), manna grasses (<i>Glyceria</i> spp.), slough grass (<i>Beckmannia syzigachne</i>), and whitetop (<i>Scolochloa festucacea</i>)

A Description of the Hierarchical Wetland System Used by the U.S. Fish and Wildlife Service (Cowardin et al. 1979). Only three systems, palustrine, lacustrine, and riverine, out of five were identified in the Fort Wainwright Yukon Training Area and Fort Greely withdrawal area with a majority of wetlands in the area classified as palustrine.

Class	Definition	Description	Sub class	Definition	Plant/Animal species
aquatic bed	Includes wetlands and deepwater habitats dominated by plants that grow principally on or below the surface of water for most of the growing season.	Represents a diverse group of plant communities that requires surface water for optimum growth and reproduction. They develop in areas with relatively permanent water or under conditions of repeated flooding.	rooted vascular	Rooted vascular plants occur at all depths within the photic zone, typically in areas where there is little water movement.	Pondweeds, horned pondweed (Zannichellia palustris), ditch grasses (Ruppia), wild celery, and waterweed (Elodea), riverweed (Postostemum ceratophyllum)
			floating-leaved vascular	Plants float freely either in the water or on its surface. Surface plants are found primarily in protected portions of slow-flowing rivers.	Surface plants include: duckweeds (Lemna, Spirodela), water lettuce (Pistia stratiotes), water hyacinth (Eichhornia crassipes), water nut (Trapa natans), water ferns (Salvinia spp.), and mosquito ferns (Azolla). Below-surface plants include: bladderworts (Utricularia), coontails (Ceratophyllum), and watermeal (Wolffia)
forested	Characterized by woody vegetation that is 6 m tall or taller.	They normally possess an overstory or trees, an understory of young trees or shrubs, and a herbaceous layer.	broad-leaved deciduous	Generally occur on mineral soils or highly decomposed organic soils.	
			needle-leaved evergreen		Black spruce on organic soils, Northern white cedar (Thuja occidentalis) on more nutrient poor soils.
			needle-leaved deciduous	Organic soils	Tamarack is characteristic of the Boreal Forest Region.
unconsolidated bottom	Includes all wetlands and deepwater habitats with at least 25% cover of particles smaller than stones, and a vegetative cover less than 30%.	Characterized by the lack of large stable surfaces for plant and animal attachment. They are usually found in areas with low energy and may be very unstable. There is usually a high correlation between the nature of the substrate and the number of species and individuals.			macroalgae, Macoma and the amphipod Melita; polychaete worm Chaetopterus

A Description of the Hierarchical Wetland System Used by the U.S. Fish and Wildlife Service (Cowardin et al. 1979). Only three systems, palustrine, lacustrine, and riverine, out of five were identified in the Fort Wainwright Yukon Training Area and Fort Greely withdrawal area with a majority of wetlands in the area classified as palustrine.

Class	Definition	Description	Sub class	Definition	Plant/Animal species
Riverine - Nontidal and tidal-freshwater wetlands within a channel. Vegetation, when present, is same as in the Lacustrine System.					
open water/ unknown bottom					
unconsolidated bottom	Includes all wetlands and deepwater habitats with at least 25% cover of particles smaller than stones, and a vegetative cover less than 30%.	Characterized by the lack of large stable surfaces for plant and animal attachment. They are usually found in areas with low energy and may be very unstable. There is usually a high correlation between the nature of the substrate and the number of species and individuals.		Substrate type is largely determined by current velocity, and plants and animals exhibit a high degree of morphologic and behavioral adaption to flowing water.	macroalgae, Macoma and the amphipod Melita; polychaete worm Chaetopterus
unconsolidated shore	Includes all wetland habitats that have three characteristics: (1) unconsolidated substrates with less than 75% areal cover of stones, boulders, or bedrock; (2) less than 30% areal cover of vegetation other than pioneering plants; and (3) seasonally flooded.	Characterized by substrates lacking vegetation except for pioneering plants. Erosion and deposition by waves and currents produce beaches, bars, and flats and are found adjacent to unconsolidated bottoms. The particle size of the substrate and the water regime determine types of plant and animal communities present.			

General Wetland Description

In general, land areas falling into one the following five categories are considered wetlands:

- (1) areas with hydrophytes and hydric soils, such as those commonly known as marshes, swamps, and bogs;
- (2) areas without hydrophytes but with hydric soils, such as flats where drastic fluctuation in water level, wave action, turbidity, or high concentration of salts may prevent the growth of hydrophytes;
- (3) areas with hydrophytes but nonhydric soils, such as margins of impoundments or excavations where hydrophytes have become established but hydric soils have not yet developed;
- (4) areas without soils but with hydrophytes such as the seaweed-covered portion of rocky shores; and
- (5) wetlands without soil and without hydrophytes, such as gravel beaches or rocky shores without vegetation (Cowardian et al. 1979).

Wetlands on the withdrawal areas of Fort Wainwright and Fort Greely are considered ombrotrophic bogs with hydrophytes and hydric soils which develop in areas whose principle supply of water is from the atmosphere. Bogs exist in most areas of Alaska because annual precipitation exceeds calculated annual evapotranspiration. In the Interior region, the water balance is controlled by the combination of low evapotranspiration rates and the presence of low permeability permafrost, which allows the development of wetlands under semiarid (less than 10 inches of precipitation per year) conditions.

Hydrologic Role of Alaskan Wetlands

Many Alaskan wetlands are affected by permafrost, due to its strong influence on infiltration rates. In discontinuous permafrost regions, whether a slope faces away from or toward the sun can determine the presence or absence of permafrost and thus influence the location and distribution of wetlands.

Wetlands underlain by permafrost play an important role in the local hydrologic regime of the withdrawal areas. Wetlands influence the general hydrologic response of a watershed by affecting the relationship between the amount of incoming precipitation, the amount of storm runoff generated and its associated peak; the amount of time between precipitation inputs and the greatest amount of storm discharge, known as lag time; and the amount of time until normal baseflow conditions are reestablished, known as recession time.

Spring snowmelt and its associated runoff is the single most important hydrologic event occurring in interior Alaska watersheds. During this time, wetlands have limited flood control or water storage functions due to several factors. Permafrost underlying wetlands at a shallow depth can limit storage capacity and promote rapid runoff. Also, wetland peats retain a large portion of the water released by thawing of seasonally frozen upper soils. As a result, there is little excess storage capacity for water entering the wetland from other sources. Due to the fact that wetland soils tend to have a large ice content during snowmelt, they probably do not contribute significantly either to flood storage or to groundwater recharge. Thus, peak flows are typically higher in permafrost dominated catchments. However, wetlands also help to relatively reduce peak flows, even when the soils are frozen. Water is detained behind hummocks (elevated areas composed of moss and grasses) and within depressions, and the velocity is slowed by vegetation.

Generally speaking, lag times for arctic and subarctic wetland catchments tend to be much shorter than those of their temperate counterparts. Because of the shallowness of the thawed layer, potential storage capacity of rainfall is quickly reached when permafrost is present, even when peat deposits are deep.

Longer recession times are associated with Alaskan wetlands due to the combination of storage and slow release by peats with high water retention capabilities and low evapotranspiration rates. However, during snowmelt runoff the ability of wetlands to attenuate streamflow is small.

The contribution of water from wetlands on the withdrawal areas to groundwater recharge is slight. Since the climate within continuous and discontinuous permafrost regions of Alaska is typically arid, summer precipitation is usually balanced by summer evapotranspiration. As a result, groundwater recharge would likely occur during spring snowmelt. However, due to the poor infiltration rates of underlying permafrost, recharge would likely not occur in wetland areas. In regions of discontinuous permafrost, recharge primarily occurs in locations free of permafrost with little or no contribution from wetlands.

Wetlands also play an important role in erosion control by decreasing wind and water velocities near the ground and by holding soil particles together with the roots of wetland vegetation. On the withdrawal area, wetlands provide insulation for underlying permafrost by preventing warming and eventual thawing of ice-rich soils. Wetlands bordering floodplains aid in erosion control in a limited capacity by removing suspended sediment from floodwaters. Wetland vegetation in these areas help to stabilize the riverbank, preventing streambank collapse and the widening and deepening of channels. Removal of wetland vegetation increases local erosive forces and creates large depressions in the land surface, known as thermokarst. This is caused by the thawing of permafrost and subsequent settling of the land.

The water chemistry of wetlands is primarily the result of geologic setting, water

balance, quality of inflowing water, type of soils and vegetation, and human activity within or near the wetland (Fretwell et al. 1996). In areas where wetland water quality reflects the contents of its direct water source, whether it be surface flow, precipitation, or groundwater, an accumulation of waterborne constituents may result. Wetlands can filter out or transform these constituents through a variety of biological and chemical processes depending upon the wetland's substrate, water, vegetation, and microbial populations. Overall, wetlands can maintain good quality water and improve degraded water.

Federal Protection of Wetlands

Modification of wetlands is controlled by the Federal government through Section 404 of the Clean Water Act. The Section 404 program was created as a result of the 1972 amendments to the Federal Water Pollution Control Act to control the discharge of dredged and fill materials into water of the United States. Specifically, this section prohibits a person from discharging or placing dredged or fill materials into navigable waters, which includes wetlands, without a permit. Dredged material is material that is excavated or dredged from the waters of the United States. Fill material is any material used for the primary purpose of replacing an aquatic area with dry land or of elevating the bottom of a body of water. Section 404 permits are required for a variety of projects such as channel construction and maintenance, fills to create dry land for development sites near water, and water-control projects such as dams and levees. The United States Army Corps of Engineers (USACE) and the Environmental Protection Agency (EPA) oversee the permitting program under Section 404. Section 404(c) gives the EPA power to veto any permits it deems harmful to surrounding resources.

In reviewing permit applications, the USACE must consider four basic questions relating to the guidelines set forth in the Section 404 program:

- (1) Is the proposed discharge the least damaging practical alternative?
- (2) Does the proposed discharge comply with other environmental standards or regulations?
- (3) Will the proposed discharge significantly degrade wetlands?
- (4) Have all the appropriate and practical steps been taken to minimize potential harm to the wetlands? (Fretwell et al. 1996)

In general, the USACE tries to balance the benefits an activity may provide against the costs it may incur. The permitting process requires the participation of other Federal agencies, state agencies, and the general public through various information collecting techniques. In addition, the cumulative effects of a dredge and fill project are taken into consideration when reviewing a permit application. As a result, a wetland mitigation plan is often required of the permit applicant.

Not all dredge and fill activities require a Section 404 permit. Exempted practices include farming activities; maintenance or reconstruction of dams, breakwaters, and other similar structures; operation of farm ponds or irrigation and drainage ditches; construction of temporary sediment basins; construction of farm roads, forest roads, or roads for mining; and activities under a state approved nonpoint source management program (CWA 404(f)(1); 22 U.S.C.A. 1344(f)(1)). The following table lists various wetland alterations. Unregulated methods include wetland drainage, the lowering of groundwater levels in areas adjacent to wetlands, permanent flooding of existing wetlands, deposition of material that is not specifically defined as dredged and fill material by the Clean Water Act, and wetland vegetation removal (Office of Technology Assessment 1984 in Fretwell et al. 1996).

Methods of Altering Wetlands. Not all methods of altering wetlands are regulated by Section 404. Unregulated methods include wetland drainage, the lowering of groundwater levels in areas adjacent to wetlands, permanent flooding of existing wetlands, deposition of material that is not specifically defined as dredged and fill material by the Clean Water Act, and wetland vegetation removal (Office of Technology Assessment 1984 in Fretwell et al. 1996).

Physical	
Filling	adding any material to raise the bottom level of wetland or to replace the wetland with dry land
Draining	removing the water from a wetland by ditching, tiling, pumping, and so forth
Excavating	dredging and removing soil and vegetation from a wetland
Diverting water away	preventing the flow of water into a wetland by removing water upstream, lowering lake levels, or lowering groundwater tables
Clearing	removing vegetation by burning, digging, application of herbicide, scraping, mowing, or otherwise cutting
Flooding	raising water levels, either behind dams, by pumping, or otherwise channeling water into a wetland
Diverting or withholding sediment	trapping sediment by constructing dams, channels, or other types of projects, thereby inhibiting wetland regeneration in natural deposition areas such as deltas
Shading	placing pile-supported platforms or bridges over wetlands, causing vegetation to die because of a lack of adequate sunlight
Conducting activities in adjacent areas	disrupting the interactions between wetlands and adjacent land areas, or incidentally affecting wetlands through activities at adjoining sites
Chemical	
Changing nutrient levels	increasing or decreasing nutrient levels within the local water and or soil system, forcing wetland plant community changes

Methods of Altering Wetlands. Not all methods of altering wetlands are regulated by Section 404. Unregulated methods include wetland drainage, the lowering of groundwater levels in areas adjacent to wetlands, permanent flooding of existing wetlands, deposition of material that is not specifically defined as dredged and fill material by the Clean Water Act, and wetland vegetation removal (Office of Technology Assessment 1984 in Fretwell et al. 1996).

Introducing toxics	adding toxic compounds to a wetland either intentionally (for example, herbicide treatment to reduce vegetation) or unintentionally, adversely affecting wetland plants and animals
Biological	
Grazing	consumption and compaction of vegetation by domestic or wild animals
Disrupting natural populations	reducing populations of existing species, introducing exotic species, or otherwise disturbing resident organisms

In addition to Section 404 of the Clean Water Act, wetlands are also safeguarded under Executive Order 11990, *Protection of Wetlands*. The purpose of this legislation, which was signed by President Carter in 1977, was to ensure protection and proper management of floodplains and wetlands by Federal agencies. The Executive Order requires Federal agencies to consider the direct and indirect adverse effects of their activities on floodplains and wetlands. This is done through the NEPA process by identifying wetland conflicts with regard to planned actions and review of projects and activities involving wetlands.

APPENDIX 3.11
Vegetation

Checklist of collected vascular plants arranged by family from Fort Wainwright Military Installation, Alaska, 1995 and two plants found on Fort Greely not in the list. (*)

Adiantaceae

Cryptogramma stelleri (S. Gmelin) Prantl

Adoxaceae

Adoxa moschatellina L.

Alismataceae

Alisma triviale Pursh

Sagittaria cuneata e. Sheldon

Apiaceae

*Bupleurum americanum**

Diduta bulbifera L.

Cicuta virosa L.

Cnidium cnidiifolium (Turcz.) Schischkin

Podustera macounii (J. Coulter & Rose) Mathias & Constance

Sium suave Walter

Apocynaceae

Apocynum androsaemifolium L.

Araceae

Calla palustris L.

Aspleniaceae

Athyrium filix-femina (L.) Roth

Cystopteris fragilis (L.) Bernh.

Dryopteris fragrans (L.) Schott

Gymnocarpium dryopteris (L.) Newman

Gymnocarpium robertianum (Hoffm.) Newman

Woodsia ilvensis (L.) R. Br.

Asteraceae

Achillea borealis Bong.

Achillea millefolium L.

Achillea sibirica Ledeb.

Antennaria friesiana (Trautv.) Ekman

Antennaria pulcherrima (Hook.) E. Greene

Antennaria rosea (D. C. Eaton) E. Greene

Anthemis cotula L.

Arnica alpina (L.) Olin ssp. *Attenuata* (E. Greene) Maguire

Arnica angustifolia M. Vahl

Arnica grisea Fern. ssp. *frigida* (C. Meyer ex Iljin) S. J. Wolf
Artemisia alaskana Rydb.
Artemisia arctica Less.
Artemisia frigida Willd.
Artemisia furcata m. Bieb.
Artemisia laciniata Willd.
Artemisia latifolia Ledeb. ssp. *ELATIOR* (Torr. & A. Gray) Hulten
Aster junciformis Rydb.
Aster sibiricus L.
Bidens cernua L.
Chrysanthemum leucanthemum L.
Cirsium arvense (L.) Scop.
Conyza canadensis (L.) Cronq.
Crepis elegans Hook.
Crepis tectorum L.
Erigeron acris L.
Erigeron caespitosus Nutt.
Erigeron compositus Pursh
Erigeron elatus e. Greene
Erigeron glabellus Nutt.
Erigeron lonchophyllus Hook.
Gaillardia pulchella Foug.
Gnaphalium uliginosum L.
Matricaria matricarioides (Less.) Porter
Petasites frigidus (L.) Franchet
Petasites nivalis e. Greene
Petasites sagittatus (Banks) A. Gray
Rubeckia hirta L.
Saussurea angustifolia (Willd.) DC.
Senecio atropurpureus (Ledeb.) B. Fedtsch.
Senecio atropurpureus (R. Br.) DC.
Senecio illugens Richardson
Senecio pauciflorus Pursh
Senecio tundricola Tolm.
Senecio vulgaris L.
Solidago canadensis L.
Solidago decumbens e. Greene
Solidago multiradiata Aiton
Sonchus arvensis L.
Sonchus asper (L.) Hill
Taraxacum ceratophorum (Ledeb.) DC.
Taraxacum officinale g. Weber
Tripleurospermum inodorum (L.) Schultz-Bip.

Balsaminaceae

Impatiens noli-tangere L.

Betulaceae

Alnus tenuifolia Nutt.
Alnus viridis ssp. *crispa* (Aiton) A. Loeve & D. Loeve
Betula glandulosa Michaux
Betula hybrids
Betula nana L.
Betula papyrifera Marshall

Boraginaceae

Lappula myosotis Moench
Mertensia paniculata (Aiton) G. Don
Plagiobothrys cognatus (E. Greene) I. M. Johnston

Brassicaceae

Arabis divaricarpa Nelson
Arabis hirsuta (L.) Scop.
Arabis holboellii Hornem.
Arabis lyrata L.
Barbarea orthoceras Ledeb.
Brassica rapa L.
Capsella bursa-pastoris (L.) Medikus
Cardamine pratensis L. ssp. *angustifolia* (Hook.) O. E. Schulz
Descurainia sophia (L.) Prantl
Descurainia sopheroides (Fischer) O. Schulz
Draba fladnizensis Wulfen
Draba glabella Pursh
Draba nemorosa L.
Erysimum cheiranthoides L. ssp. *Cheiranthoides*
Erysimum inconspicuum (S. Watson) Macmillan
Halimolobos mollis (Hook.) Rollins
Hesperis matronalis L.
Lepidium densiflorum Schrader
Hesperis matronalis L.
Parrya nudicaulis (L.) Regel
Rorippa barbareaefolia (DC.) Kitigawa
Rorippa curvisiliqua (Hook.) Besser
Rorippa palustris (L.) Besser ssp. *HISPIDA* (Desv.) Jonsell
Rorippa palustris (L.) Besser ssp. *PALUSTRIS*
Thlaspi arvense L.

Callitrichaceae

Callitriche verna L. emend. Kutz.

Campanulaceae

Campanula lasiocarpa Cham.
Campanula uniflora L.

Caprifoliaceae

Linnaea borealis L.

Viburnum edule (Michaux) Raf.

Caryophyllaceae

Dianthus barbatus L.

Gastrolychnis affinis (Vahl) Tolm. & Kozhanch.

Gastrolychnis ostenfeldii (A. Pors.) V. V. Petrovsky

Minuartia arctica (Steven) Asch. & Graebner

Minuartia yukonensis Hulten

Moehringia lateriflora (L.) Fenzl

Silene williamsii Britton

Spergularia rubra (L.) J. S. Presl & C. Presl

Stellaria borealis Bigelow ssp. BOREALIS

Stellaria calycantha (Ledeb.) Bong.

Stellaria crassifolia Ehrh.

Stellaria laeta Richardson

Stellaria longifolia Muhlenb. ex Willd.

Stellaria longipes Goldie

Stellaria media (L.) Villars

Wilhelmsia physodes (Fischer) McNeill

Ceratophyllaceae

Ceratophyllum demersum L.

Chenopodiaceae

Chenopodium album L.

Chenopodium capitatum (L.) Asch.

Chenopodium hybridum L.

Cornaceae

Cornus canadensis L.

Cornus canadensis_x_suecica L.

Swida stolonifera (Michx.) Rydb.

Cupressaceae

Juniperus communis L.

Cyperaceae

Carex aenea Fern.

Carex aquatilis Wahlenb.

Carex atherodes Sprengel

Carex bigelowii Torrey

Carex bonanzensis Britton

Carex brunnescens (Pers.) Poiret

Carex canescens L.

Carex capillaris L.

Carex capitata Sol.
Carex chordorrhiza Ehrh.
Carex concinna r. Br.
Carex crawfordii Fern.
Carex diandra Schrank
Carex disperma Dewey
Carex duriuscula c.e. Mey.
Carex eleusinoides Turcz.
Carex filifolia Nutt.
Carex garberi Fern. ssp. *bifaria* (Fern.) Hulten
Carex krausei Boeckeler
Carex lasiocarpa Ehrh.
Carex leptalea Wahlenb.
Carex limosa L.
Carex magellanica Lam. ssp. *irrigua* (Wahlenb.) Hulten
Carex maritima Gunnerus
Carex media r. Br.
Carex microchaeta Holm ssp. *Microchaeta*
Carex microchaeta Holm ssp. *nesophila* (Holm) D. Murray
Carex obtusata Lilj.
Carex oederi Retz.
Carex peckii Howe
Carex phyllomanica w. Boott
Carex podocarpa r. Br.
Carex rossii Boott
Carex rostrata Stokes
Carex rotundata Wahlenb.
Carex rupestris All.
Carex saxatilis L.
Carex supina Willd. ssp. *spaniocarpa* (Steudel) Hulten
Carex tenuiflora Wahlenb.
Carex utriculata f. Boott
Carex vaginata Tausch
Eleocharis acicularis (L.) Roemer & Schultes
Eleocharis palustris (L.) Roemer & Schultes
Eriophorum angustifolium Honck. ssp. *scabriusculum* Hulten
Eriophorum gracile Koch
Eriophorum russeolum Fries
Eriophorum scheuchzeri Hoppe
Eriophorum vaginatum L.
Kobresia simpliciuscula (Wahlenb.) Mackenzie
Scirpus validus m. Presl
Scirpus validus m. Vahl
Trichophorum alpinum (L.) Pers.

Diapensiaceae

Diapensia lapponica L. ssp. *obovata* (F. Schmidt) Hulten

Droseraceae

Drosera anglica Hudson
Drosera rotundifolia L.

Elaeagnaceae

*Elaeagnus commutata**
Shepherdia canadensis (L.) Nutt.

Empetraceae

Empetrum hermaphroditum (Lange) Hagerup

Equisetaceae

Equisetum arvense L.
Equisetum fluviatile L. ampl. Ehrh.
Equisetum hiemale L.
Equisetum palustre L.
Equisetum pratense Ehrh.
Equisetum scirpoides Michaux
Equisetum silvaticum L.
Equisetum variegatum Schleicher

Ericaceae

Andromeda polifolia L.
Arctostaphylos uva-ursi (L.) Sprengel
Arctous alpina (L.) Niedenzu
Arctous rubra (Rehder & E. Wilson) Nakai
Cassiope tetragona (L.) D. Don ssp. *tetragona*
Chamaedaphne calyculata (L.) Moench
Ledum groenlandicum Oeder
Ledum palustre L. ssp. *decumbens* (Aiton) Hulten
Loiseleuria procumbens (L.) Desv.
Oxycoccus microcarpus Turcz. ex Rupr.
Vaccinium uliginosum L. ssp. *alpinum* (Bigelow) Hulten
Vaccinium vitis-idaea L.

Fabaceae

Astragalus adsurgens Pallas ssp. *viciifolius* (Hulten) Welsh
Astragalus alpinus L.
Astragalus bodinii e. Sheldon
Caragana arborescens Lam.
Hedysarum alpinum L. ssp. *americanum* (Michaux) B. Fedtsch.
Hedysarum mackenzii Richardson
Lupinus arcticus s. Watson
Medicago falcata L.
Medicago sativa L.
Melilotus albus Desrr.

Melilotus officinalis (L.) Lam.
Oxytropis deflexa (Pallas) dc. var. *foliolosa* (Hook.) Barneby
Oxytropis deflexa (Pallas) dc. var. *sericea* Torrey & A. Gray
Oxytropis tanenensis B. A. Yurtsev
Oxytropis varians (Rydb.) Schumann
Trifolium hybridum L.
Trifolium pratense L.
Trifolium repens L.
Vicia angustifolia (L.) Reichard
Vicia cracca L.

Fumariaceae

Corydalis aurea Willd.
Corydalis sempervirens (L.) Pers.

Gentianaceae

Gentiana glauca Pallas
Gentianella amarella (L.) Boerner
Gentianella propinqua (Richardson) J. M. Gillett
Gentianopsis detonsa (Rottb.) Malte ssp. *yukonensis* (J.M. Gillett) J.M. Gillett
Lomatogonium rotatum (L.) E. Fries
Menyanthes trifoliata L.

Geraniaceae

Erodium cicutarium (L.) L'Her.
Geranium bicknellii Britton

Grossulariaceae

Ribes hudsonianum Richardson
Ribes lacustre (Pers.) Poiret
Ribes triste Pallas

Haloragaceae

Hippuris bulgaris L.
Myriophyllum sibiricum Kom.
Myriophyllum verticillatum L.

Hydrophyllaceae

Nemophila menziesii Hook. & Arn.

Iridaceae

Iris setosa Pallas

Juncaceae

Juncus alpinus Villars
Juncus arcticus Willd. ssp. *alaskanus* Hulten
Juncus arcticus Willd. ssp. *ater* (Rydb.) Hulten

Juncus bufonius L.
Juncus castaneus Smith ssp. *castaneus*
Juncus castaneus Smith ssp. *leucochlamys* (L. Zinserl.) Hulten
Juncus filiformis L.
Juncus stygius L.
Juncus triglumis L. ssp. *albescens* (Lange) Hulten
Luzula confusa Lindeb.
Luzula kjellmaniana Miyabe & Kudo
Luzula multiflora (Retz.) Lej.
Luzula parviflora (Ehrh.) Desv.
Luzula rufescens Fischer

Juncaginaceae

Triglochin maritimum L.
Triglochin palustris L.

Lamiaceae

Dracocephalum parviflorum Nutt.
Galeopsis bifida Boenn.
Lycopus uniflorus Michaux
Scutellaria galericulata L.
Stachys palustris L. ssp. *pilosa* (Nutt.) Epling

Lemnaceae

Lemna minor L.
Lemna trisulca L.

Lentibulariaceae

Pinguicula villosa L.
Utricularia intermedia Hayne
Utricularia minor L.
Utricularia vulgaris L.

Liliaceae

Tofieldia coccinea Richardson
Zygadenus elegans Pursh

Linaceae

Linum lewisii Pursh

Lycopodiaceae

Huperzia selago (L.) C. Martius
Lycopodium alpinum L.
Lycopodium annotinum L. ssp. *annotinum*
Lycopodium annotinum L. ssp. *pungens* (L. Pyl.) Hulten
Lycopodium complanatum L.
Lycopodium obscurum L.

Myricaceae

Myrica gale L.

Nymphaeaceae

Nuphar polysepalum Engelm.

Nymphaea tetragona Georgi

Onagraceae

Circaea alpina L.

Epilobium angustifolium L.

Epilobium ciliatum Raf.

Epilobium ciliatum Raf. ssp. *adenocaulon* (Hausskn.) Hoch & Raven

Epilobium Hornemannii Reichb. ssp. *hornemannii*

Epilobium latifolium L.

Epilobium palustre L.

Ophioglossaceae

Botrychium lunaria (L.) Sw.

Orchidaceae

Calypso bulbosa (L.) Oakes

Corallorrhiza trifida Chatel.

Cypripedium guttatum Sw. ssp. *guttatum*

Cypripedium passerinum Richardson

Goodyera repens (L.) R. Br.

Hammarbya paludosa (L.) Kuntze

Listera borealis Morong

Platanthera hyperborea (L.) Lindley

Platanthera obtysata (Pursh) Lindley

Spiranthes romanzoffiana Cham.

Orobanchaceae

Boschniakia rossica (Cham. & Schldl.) B. Fedtsch.

Papaveraceae

Exchscholzia californica Cham.

Pinaceae

Larix laricina (Du Roi) K. Koch

Picea glauca (Moench) Voss

Picea mariana (Miller) Britton, Sterns, Pogg.

Plantaginaceae

Plantago major L. var. *major*

Poaceae

Agrostis scabra Willd.

Alopecurus aequalis Sobol.
Alopecurus alpinus Smith
Alopecurus pratensis L.
Arctagrostis latifolia (R. Br.) Griseb. var. *Arundinacea* (Trin.) Griseb.
Arctophila Fulva (Trin.) Andersson
Avena fatua L.
Beckmannia erucaeformis (L.) Host
Bromopsis inermis (Leysser) Holub
Bromopsis pumpelliana (Scribner) Holub ssp. *Pumpelliana*
Calamagrostis canadensis (Michaux) P. Beauv.
Calamagrostis inexpansa a. Gray
Calamagrostis lapponica (Wahlenb.) Hartman F.
Calamagrostis neglecta (Ehrh.) Gaertner
Calamagrostis purpurascens r. Br.
Deschampsia cespitosa (L.) P. Beauv.
Elymus alaskanus (Scribner & Merr.) A. Loeve ssp. *BOREALIS* (Turcz.) A. Loeve & D. Loeve
Elymus macrourus (Turcz.) Tzvelev
Elymus subsecundus (Link) A. Loeve & D. Loeve
Elymus trachycaulus (Link) Gould ex Shinners
Elymus trachycaulus (Link) Gould ex Shinners ssp. *Trachycaulus*
Elymus trachycaulus (Link) Gould ex Shinners ssp. *violaceus* (Hornem.) A Loeve & D. Loeve
Elytrigia repens (L.) Nevski
Elytrigia spicata (Pursh) D. R. Dewey
Festuca altaica Trin.
Festuca brachyphylla Schultes & Schultes F.
Festuca lenensis Drobov
Festuca saximontana Rydb.
Glyceria borealis (Nash) Batch.
Glyceria maxima (Hartman F.) O. Holmb.
Glyceria pulchella (Nash) Schum.
Hierochloa alpina (Sw.) Roemer & Schultes
Hierochloa odorata (L.) P. Beauv.
Hordeum brachyantherum Nevski
Hordeum jubatum L.
Leymus innovatus (Beal) Pilger
Lolium multiflorum Lam.
Ohleum pratense L.
Poa alpina L.
Poa annua L.
Poa arctica r. Br.
Poa glauca m. Vahl
Poa palustris L.
Poa pratensis L.
Puccinellia borealis Swallen
Puccinellia t. Sorensen

Trisetum spicatum (L.) K. Richter

Polemoniaceae

Collomia linearis Nutt.

Polemonium acutiflorum Willd.

Polygonaceae

Bistorta plumosa (Small) E. Greene

Bistorta vivipara (L.) Gray

Polygonum alaskanum (Small) W. Wight

Polygonum amphibium L.

Polygonum aviculare L.

Polygonum convolvulus L.

Polygonum lapathifolium L.

Polygonum pennsylvanicum L. ssp. *oneillii* (Brenckle) Hulten

Rumex arcticus Trautv.

Rumex arcticus Greene

Rumex mexicanus Meissner

Rumex sibiricus Hulten

Polypodiaceae

Polypodium vulgare L. ssp. *columbianum* (Gilbert) Hulten

Potamogetonaceae

Potamogeton alpinus Balbis

Potamogeton epihydrus Raf.

Potamogeton filiformis Pers.

Potamogeton friesii Rupr.

Potamogeton gramineus L.

Potamogeton pectinatus L.

Potamogeton praelongus Wulfen

Potamogeton pusillus L. var. *tenuissimus* Mert. & Koch

Potamogeton richardsonii (A. Bennett) Rydb.

Potamogeton vaginatus Turcz.

Potamogeton zosteriformis Fernald

Primulaceae

Androsace septentrionalis L.

Dodecatheon pulchellum (Raf.) Merr. ssp. *Pauciflorum* (E. Greene) Hulten

Lysimachia thyrsiflora L.

Primula incana m. e. Jones

Trientalis europaea L. ssp. *arctica* (Fischer) Hulten

Pyrolaceae

Moneses uniflora (L.) A. Gray

Orthilia secunda (L.) House

Orthilia secunda (L.) House ssp. *Obtusata* (Turcz.) Bocher

Pyrola asarifolia Michaux
Pyrola chlorantha Sw.
Pyrola grandiflora Radius

Ranunculaceae

Aconitum delphinifolium dc.
Actaea rubra (Aiton) Willd.
Anemone narcissiflora L. var. *monantha* dc.
Anemone parviflora Michaux
Anemone richardsonii Hook.
Aquilegia brevistyla Hook.
Caltha natans Pallas
Caltha palustris L.
Consolida ambigua (L.) P. Bass & Heyw.
Delphinium glaucum s. Watson
Pulsatilla patens (L.) Miller
Ranunculus gmelinii dc.
Ranunculus lapponicus L. Rottb.
Ranunculus lapponicus L.
Ranunculus macounii Britton
Ranunculus pennsylvanicus L. f.
Ranunculus reptans L.
Ranunculus sceleratus L. ssp. *multifidus* (Nutt.) Hulten
Ranunculus trichophyllus Chaix
Rhalictrum sparsiflorum Turcz.

Rosaceae

Amelanchier alnifolia (Nutt.) Nutt.
Comarum palustre L.
Dryas drummondii Richardson
Dryas octopetala L. var. *octopetala*
Fragaria virginiana Duchesne
Geum perincisum Rydb.
Pentaphylloides floribunda (Pursh) A. Loeve
Potentilla arguta Pursh
Potentilla egedii Wormsk.
Potentilla hookeriana Lehm.
Potentilla multifida L.
Potentilla norvegica L.
Potentilla pensylvanica L.
Potentilla uniflora Ledeb.
Potentilla virgulata Nelson
Rosa acicularis Lindley
Rosa woodsii Lindley
Rubus arcticus L. ssp. *arcticus*
Rubus chamaemorus L.
Rubus idaeus L.

Sanguisorba officinalis L.
Sorbus scopulina e. Greene
Spiraea stevenii (C. Schneider) Rydb.

Rubiaceae

Galium boreale L.
Galium brandegei a. Gray
Galium trifidum L. ssp. *trifidum*
Galium triflorum Michaux

Salicaceae

Populus balsamifera L. ssp. *balsamifera*
Populus tremuloides Michaux
Salix alaxensis (Andersson) Cov. var. *longistylis* (Rydb.) C. Schneider
Salix arbusculoides Andersson
Salix arctica Pallas
Salix bebbiana Sarg.
Salix brachycarpa Nutt.
Salix brachycarpa Nutt. ssp. *niphoclada* (Rydb.) Argus
Salix fuscescens Andersson
Salix glauca L.
Salix glauca L. var. *acutifolia* (Andersson) C. Schneider
Salix hastata L.
Salix rowlee
Salix lucida Muhl. ssp. *lasiandra* (Benth.) Argus
Salix myrtillofolia Andersson
Salix novae-angliae Andersson
Salix phlebophylla Andersson
Salix planifolia Pursh
Salix planifolia Pursh ssp. *pulchra* (Cham.) Argus
Salix pseudomonticola c. Ball
Salix scouleriana j. Barratt

Santalaceae

Geocaulon lividum (Richardson) Fern.

Saxifragaceae

Chrysosplenium tetrandrum (N. Lund) T. C. E. Fries
Parnassia palustris L.
Saxifraga cernua L.
Saxifraga nelsoniana d. Don
Saxifraga reflexa Hook.
Saxifraga tricuspidata Rottb.

Scrophulariaceae

Castilleja caudata (Pennell) Rebrist.
Castilleja elegans Malte

Euphrasia disjuncta Fern. & Wieg.
Linaria vulgaris Miller
Pedicularis capitata Adams
Pedicularis labradorica Wirs.
Pedicularis lanata Cham. & Schldl.
Pedicularis langsdoeffii Fischer ex Steven
Pedicularis macrodonta Richardson
Rhinanthus minor L.
Synthyris minor L. Pennell
Veronica scutellata L.

Selaginellaceae

Selaginella sibirica (Milde) Hieron.

Sparganiaceae

Sparganium angustifolium Michaux
Sparganium hyperboreum Laest.
Sparganium minimum (Hartman F.) Fries

Typhaceae

Typha latifolia L.

Urticaceae

Urtica dioica L. ssp. *gracilis* (Aiton) Selander

Valerianaceae

Valeriana capitata Pallas

Violaceae

Viola biflora L.
Viola epipsila Ledeb.
Viola renifolia a. Gray
Viola tricolor L.

Checklist of collected cryptogams from Fort Wainwright Military Installation,
Alaska, 1995.

LICHENS

Alectoria ochroleuca (Hoffm.) A.Massal.
Anamylopsora pulcherrima (Vain.) Timdal
Arctoparmelia separata (Th.Fr.) Hale
Asahinea chrysantha (Tuck.) W.L.Culb. & C.F.Culb.
Asahinea scholanderi (Llano) W.L.Culb. & C.F.Culb.

Bacidia

Baeomyces

Baeomyces rufus (Huds.) Rebent.

Brodoa oroarctica (Krog) Goward

Bryocaulon divergens (Ach.) Kèrnefelt

Bryoria lanestris (Ach.) Brodo & D.Hawksw.

Bryoria nitidula (Th.Fr.) Brodo & D.Hawksw.

Caloplaca

Candelariella

Cetraria

Cetraria aculeata (Schreb.) Fr.

Cetraria islandica (L.) Ach.

Cetraria laevigata Rass.

Cetraria muricata (Ach.) Eckfeldt

Cetraria nigricans Nyl.

Chaenotheca stemonea (Ach.) Mfll.Arg.

Cladina

Cladina aberrans (Abbeyes) Hale & W.L.Culb.

Cladina arbuscula (Wallr.) Hale & W.L.Culb.

Cladina rangiferina (L.) Nyl.

Cladina stellaris (Opiz) Brodo

Cladonia

Cladonia amaurocraea (Flörke) Schaer.

Cladonia borealis S.Stenroos

Cladonia cariosa (Ach.) Spreng.

Cladonia cenotea (Ach.) Schaer.

Cladonia coccifera (L.) Willd.

Cladonia cornuta (L.) Hoffm.

Cladonia cornuta (L.) Hoffm. subsp. *cornuta*

Cladonia crispata (Ach.) Flot.

Cladonia deformis (L.) Hoffm.

Cladonia fimbriata (L.) Fr.

Cladonia furcata (Huds.) Schrad.

Cladonia gracilis (L.) Willd.

Cladonia gracilis (L.) Willd. subsp. *gracilis*

Cladonia gracilis (L.) Willd. subsp. *turbinata* (Ach.) Ahti

Cladonia kanewskii Oksner

Cladonia phyllophora Ehrh. ex Hoffm.

Cladonia pleurota (Flörke) Schaer.

Cladonia pocillum (Ach.) Grognot

Cladonia scabriuscula (Delise) Nyl.

Cladonia singularis S.Hammer

Cladonia uncialis (L.) Weber ex F.H.Wigg.

Collema

Cornicularia

Dactylina

Dactylina arctica (Richardson) Nyl.

Dibaeis baeomyces (L.f.) Rambold & Hertel
Diploschistes
Endocarpon
*Epilichen scabrosus** (Ach.) Clem. ex Hafellner
Flavocetraria cucullata (Bellardi) Kèrnefelt & Thell
Flavocetraria nivalis (L.) Kèrnefelt & Thell subsp. *nivalis*
Hypogymnia
Hypogymnia austerodes (Nyl.) Rèsènen
Hypogymnia physodes (L.) Nyl.
Hypogymnia subobscura (Vain.) Poelt
Icmadophila ericetorum (L.) Zahlbr.
Lasallia pensylvanica (Hoffm.) Llano
Lecanora
Lecidea
Leproplaca
Leptogium
Lobaria linita (Ach.) Rabenh.
Lobaria linita (Ach.) Rabenh. var. *linita*
Lobaria scrobiculata (Scop.) DC. in Lam. & DC.
Lopadium pezizoideum (Ach.) KÙrb.
Masonhalea richardsonii (Hook.) Kèrnefelt
Melanelia
Melanelia granulosa (Lyngé) Essl.
Melanelia hepatizon (Ach.) Thell
Nephroma arcticum (L.) Torss.
Nephroma bellum (Spreng.) Tuck.
Nephroma expallidum (Nyl.) Nyl.
Nephroma parile (Ach.) Ach.
Nephroma resupinatum (L.) Ach.
Ochrolechia
Ochrolechia upsaliensis (L.) A.Massal.
Ophioparma lapponica (Rèsènen) Hafellner & R.W.Rogers
Pannaria pezizoides (Weber) Trevis.
Parmelia
Parmelia fraudans (Nyl.) Nyl.
Parmelia omphalodes (L.) Ach.
Parmelia panniformis (Nyl.) Vain.
Parmelia saxatilis (L.) Ach.
Parmelia sulcata Taylor
Parmeliella
Peltigera
Peltigera aphthosa (L.) Willd.
Peltigera canina (L.) Willd.
Peltigera collina (Ach.) Schrad.
Peltigera didactyla (With.) J.R.Laundon
Peltigera didactyla (With.) J.R.Laundon var. *didactyla*
Peltigera didactyla (With.) J.R.Laundon var. *extenuata* (Nyl. ex Vain.) Goffinet

& Hastings

Peltigera elisabethae Gyeln.
Peltigera lepidophora (Nyl. ex Vain.) Bitter
Peltigera leucophlebia (Nyl.) Gyeln.
Peltigera malacea (Ach.) Funck
Peltigera neckeri Hepp ex Mfll.Arg.
Peltigera praetextata (Flörke ex Sommerf.) Zopf
Peltigera retifoveata Vitik.
Peltigera rufescens (Weiss) Humb.
Peltigera scabrosa Th.Fr.
Peltigera venosa (L.) Hoffm.
Pertusaria
Pertusaria subobducens Nyl.
Phaeophyscia
Phaeophyscia constipata (Norrl. & Nyl.) Moberg
Phaeophyscia kairamoi (Vain.) Moberg
Phaeophyscia sciastra (Ach.) Moberg
Phaeorrhiza nimbosa (Fr.) H.Mayrhofer & Poelt
Physcia
Physconia
Physconia isidiigera (Zahlbr.) Essl.
Physconia muscigena (Ach.) Poelt
Physconia perisidiosa (Erichsen) Moberg
Polychidium muscicola (Sw.) Gray
Psora
Psoroma hypnorum (Vahl) Gray
Psorula rufonigra (Tuck.) Gotth.Schneid.
Ramalina
Rhizocarpon
Rhizoplaca
Rhizoplaca chrysoleuca (Sm.) Zopf
Rinodina
Schadonia fecunda (Th.Fr.) Vezda & Poelt
Solorina crocea (L.) Ach.
Sphaerophorus fragilis (L.) Pers.
Sphaerophorus globosus (Huds.) Vain.
Sphaerophorus globosus (Huds.) Vain. var. *globosus*
Stereocaulon
Stereocaulon alpinum Laurer ex Funck
Stereocaulon coniophyllum I.M.Lamb
Stereocaulon glareosum (Savicz) H.Magn.
Stereocaulon paschale (L.) Hoffm.
Stereocaulon subcoralloides (Nyl.) Nyl.
Thamnolia
Thamnolia vermicularis (Sw.) Ach. ex Schaer.
Toninia
Tuckermannopsis americana (Spreng.) Hale

Umbilicaria
Umbilicaria deusta (L.) Baumg.
Umbilicaria vellea (L.) Ach.
Usnea
Vulpicida pinastri (Scop.) Mattson & M.J.Lai
Vulpicida tilesii (Ach.) Mattson & M.J.Lai
Xanthoparmelia
Xanthoria

HEPATICS

Aneura pinguis (L.) Dumort.
Asterella
Asterella saccata (Wahlenb.) A.Evans
Blepharostoma trichophyllum (L.) Dumort.
Calypogeia
Cephaloziella
Conocephalum conicum (L.) Underw.
Diplophyllum
Gymnomitrium
Lophozia
Marchantia
Marchantia aquatica (Nees) Burgeff
Marchantia polymorpha L.
Marsupella
Mylia
Pellia
Preissia
Preissia quadrata (Scop.) Nees
Ptilidium ciliare (L.) Hampe
Riccia fluitans L.
Ricciocarpos natans (L.) Corda
Tetralophozia setiformis (Ehrh.) Schljakov

MOSSES

Abietinella abietina (Hedw.) M.Fleisch.
Aloina brevirostris (Hook. & Grev.) Kindb.
Andreaea rupestris Hedw.
Andreaea rupestris Hedw. var. *rupestris*
Aongstroemia longipes (Sommerf.) Bruch & Schimp. in Bruch, Schimp. & W.Gfmbel
Aulacomnium palustre (Hedw.) Schwègr.
Aulacomnium turgidum (Wahlenb.) Schwègr.
Barbula
Bartramia ithyphylla Brid.
Brachythecium

Bryoerythrophyllum recurvirostrum (Hedw.) P.C.Chen
Bryum
Bryum argenteum Hedw.
Bryum pseudotriquetrum (Hedw.) P.Gaertn. , B.Mey. & Scherb.
Calliergon
Calliergon cordifolium (Hedw.) Kindb.
Calliergon giganteum (Schimp.) Kindb.
Calliergon richardsonii (Mitt.) Kindb.
Calliergon stramineum (Brid.) Kindb.
Campylium
Catoscopium nigrum (Hedw.) Brid.
Ceratodon purpureus (Hedw.) Brid.
Ceratodon purpureus (Hedw.) Brid. var. *purpureus*
Claopodium
Climacium dendroides (Hedw.) F.Weber & D.Mohr
Cnestrum
Conostomum tetragonum (Hedw.) Lindb.
Cratoneuron
Cynodontium
Dicranella
Dicranoweisia crispula (Hedw.) Lindb. ex Milde
Dicranum
Dicranum polysetum Sw.
Dicranum undulatum Brid.
Didymodon
Distichium capillaceum (Hedw.) Bruch & Schimp.
Ditrichum
Drepanocladus
Drepanocladus exannulatus (Schimp. in Bruch, Schimp. & W.Gfmbel) Warnst.
Encalypta
Encalypta brevicolla (Bruch & Schimp. in Bruch, Schimp. & W.Gfmbel) Bruch
ex üngstr.
Encalypta ciliata Hedw.
Encalypta rhaptocarpa Schwègr.
Eurhynchium
Fissidens
Funaria hygrometrica Hedw.
Grimmia
Grimmia torquata Hornsch. in Grev.
Hamatocaulis vernicosus (Mitt.) Hedenès
Hedwigia ciliata (Hedw.) P.Beauv.
Helodium blandowii (F.Weber & D.Mohr) Warnst.
Hylocomium splendens (Hedw.) Schimp. in Bruch, Schimp. & W.Gfmbel
Hypnum
Kiaeria
Leptobryum pyriforme (Hedw.) Wilson
Meesia uliginosa Hedw.

Mnium
Oncophorus
Oncophorus virens (Hedw.) Brid.
Orthotrichum obtusifolium Brid.
Paraleucobryum
Plagiomnium
Plagiomnium cuspidatum (Hedw.) T.Kop.
Plagiomnium rugicum (Laurer) T.Kop.
Plagiothecium
Pleurozium schreberi (Brid.) Mitt.
Pogonatum dentatum (Brid.) Brid.
Pohlia
Pohlia andalusica (Hoehnel) Broth.
Pohlia cruda (Hedw.) Lindb.
Pohlia prolifera (Lindb. ex Breidl.) Lindb. ex Arnell
Polytrichastrum longisetum (Brid.) G.L.Sm.
Polytrichum
Polytrichum commune Hedw.
Polytrichum hyperboreum R.Br.
Polytrichum juniperinum Hedw.
Polytrichum piliferum Hedw.
Polytrichum strictum Brid.
Pseudobryum cinclidioides (Huebener) T.Kop.
Psilopilum cavifolium (Wilson) I.Hagen
Pterygoneurum sessile (Brid.) Jur.
Ptilium crista-castrensis (Hedw.) De Not.
Pylaisiella polyantha (Hedw.) Grout
Racomitrium ericoides (F.Weber ex Brid.) Brid.
Racomitrium lanuginosum (Hedw.) Brid.
Rhizomnium
Rhizomnium punctatum (Hedw.) T.Kop.
Rhytidiadelphus triquetrus (Hedw.) Warnst.
Rhytidium rugosum (Hedw.) Kindb.
Sanionia uncinata (Hedw.) Loeske
Schistidium
Schistidium apocarpum (Hedw.) Bruch & Schimp. in Bruch, Schimp. & W.Gfmbel
Scorpidium cossonii (Schimp.) Hedenès
Scorpidium scorpioides (Hedw.) Limpr.
Sphagnum
Sphagnum angustifolium (C.E.O.Jensen ex Russow) C.E.O.Jensen in Tolf
Sphagnum fimbriatum Wilson in Wilson & Hook.f. in Hook.f.
Sphagnum fuscum (Schimp.) H.Klinggr.
Sphagnum girgensohnii Russow
Sphagnum lindbergii Schimp. in Lindb.
Sphagnum magellanicum Brid.
Sphagnum platyphyllum (Lindb. ex Braithw.) Sull. ex Warnst.

Sphagnum riparium üngstr.
Sphagnum rubellum Wilson
Sphagnum russowii Warnst.
Sphagnum squarrosum Crome
Sphagnum teres (Schimp.) üngstr.
Sphagnum warnstorffii Russow
Splachnum
Splachnum ampullaceum
Splachnum luteum Hedw.
Splachnum melanocaulon (Wahlenb.) Schwègr.
Splachnum rubrum Hedw.
Splachnum sphaericum Hedw.
Syntrichia
Syntrichia ruralis (Hedw.) F. Weber & D. Mohr
Tetraplodon
Tetraplodon mnioides (Hedw.) Bruch & Schimp. in Bruch, Schimp. & W.Gfmbel
Thuidium
Thuidium recognitum (Hedw.) Lindb.
Timmia
Timmia austriaca Hedw.
Timmia megapolitana Hedw.
Tomentypnum nitens (Hedw.) Loeske
Tortella fragilis (Drumm.) Limpr.
Tortula
Tortula acaulon (L. ex With.) R.H.Zander
Tortula mucronifolia Schwègr.
Trichodon
Ulota

Genus names represent specimens identified to genus but not yet identified to species. * refers to a lichenicolous fungus.

SOURCE: Racine, Charles, Robert Lichabar, Barbara Murray, Gerald Tande, Robert Lipkin, And Michael Duffy. *A Floristic Inventory And Spatial Database For Fort Wainwright, Interior Alaska*. U.S. Army Corps of Engineers, Cold Regions Research And Engineering Laboratory. Special Report 97-23. Hanover, NH. 1997.

APPENDIX 3.12
Wildlife

Confirmed Fauna of Fort Wainwright and Fort Greely

**Species found only on Fort Wainwright

* Species found only on Fort Greely

(+) Species does not occur in Alaska (mis-identified)

MAMMALS

Scientific Name	Common Name	Habitat
<i>Microtus longicaudus</i> *	long-tailed vole	moist wet meadows, streambanks
<i>Microtus miurus</i>	Alaska (singing) vole	slopes
<i>Microtus pennsylvanicus</i>	meadow vole	meadow
<i>Microtus oeconomus</i>	tundra vole	alpine
<i>Microtus xanthognathus</i>	yellow-cheeked vole	spruce forests
<i>Clethrionomys rutilus</i>	redback (tundra) vole	alpine, forest
<i>Lemmus trimucronatus</i>	brown lemming	alpine
<i>Synaptomys borealis</i>	northern bog lemming	wet alpine tundra, muskeg
<i>Peromyscus maniculatus</i>	deer mouse	dry forest, grassland
<i>Zapus hudsonicus</i>	meadow jumping mouse	grass
<i>Sorex hoyi</i>	pygmy shrew	forest, grassland
<i>Sorex monticulus</i>	dusky shrew	muskeg, forest
<i>Sorex cinereus</i>	masked shrew	subalpine
<i>Sorex tundrensis</i>	tundra shrew	tamarack and spruce swamps
<i>Myotis lucifugus</i>	little brown bat	wooded areas, abandoned buildings
<i>Mustela erminea</i>	short-tailed weasel	forest, brush
<i>Mustela frenata</i> (+)	long-tailed weasel	woodlands
<i>Mustela nivalis</i>	least weasel	brush
<i>Mustela vison</i>	mink	near water
<i>Marmota caligata</i>	hoary marmot	alpine
<i>Marmota monax</i>	woodchuck	dry woods, brushy ravines, rocky slopes
<i>Lontra canadensis</i>	river otter	near water
<i>Lepus americanus</i>	snowshoe hare	forest, brush
<i>Ondatra zibethicus</i>	muskrat	near water, marsh
<i>Spermophilus parryi</i>	Arctic ground squirrel	alpine
<i>Erethizon dorsatum</i>	porcupine	coniferous forest
<i>Tamiasciurus hudsonicus</i>	red squirrel	spruce forest
<i>Glaucomys sabrinus</i>	northern flying squirrel	conifers and mixed hardwood forests, nest boxes
<i>Castor canadensis</i>	beaver	streams