

Western Airborne Contaminants Assessment Project

Database User's Guide

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1.0 Introduction

The purpose of the Western Airborne Contaminants Assessment Project (WACAP) was to evaluate ecological impacts of airborne contaminants in national parks using a network of sites to provide spatially extensive, site specific, and temporally-resolved information on the exposure, accumulation, and impacts of airborne toxic compounds. WACAP was designed and implemented by the National Park Service's Air Resources Division with cooperators from the U.S. Environmental Protection Agency, U.S. Geological Survey, and several universities, as well as the participating National Parks. Eight core national parks participated in WACAP: Sequoia, Rocky Mountain, Olympic, Mt. Rainier, Glacier, Denali, Noatak, and Gates of the Arctic. An additional 11 national parks and one national forest participated in sampling vegetation and air in 2005.

WACAP was conducted over a six-year timeline, with the first year (2002) for design and method development work, three years (2003-2005) for field sampling and analysis, and the last four years (2006 to 2009) for completing analyses and preparing the final report, database and interpretive reports. The final report for WACAP, *The Fate, Transport, and Ecological Impacts of Airborne Contaminants in Western National Parks (USA)* (Landers et al. 2008), contains details about the sampling design, methods, and results. Section 3.4 of the report provides details of methods used for each ecosystem medium.

WACAP sampled a variety of ecosystem media to provide information about contaminant accumulation, and the database is organized by these media:

- Air, to obtain a measure of SOCs in ambient air to compare loadings between parks and across geographic and elevational gradients;
- Atmospheric transport modeling, to develop back trajectory cluster models to obtain information about the routes of contaminant transport;
- Fish, to measure food web impacts and bioaccumulation;
- Moose, to measure a food source used by native peoples;
- Sediment, to provide information about historic trends of contaminant loading to watersheds;
- Snow, to measure direct atmospheric loading;
- Vegetation, including lichens to measure food web impacts and bioaccumulation, and conifer needles to measure ecosystem exposure; and
- Water, to measure hydrophilic current use chemicals.

The WACAP database is in Microsoft Access, which is a relational database management system. Data are stored in tables, with queries used to combine and sort data from multiple tables as needed to produce datasets for analyses. Each ecosystem medium has multiple types of analyses, e.g., SOCs, mercury, metals, and some media-specific analyses. The database was constructed from data submitted from 11 laboratories, and includes data for approximately 100 variables for over 2000 samples.

The WACAP Database includes raw data values, such as concentrations, blanks, and replicates, as well as calculated values, such as flux and lipid-normalized values. The values that are reported as raw data values were determined by each lab, e.g. the SOC lab reported blank-subtracted data, and the metals and Hg laboratories reported averaged data from replicate injections.

Each medium contains three tables of data in the Access database:

- 1) The Data table contains all data for one media type, with each data result uniquely identified by four fields: WACAP_No, SampleType, Parameter, and MediaBasis. Additional information about each data result is provided in the fields MediaSubset, LabCode, Units, Flags, and Qualifiers. WACAP_No is the sample number that identifies each sample.
- 2) The Sample_Data table links each sample, identified by the WACAP_No, with the site and sampling information.
- 3) The Site_Data table contains the location information about each site, including latitude, longitude, and elevation.

There are several options for searching and retrieving data from database. Each medium has an established query that links the three tables, i.e., data table, sample table, and site table. The main searchable options are by the following fields in the data tables for each medium:

- 1) Park and/or site
- 2) Media subset
- 3) Analyte type
- 4) Parameter
- 5) Sample type
- 6) Media basis
- 7) Laboratory (LabCode)

Figure 1 contains a flow diagram showing the steps involved as the database was prepared, from how the data were prepared for importing and organizing into the database, to using queries to export data to a format to use for data analyses. Table 1 contains a list of tables in the database.

2.0 Field Names

Tables in an Access database are organized into columns, or fields, and rows, or records, with typically one record per sample result. The Data table for each ecosystem medium typically contains the 11 or 12 fields listed and described in Table 2. Data tables for fish, moose, and vegetation contain all 12 fields, and the Atm_Modeling Data table contains 8 fields because it does not contain fields for WACAP_No, MediaSubset, SampleType, and MediaBasis. The remaining tables (Air, Sediment, Snow, and Water) have 11 fields because they do not include the MediaSubset Field. All field names used in all tables, including the Site_Data, Sample_Data, and the Auxiliary tables, are listed alphabetically with descriptions in Appendix A.

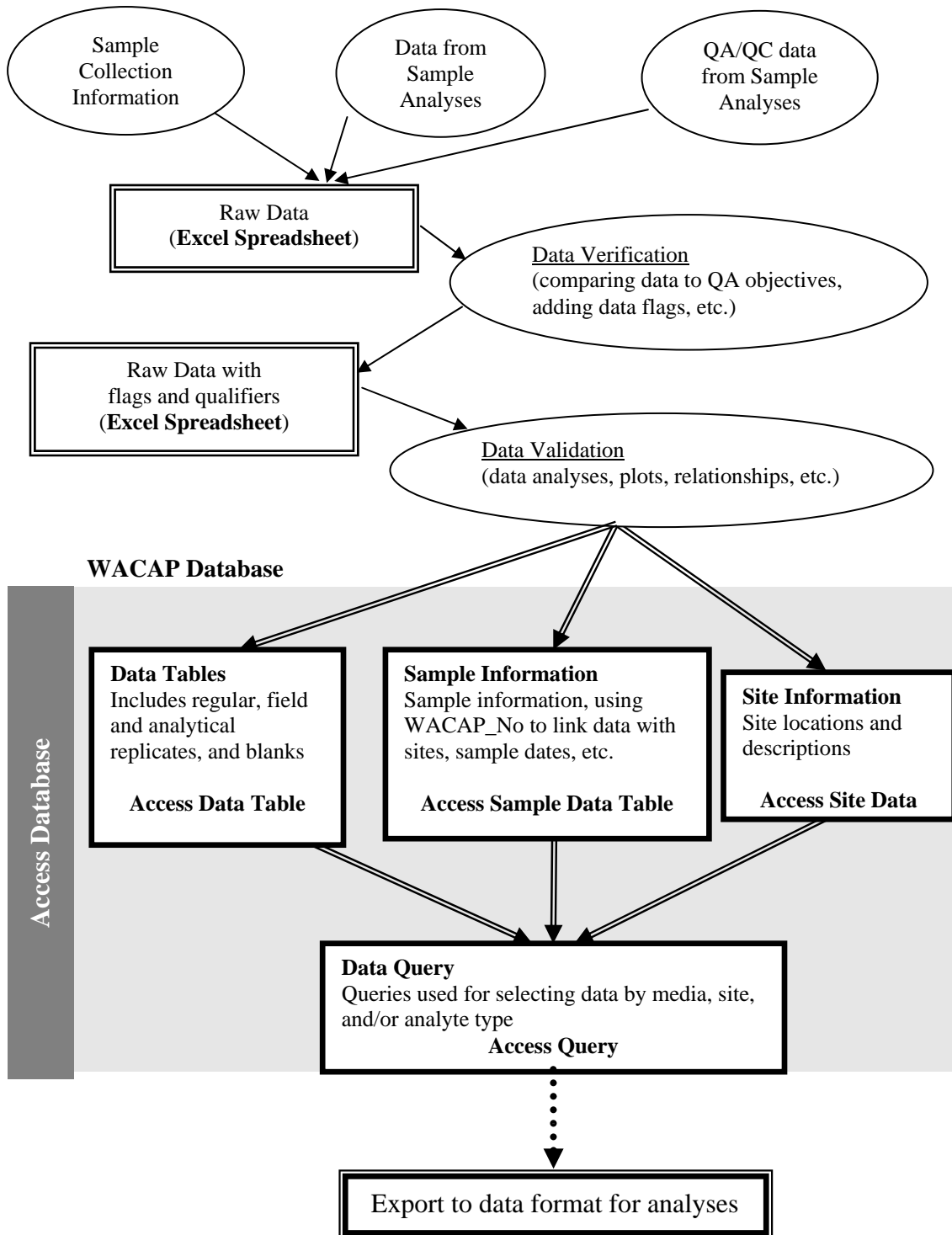


Figure 1. Development and Design of WACAP Database

Table 1. Descriptions of Tables in Database

Table Names	Description
1_Field_Name_Descriptions	Description of fields used in all tables, including abbreviations and codes used in fields
2_AnalyteType_Descriptions	List of abbreviations used for analyte type field with descriptions
3_SampleType_Descriptions	List of abbreviations used for sample type field with descriptions
4_LabCodes	Lab codes used in data tables for WACAP Labs
5_Parameters_Abbreviations	Descriptions and names for abbreviations used for parameters
6_MediaBasis_Descriptions	List of abbreviations used for media basis field with descriptions
7_Unit_Abbreviations	Descriptions and names for unit abbreviations
8_Flags_and_Qualifiers	Descriptions of flags and qualifiers used in data tables
9_Miscellaneous_Abbreviations	Description of miscellaneous abbreviations used in tables
Air_Data	Data from passive air sampling devices (PASDs)
Air_Sample_Data	Park and site info for each air sample
Air_Site_Data	Information & notes about PASD sites, including lat, long, & elevation
Atm_Modeling_Data	Back trajectory clusters, and precip. & temp data used for cluster analyses
Atm_Site_Data	Starting locations for back trajectories and source info for precip data
Fish_Data	Data from fish samples
Fish_Sample_Data	Information about each fish sample, including park, site, species, date sampled, and data available
FishAuxiliaryTable_Codes_and_Abbreviations	Definitions of codes & abbreviations used in fish data parameters
FishAuxiliaryTable_Histopathology_Notes	Notes from histopathological examination of fish samples
FishAuxiliaryTable_TestesCategories	Categorization of trout testes in current and historic fish
Moose_Data	Data from moose samples
Moose_Sample_Data	Information about each moose sample
Sediment_Data	Data from sediment core samples
Sediment_Sample_Data	Information about each sediment interval sample, incl. date and sedimentation rate
Sediment_Site_Data	Sediment core location descriptions, and list of available data for each core
SedimentAuxiliaryTable_Focusing_Factors	Sediment focusing factor for each site

Table Names	Description
SedimentAuxiliaryTable_Metals_Lab3_dBaseIDs	Lab 3 database ID for each WACAP_No
SedimentAuxiliaryTable_Metals_MedianDetectionLimits	Median detection limits for sediment metals analyses
SedimentAuxiliaryTable_Notes	Notes concerning sediment analyses
Snow_Data	Data from snow samples
Snow_Sample_Data	Information about each snow sample, including site and date sampled
Snow_Site_Data	Information about snow sampling sites, including lat, long, elevation
Vegetation_Data	Data from vegetation samples
Vegetation_Sample_Data	Information about vegetation samples, including site, date sampled, & species
Vegetation_Site_Data	Information about vegetation sites, including lat, long, elevation, & site descriptions
WACAP_Lake_Sites	Location of lake sites, including lat, long, & elevations
Water_Data	Data from water samples
Water_Sample_Data	Information about water samples, including sample depths, stratum, and SOC sampler position

Table 2. Field Names in Data Tables.

Field Name	Abbreviations	Description
WACAP_No	range from 36001 to 66875, non-continuously	Each WACAP sample was assigned a 5 digit number, with the first digit representing the year the sample was collected, i.e., 3 for the year 2003, 4 for the year 2004, etc. The second digit is assigned as "6" or "8" and denotes the WACAP project at the WRS Analytical Laboratory. The third digit represents the media sampled. The WACAP_No field is the primary key used to link the sample with site and sampling information. The WACAP_No used with the SampleType, Parameter, and MediaBasis fields uniquely identify each sample result.
Media	Air, Atm_Modeling, Fish, Moose, Sediment, Snow, Vegetation, Water	Ecosystem component
MediaSubset	Fillet, Liver, Whole, Meat, Lichen, ConiferNeedles	Subset of media field indicates whether analysis was on whole fish, fillet or liver for fish, meat or liver for moose, and conifer needles or lichen for vegetation.

Field Name	Abbreviations	Description
AnalyteType	Biology/Path, SOC, Hg, Metals, Inorg/Phys	Describes groups of parameters; this can be used to search, sort, and retrieve data. See Table 6 in the WACAP Database User's Guide or table "2_AnalyteType_Descriptions" in the WACAP Database for the abbreviations and descriptions for the five groups of analyte types in this field.
SampleType	AREP, FB, GB, LB, R, REP, etc.	Indicates whether sample was collected as a regular sample, or field replicate, analytical replicate, field blank, laboratory blank, etc. The sample type of R, for regular sample, should be selected when retrieving data for most data analyses. Fish samples were considered replicates from the same lake, so their standard sample type is "REP." See Table 7 in the WACAP Database User's Guide or table "3_SampleType_Descriptions" in the WACAP Database for SampleType abbreviations and descriptions
LabCode	1 to 11	See Table 4 in the WACAP Database User's Guide or table "4_LabCodes" in the WACAP Database for laboratory codes and contact information.
Parameter	-----	See Table 8 in the WACAP Database User's Guide or table "5_Parameter_Abbreviations" in the WACAP Database for parameter abbreviations and descriptions.
Data	-----	Contains data result for the specified sample, sample type, parameter, and media basis.
MediaBasis	Concentration, Flux, ww, dw, lip, etc.	Indicates whether the data value reported is in concentration units based on dry, or wet weight, or normalized to the lipid or total organic carbon content, or is reported in flux units. See Table 9 in the WACAP Database User's Guide or table "6_MediaBasis_Descriptions" in the WACAP Database for MediaBasis abbreviations and descriptions.
Units	pg/g, mgC/cm ² /y, µg/ml, etc.	See Table in the WACAP Database User's Guide or table "7_Unit_Abbreviations" in the WACAP Database for Units abbreviations and descriptions.
Flag	null, BDL, ND, C, X, or COM	Define the use/do not use status of the data; qualifiers define why or what is wrong. See Table 9 in the WACAP Database User's Guide or table "8_Flags_and_Qualifiers" in the WACAP Database for Units abbreviations and descriptions.
Qualifier	r, a, c, d, e, etc.	Used with flags, define why or what is wrong. See Table 9 in the WACAP Database User's Guide or table "8_Flags_and_Qualifiers" in the WACAP Database for Units abbreviations and descriptions.

3.0 Park and Site Fields

Fourteen lake sites in the eight core national parks were sampled, and the national park code and lake name are used to identify each site. The four-letter park codes used in the database are the codes used by the National Park Service, which are created by using the first two letters of the first two words in the park name. Snow and vegetation samples were collected from additional sites, so there are more sites than the 14 lake watersheds in the core parks. In addition, vegetation and air were sampled from an additional set of 11 parks and one national forest. Table 3 lists the park codes and site names for the 14 lake watersheds in the eight core national parks. Table 4 lists the park codes for the additional parks for vegetation sampling.

Table 3. WACAP Sites in Core Parks. All media were sampled at each site, including water, snow, air, vegetation (conifer needles and lichens), fish, and sediments. Parks are listed alphabetically by park code.

Park Code	Park ¹	State	Lake Site	Latitude ² (dd)	Longitude ² (dd)	Lake Elevation ³ (m)	Year Sampled
DENA	Denali NP and Preserve	Alaska	McLeod	63.38	-151.07	564	2004
DENA	Denali NP and Preserve	Alaska	Wonder	63.48	-150.88	605	2004
GAAR	Gates of the Arctic NP and Preserve	Alaska	Matcharak	67.75	-156.21	502	2004
GLAC	Glacier NP	Montana	Oldman	48.50	-113.46	2026	2005
GLAC	Glacier NP	Montana	Snyder	48.62	-113.79	1597	2005
MORA	Mt. Rainier NP	Washington	Golden	46.89	-121.90	1369	2005
MORA	Mt. Rainier NP	Washington	LP19	46.82	-121.89	1372	2005
NOAT	Noatak National Preserve	Alaska	Burial	68.43	-159.18	430	2004
OLYM	Olympic NP	Washington	Hoh	47.90	-123.79	1380	2005
OLYM	Olympic NP	Washington	PJ	47.95	-123.42	1384	2005
ROMO	Rocky Mountain NP	Colorado	LonePine	40.22	-105.73	3018	2003
ROMO	Rocky Mountain NP	Colorado	Mills	40.29	-105.64	3030	2003
SEKI	Sequoia and Kings Canyon NP	California	Emerald	36.58	-118.67	2810	2003
SEKI	Sequoia and Kings Canyon NP	California	Pear	36.60	-118.67	2908	2003

¹NP = National Park, ²dd= decimal degrees; ³ from drg (digital raster graphic), m = meter

Table 4. WACAP Secondary Parks for Vegetation and Air Sampling. Parks are listed alphabetically by park code.

Park Code	Park ¹	State	No. of Vegetation Sampling Sites	Minimum Elevation of Sites (m)	Maximum Elevation of Sites (m)	No. of Air Sampling Sites	Year Sampled
BAND	Bandelier National Monument	New Mexico	5	1854	2926	1	2005
BIBE	Big Bend NP	Texas	5	560	2316	4	2005
CRLA	Crater Lake NP	Oregon	5	1798	2713	1	2005
GLBA	Glacier Bay NP&P	Alaska	4	8	625	1	2005
GRSA	Great Sand Dunes NP&P	Colorado	5	2469	3338	1	2005
GRTE	Grand Teton NP	Wyoming	5	2073	3048	1	2005
KATM	Katmai NP&P	Alaska	6	36	1112	1	2005
LAVO	Lassen Volcanic NP	California	5	1829	2713	1	2005
NOCA	North Cascades NP	Washington	5	198	1600	1	2005
STLE	Stikine-LeConte Wilderness, Tongass NF	Alaska	5	1	1064	4	2005
WRST	Wrangell-St. Elias NP&P	Alaska	6	7	1421	1	2005
YOSE	Yosemite NP	California	5	661	3048	1	2005

¹NP = National Park, NF = National Forest, NPP = National Park & Preserve

4.0 WACAP Laboratories and Sample Numbers

Each WACAP sample was assigned a 5 digit number, with the first digit representing the year the sample was collected, i.e., 3 for the year 2003, 4 for the year 2004, and 5 for the year 2005. The second digit represents the WACAP project at the WRS Analytical Laboratory and is assigned as “6” or “8”. The third digit represents the media sampled. The WACAP_No field is the primary key used to link the sample with site and sampling information. The WACAP_No used with the SampleType and Parameter fields will uniquely identify each sample result.

A numerical code identifies each laboratory. The LabCode field identifies which laboratory produced the sample result for each parameter. Table 5 lists laboratory codes and contact information. Table 6 provides a chart of the analyses for each media type, with the laboratory responsible for the analyses indicated by a laboratory code.

Table 5. WACAP Laboratory Codes and Contact Information

Lab Code	Laboratory	WACAP Analyses	Address	Contact Information	Additional Contact Information
1	Simonich Environmental Chemistry (SEC) Laboratory	SOC Analyses	1161 Agricultural and Life Sciences Dept. of Environmental and Molecular Toxicology Oregon State University Corvallis, OR 97331	Staci Simonich 541-737-9194 staci.simonich@orst.edu	
2	Willamette Research Station (WRS) Analytical Laboratory	Hg in sediment, fish, lichen, & moose; sediment processing, C analyses in sediment, Major ions in water	Willamette Research Station Analytical Laboratory, U.S. EPA 1350 SE Goodnight Ave. Corvallis, OR 97333	Phil Monaco 541-754-4720 monaco.phil@epa.gov	Dixon Landers 541-754-4427 Landers.Dixon@epa.gov
3	USGS Boulder Laboratory	Metals in snow, fish, lichen, sediment, moose, & water	Trace Element Environmental Analytical Chemistry Project U.S Geological Survey National Research Program 3215 Marine St., Suite E-127 Boulder, CO 80303	Howard Taylor 303-541-3007 hetaylor@usgs.gov	
4	OSU Fish Laboratories	Fish health data: hematology, physiology, & macrophage aggregate analyses	Dept. of Microbiology 220 Nash Hall Oregon State University Corvallis, OR 97331 Oregon Cooperative Fish and Wildlife Research Unit 170 Nash Hall Oregon State University Corvallis, OR 97331	Mike Kent 541-737-8652 or -5088 Michael.kent@orst.edu Carl Schreck 541-737-1961 carl.schreck@orst.edu	

Lab Code	Laboratory	WACAP Analyses	Address	Contact Information	Additional Contact Information
5	USGS Wisconsin Laboratory	Hg in snow	Wisconsin District Mercury Research Lab USGS Water Resources Division 8505 Research Way Middleton, WI 53562	David Krabbenhoft 608-821-3843, 608-828-9901 dpkrabbe@usgs.gov	
6	USGS Colorado Water Science Center	Major ions, pH, specific conductance, & alkalinity in snow	USGS – WRD, Colorado District Denver Federal Center, MS-415 Bldg. 53 Lakewood, CO 80225	Alisa Mast 303.236.4882 ext. 314 mamast@usgs.gov	
7	UMNRAL (Univ. of MN Research Analytical Lab)	N & S in lichen	Research Analytical Laboratory University of Minnesota Rm. 135 Crops Research Bldg. 1902 Dudley Ave. St Paul, MN 55108-6089	ral@soils.umn.edu 612- 625-3101	Roger Eliason 612-625-7701 FAX: 612-624-3420 elias004@umn.edu
8	Environmental Radioactivity Research Centre	Sediment dating	The University of Liverpool Liverpool, UK L69 3BX	Prof. Peter Appleby +44 (0)151 794 4020 Appleby@liv.ac.uk	
9	Environmental Change Research Centre	SCP analyses in sediment	University College London Pearson Building, Gower Street London UK WC1E 6BT	Prof. Neil Rose +44 (0) 20 7679 0543 nrose@geog.ucl.ac.uk	
10	Atmospheric and Environmental Chemistry	Atmospheric modeling data	University of Washington-Bothell 18115 Campus Way NE Bothell, WA 98011	Dan Jaffe 425-352-5357 djaffe@u.washington.edu	
11	Chesapeake Biological Laboratory, Univ. of MD	Particulate C and N in snow	CBL, Center for Environmental and Estuarine Studies 1 Williams Street, PO Box 38 Solomons, MD 20688	Carl F. Zimmermann 410-326-7252 carlz@cbl.umces.edu	

Table 6. WACAP Laboratories by Media and Analyses. Laboratory abbreviations¹ and codes are listed in Table 4.

MEDIA	SNOW	FISH	SEDIMENT	VEGETATION	WATER	MOOSE	AIR (PASDs)
ANALYSES²							
SOC	SEC Laboratory (1)	SEC Laboratory (1)	SEC Laboratory (1)	SEC Laboratory (1)	SEC Laboratory (1)	SEC Laboratory (1)	SEC Laboratory (1)
Hg	USGS-Wisconsin (5)	WRS Laboratory (2)	WRS Laboratory (2)	WRS Laboratory (2)	USGS-Boulder (3)	WRS Laboratory (2)	
Metals	USGS-Boulder (3)	USGS-Boulder (3)	USGS-Boulder (3)	USGS-Boulder (3)	USGS-Boulder (3)	USGS-Boulder (3)	
Inorganic/ Physical	USGS-CWSC (6), CBL (11)		WRS Laboratory (2)	UMNRAL (7)	WRS Laboratory (2)		
Biology/pathology		OSU Fish Laboratories (4)					
Sediment Dating			ERRC (8)				
Sediment SCP			ECRC (9)				

 = not applicable

¹ Laboratories: SEC = Simonich Environmental Chemistry, WRS = Willamette Research Station, CWSC = Colorado Water Science Center, UMNRL=Univ. of Minnesota Research Analytical Laboratory, ERRC = Environmental Radioactivity Research Centre, ECRC= Environmental Change Research Centre

² SOC= semi-volatile organic compounds, Hg = mercury, SCP= spheroidal carbonaceous particles

5.0 Media Subset Field

All data for each ecosystem medium are organized into one table. Three media also have subsets:

- Fish: whole fish, fillet, and liver
- Moose: liver, meat
- Vegetation: conifer needles, lichen

6.0 Analyte Type Field

Analyte types describe groups of parameters. Each data table has an AnalyteType field that can be used to search, sort, and retrieve data. Table 7 provides the abbreviations and descriptions for the five groups of analyte types in this field.

7.0 Sample Type Field

Each data table contains results for all sample types, including field replicates, analytical replicates, field blanks, laboratory blanks, etc. The sample type of R, for regular sample, should be selected when retrieving data for most data analyses. Fish samples were considered replicates from the same lake, so their standard sample type is "REP." Descriptions of each sample type used in the database are provided in Table 8.

8.0 Parameter Field

Table 9 contains a list of all parameters with their abbreviations and descriptions. The abbreviations are used in the parameter field in the data tables.

Table 7. AnalyteType abbreviations and descriptions.

AnalyteType	Description
Biology/Path	Fish biological and pathological parameters, such as fork length, age macrophage aggregates, vitellogenin.
Hg	Mercury
Inorg/Phys	Inorganic and physical parameters, such as chlorophyll a, percent moisture, percent lipid, etc.
Metals	Metals, primarily cadmium, copper, lead, nickel, vanadium, and zinc
SOC	Semi-volatile organic compounds

Table 8. SampleType abbreviations and descriptions.

SampleType	Description
AREP	Analytical replicate, collected by pouring from same aliquot container for a second analysis during the same run; numbers are added if more than one collected (e.g., AREP1, AREP2)
CP	Composite bulk precipitation sample
FB	Field blank
GB	Grind blank for SOC/Hg fish processing
LB	Laboratory blank
LB_AREP	Laboratory blank that was also split into an analytical replicate
LREP	Laboratory replicate, collected by filtering a second set of aliquots; numbers are added if more than one collected (e.g., LREP1, LREP2)
QA	Quality assurance data; note that this sample type is used only in the table Sediment_Data as the sample type for the lower and upper 90% confidence limits for the spheroidal carbonaceous particle counts (parameters SCP_CL90%Lower and SCP_CL90%Upper).
R	Regular sample
REP	Field replicate sample; numbers are added if more than one collected (e.g., REP1, REP2); note that fish collected from same lake are designated as REPs.
REP_AREP	Field replicate sample that was then split into an analytical replicate
TB_IN	Travel blank used when PASDs were harvested
TB_OUT	Travel blank used when PASDs were deployed

9.0 Media Basis Field

Media basis indicates whether the data value reported is in concentration units based on dry, or wet weight, or normalized to the lipid or total organic carbon content, or is reported in flux units. The abbreviations used in the MediaBasis field are described in Table 10.

Table 9. Parameter Abbreviations and Descriptions

Analyte Type	Parameter	Compound_Name/Description	SOC Category ¹
SOC	ACE	Acenaphthene	PAH
SOC	ACLR	Acetochlor	CUPs
SOC	ACY	Acenaphthylene	PAH
SOC	a-HCH	Hexachlorcyclohexane, alpha	HUPs
SOC	ALCLR	Alachlor	CUPs
SOC	Aldrin	Aldrin	HUPs
SOC	ANT	Anthracene	PAH
SOC	ATRZ	Atrazine	CUPs
SOC	B[a]A	Benzo(a)anthracene	PAH
SOC	B[a]P	Benzo(a)pyrene	PAH
SOC	B[b]F	Benzo(b)fluoranthene	PAH
SOC	B[e]P	Benzo(e)pyrene	PAH
SOC	B[ghi]P	Benzo(ghi)perylene	PAH
SOC	B[k]F	Benzo(k)fluoranthene	PAH
SOC	BDE 10	Brominated Diphenyl Ether 10	IUC
SOC	BDE 100	Brominated Diphenyl Ether 100	IUC
SOC	BDE 116	Brominated Diphenyl Ether 116	IUC
SOC	BDE 118	Brominated Diphenyl Ether 118	IUC
SOC	BDE 119	Brominated Diphenyl Ether 119	IUC
SOC	BDE 126	Brominated Diphenyl Ether 126	IUC
SOC	BDE 138	Brominated Diphenyl Ether 138	IUC
SOC	BDE 153	Brominated Diphenyl Ether 153	IUC
SOC	BDE 154	Brominated Diphenyl Ether 154	IUC
SOC	BDE 155	Brominated Diphenyl Ether 155	IUC
SOC	BDE 166	Brominated Diphenyl Ether 166	IUC
SOC	BDE 17	Brominated Diphenyl Ether 17	IUC
SOC	BDE 181	Brominated Diphenyl Ether 181	IUC
SOC	BDE 183	Brominated Diphenyl Ether 183	IUC
SOC	BDE 25	Brominated Diphenyl Ether 25	IUC
SOC	BDE 28	Brominated Diphenyl Ether 28	IUC
SOC	BDE 30	Brominated Diphenyl Ether 30	IUC
SOC	BDE 32	Brominated Diphenyl Ether 32	IUC
SOC	BDE 35	Brominated Diphenyl Ether 35	IUC
SOC	BDE 37	Brominated Diphenyl Ether 37	IUC
SOC	BDE 47	Brominated Diphenyl Ether 47	IUC
SOC	BDE 49	Brominated Diphenyl Ether 49	IUC
SOC	BDE 66	Brominated Diphenyl Ether 66	IUC
SOC	BDE 7	Brominated Diphenyl Ether 7	IUC
SOC	BDE 71	Brominated Diphenyl Ether 71	IUC
SOC	BDE 75	Brominated Diphenyl Ether 75	IUC
SOC	BDE 77	Brominated Diphenyl Ether 77	IUC
SOC	BDE 8	Brominated Diphenyl Ether 8	IUC
SOC	BDE 85/155	Brominated Diphenyl Ether 85/155	IUC

Analyte Type	Parameter	Compound_Name/Description	SOC Category ¹
SOC	BDE 99	Brominated Diphenyl Ether 99	IUC
SOC	BDE190	Brominated Diphenyl Ether 190	IUC
SOC	b-HCH	Hexachlorcyclohexane, beta	HUPs
SOC	c-CLDN	Chlordane, cis	HUPs
SOC	CHR/TRI	Chrysene+Triphenylene	PAH
SOC	CLPYR	Chlorpyrifos	CUPs
SOC	CLPYR O	Chlorpyrifos oxon	CUPs
SOC	c-NCLR	Nonachlor, cis	HUPs
SOC	CYAZ	Cyanazine	CUPs
SOC	D[ah]A	Dibenz(a,h)anthracene	PAH
SOC	DCPA	Dacthal	CUPs
SOC	d-HCH	Hexachlorcyclohexane, delta	HUPs
SOC	DIAZ	Diazinon	CUPs
SOC	Dieldrin	Dieldrin	HUPs
SOC	ENDO I	Endosulfan I	CUPs
SOC	ENDO II	Endosulfan II	CUPs
SOC	ENDO S	Endosulfan sulfate	CUPs
SOC	Endrin	Endrin	HUPs
SOC	Endrin A	Endrin aldehyde	HUPs
SOC	EPTC	Ethylidipropylthiocarbamate	CUPs
SOC	ETDZL	Etridiazole	CUPs
SOC	ETHN	Ethion	CUPs
SOC	FLA	Fluoranthene	PAH
SOC	FLO	Fluorene	PAH
SOC	g-HCH	Hexachlorcyclohexane, gamma (Lindane)	CUPs
SOC	HCB	Hexachlorobenzene	HUPs
SOC	HCLR	Heptachlor	HUPs
SOC	HCLR E	Heptachlor epoxide	HUPs
SOC	I[123-cd]p	Indeno(1,2,3-cd)pyrene	PAH
SOC	MBZN	Metribuzin	CUPs
SOC	MCLR	Metolachlor	CUPs
SOC	Mirex	Mirex	HUPs
SOC	M-PTHN	Methyl parathion	CUPs
SOC	MTHN	Malathion	CUPs
SOC	MXCLR	Methoxychlor	HUPs
SOC	o-CLDN	Chlordane, oxy	HUPs
SOC	op-DDD	o,p'-dichlorodiphenyldichloroethane	HUPs
SOC	op-DDE	o,p'-dichlorodiphenyldichloroethylene	HUPs
SOC	op-DDT	o,p'-dichlorodiphenyltrichloroethane	HUPs
SOC	PBLT	Pebulate	CUPs
SOC	PCB 101	2,2',4,5,5'-pentachlorobiphenyl	IUC
SOC	PCB 118	2,3',4,4',5-pentachlorobiphenyl	IUC
SOC	PCB 138	2,2',3,4,4',5'-hexachlorobiphenyl	IUC
SOC	PCB 153	2,2',4,4',5,5'-hexachlorobiphenyl	IUC
SOC	PCB 183	2,2',3,4,4',5',6-heptachlorobiphenyl	IUC

Analyte Type	Parameter	Compound_Name/Description	SOC Category ¹
SOC	PCB 187	2,2',3,4',5,5',6-heptachlorobiphenyl	IUC
SOC	PCB 74	2,4,4',5-Tetrachlorobiphenyl	IUC
SOC	PCLR	Propachlor	CUPs
SOC	PHE	Phenanthrene	PAH
SOC	PMTN	Prometon	CUPs
SOC	pp-DDD	p,p'-dichlorodiphenyldichloroethane	HUPs
SOC	pp-DDE	p,p'-dichlorodiphenyldichloroethylene	HUPs
SOC	pp-DDT	p,p'-dichlorodiphenyltrichloroethane	HUPs
SOC	PTHN	Parathion	CUPs
SOC	PYR	Pyrene	PAH
SOC	Retene	Retene	PAH
SOC	SIMZ	Simazine	CUPs
SOC	t-CLDN	Chlordane, trans	HUPs
SOC	TFLN	Trifluralin	CUPs
SOC	t-NCLR	Nonachlor, trans	HUPs
SOC	TRLTE	Triallate	CUPs
SOC	*_P	“_P” added to SOC parameter name (indicated by *) indicates the concentration is for the SOC extracted from the 1 µm glass fiber filter used to remove particulate matter during the lake water sampling with the Infiltrax 100 submersible pump, i.e., the concentration is the SOC sorbed to particulate matter.	
Biology/Path	Age	Age of the fish in years	
Biology/Path	CF	Condition factor = (mass / FL ³)* 100000	
Biology/Path	E2	Blood plasma 17beta-estradiol (ng/ml = nanograms per milliliter)	
Biology/Path	FieldIDStageDevelopment	Field ID of developmental stage; Relative stage of maturation determined by visual inspection of the gonads: 1= immature, 2= maturing, 3= maturing/mature, 4= mature, 5= post-spawn	
Biology/Path	FL	Fork Length - distance from the tip of the snout to the fork in the tail	
Biology/Path	HistopathologyNotes	Histopathologies identified in the fish kidney, liver, spleen, gonad, or gill; Notes are in table "FishAuxiliaryTable_Histopathology_Notes" with definitions of abbreviations in table "FishAuxiliaryTable_Codes_and Abbreviations"	
Biology/Path	KidneyMA	Kidney macrophage aggregates in percent area of the tissue occupied	
Biology/Path	KidneyMAsubj	Relative scoring of kidney macrophage aggregates	
Biology/Path	kT	Blood plasma 11-ketotestosterone (ng/ml = nanograms per milliliter)	
Biology/Path	LiverMA	Liver macrophage aggregates in percent area of the tissue occupied	
Biology/Path	LiverMAsubj	Relative scoring of liver macrophage aggregates	

Analyte Type	Parameter	Compound_Name/Description	SOC Category ¹
Biology/Path	Mass	Mass of the fish in grams	
Biology/Path	MaturationStage	Stage of maturation determined from histological analysis of the gonads, from 1 to 6. See table "FishAuxiliaryTable_Codes_and_Abbreviations" in WACAP Database for definitions of codes.	
Biology/Path	Sex	Sex of the fish determined from visual inspection and histological analysis of the gonads; 1= female, 2= male	
Biology/Path	Spleen MA	Spleen macrophage aggregates in percent area of the tissue occupied	
Biology/Path	SpleenMAsubj	Relative scoring of spleen macrophage aggregates	
Biology/Path	T	Testosterone (ng/ml = nanograms per milliliter)	
Biology/Path	Vtg	Blood plasma vitellogenin (µg/ml = micrograms per milliliter)	
Hg	Hg	Mercury	
Hg	Hg_SD	Standard deviation of mercury measurement	
Hg	Hg_TOT	Total mercury (unfiltered)	
Hg	MeHg_TOT	Total methyl mercury (unfiltered)	
Inorg/Phys	%Lipid	Percent of solvent extractable lipid in homogenate	
Inorg/Phys	%Moisture	Percent water in homogenate	
Inorg/Phys	%Water	Percent water	
Inorg/Phys	ALK	Alkalinity	
Inorg/Phys	ANC	Acid neutralizing capacity	
Inorg/Phys	AveTemperature	Average temperature in degrees Celsius	
Inorg/Phys	C_Part particulate	Particulate carbon; analysis of particulates extracted from filter	
Inorg/Phys	Ca	Calcium	
Inorg/Phys	Chl a	Chlorophyll a	
Inorg/Phys	Cl	Chloride	
Inorg/Phys	Color	Color measurement	
Inorg/Phys	Depth	Depth below lake surface that water sample was collected	
Inorg/Phys	DIC	Dissolved inorganic carbon	
Inorg/Phys	DOC	Dissolved organic carbon	
Inorg/Phys	dry_XAD	Weight in grams of resin (Amberlite XAD) used in passive air sampling devices	
Inorg/Phys	DryDensity	WetDensity multiplied by the FractionSolids	
Inorg/Phys	FractionSolids	Dry sediment weight divided by starting wet sediment weight	
Inorg/Phys	K	Potassium	
Inorg/Phys	Lipid	Weight of lipid in sample	
Inorg/Phys	Mg	Magnesium	
Inorg/Phys	N_Part particulate	Particulate nitrogen; analysis of particulates extracted from filter	

Analyte Type	Parameter	Compound_Name/Description	SOC Category ¹
Inorg/Phys	Na	Sodium	
Inorg/Phys	NH3-N	Ammonia nitrogen	
Inorg/Phys	NH4	Ammonium	
Inorg/Phys	NO3	Nitrate	
Inorg/Phys	pH	Negative logarithm of the hydrogen ion activity	
Inorg/Phys	Precipitation	Measurement of precipitation in cm	
Inorg/Phys	SCP	Spheroidal carbonaceous particles	
Inorg/Phys	SCP_CL90%Lower	90% upper confidence limit for SCP count	
Inorg/Phys	SCP_CL90%Upper	90% lower confidence limit for SCP count	
Inorg/Phys	SiO2	Silica	
Inorg/Phys	SnowDepth	Depth of snow in snow pit	
Inorg/Phys	SO4	Sulfate	
Inorg/Phys	SpConductance	Specific conductance	
Inorg/Phys	SWE	Snow water equivalent	
Inorg/Phys	TC	Total carbon	
Inorg/Phys	TIC	Total inorganic carbon, calculated as difference between TC and TOC	
Inorg/Phys	TN	Total nitrogen	
Inorg/Phys	TOC	Total organic carbon	
Inorg/Phys	TP	Total phosphorus	
Inorg/Phys	TSS	Total suspended solids	
Inorg/Phys	Turbidity	Suspended and colloidal matter in water	
Inorg/Phys	UVA	UV absorbance at 254 nm	
Inorg/Phys	WetDensity	Wet sediment weight divided by sediment volume	
Inorg/Phys	WetWeight	Wet weight of sample	
Inorg/Phys	WtExtracted	Weight of sample extracted for SOC analyses	
Metals	*_SD	Standard deviation for the parameter indicated by " * " with the same WACAP_No	
Metals	*_TOT	Total data; analysis on an unfiltered sample	
Metals	Al	Aluminum	
Metals	As	Arsenic	
Metals	Au	Gold	
Metals	B	Boron	
Metals	Ba	Barium	
Metals	Be	Beryllium	
Metals	Bi	Bismuth	
Metals	Ca	Calcium	
Metals	Cd	Cadmium	
Metals	Ce	Cerium	
Metals	Co	Cobalt	
Metals	Cr	Chromium	
Metals	Cs	Cesium	
Metals	Cu	Copper	
Metals	Db	Dubnium	
Metals	Dy	Dysprosium	

Analyte Type	Parameter	Compound_Name/Description	SOC Category ¹
Metals	Er	Erbium	
Metals	Eu	Europium	
Metals	Fe	Iron	
Metals	Ga	Gallium	
Metals	Gd	Gadolinium	
Metals	Ho	Holmium	
Metals	K	Potassium	
Metals	La	Lanthanum	
Metals	Li	Lithium	
Metals	Lu	Lutetium	
Metals	Mg	Magnesium	
Metals	Mn	Manganese	
Metals	Mo	Molybdenum	
Metals	Na	Sodium	
Metals	Nd	Neodmium	
Metals	Ni	Nickel	
Metals	P	Phosphorus	
Metals	Pb	Lead	
Metals	Pr	Praseodymium	
Metals	Rb	Rubidium	
Metals	Re	Rhenium	
Metals	S	Sulfur	
Metals	Sb	Antimony	
Metals	Sc	Scandium	
Metals	Se	Selenium	
Metals	Sm	Samarium	
Metals	Sr	Strontium	
Metals	Tb	Terbium	
Metals	Te	Tellurium	
Metals	Ti	Titanium	
Metals	Tl	Thallium	
Metals	Tm	Thulium	
Metals	U	Uranium	
Metals	V	Vanadium	
Metals	W	Tungsten	
Metals	Y	Yttrium	
Metals	Yb	Ytterbium	
Metals	Zn	Zinc	
Metals	Zr	Zirconium	

¹CUPs = current-use pesticide, HUPs = historic-use pesticide, PAH = polycyclic aromatic hydrocarbon, a combustion byproduct, IUC = industrial/urban use compound


 = not applicable

Table 10. MediaBasis abbreviations and descriptions.

MediaBasis	Description
Concentration	Data in concentration units
dry XAD	Concentration based on gram dry weight of resin (Amberlite XAD) used in passive air sampling devices
dw	Concentration based on dry weight
FF_Flux	Data in units of flux, corrected for focusing factor
Flux	Data in units of flux
lip	Concentration based on lipid weight
PASD	Concentration in pg for the individual passive air sampling device (PASD)
Score	Relative score developed for parameter
TOC	Concentration based on g TOC in sample
WholeFish	Parameters determined on whole, intact fish (age, sex, fork length)
ww	Concentration based on wet weight

10.0 Units

Each result in the Data field is associated with a unit provided in the Units field. Abbreviations used for units are listed in Table 11 with their full name and description where applicable

11.0 Flags and Qualifiers

A system of flags and qualifiers was developed for a consistent use of data qualifiers in the database:

- Flags define the use/do not use status of the data
- Qualifiers define why or what is wrong

Table 12 lists the codes used for the flags and qualifiers. There are six flags:

- 1) Null value indicates an acceptable sample value
- 2) BDL flag indicates a below detection limit value. The qualifier will indicate if the value in the data field is the estimated detection limit or the sample value.
- 3) ND flag indicates the value was not detected.
- 4) C flag indicates there are cautions for the use of the sample value. The Qualifier will indicate the reason for the caution.
- 5) X flag indicates no value was reported. The qualifier will indicate the reason.

6) COM flag indicates there is a comment in the qualifier field.

Most qualifiers are single letters, except for the following qualifiers:

scp, with the flag C: indicates SCPs were determined on the secondary core from the site,
 XXX, with the flag C: indicates laboratory contamination is suspected,
 na, with the flag X: indicates the parameter was not analyzed, and
 text comment, with flag COM: provides text of comment

Multiple single letter qualifiers are combined if necessary in one qualifier field to provide all information about the data result. For example, a data result with a flag of "C" and a qualifier of "def" indicates there is caution to be used with this data because the surrogate recovery was less than 30% or greater than 130% (qualifier "d"), the lab blank was greater than 5% of the sample value (qualifier "e"), and the field blank was greater than 20% of the sample value (qualifier "f").

Table 11. Units abbreviations and descriptions.

Units	Description
%area	percent area
/cm	per centimeter
°C	degree Celsius
µeq/L	microequivalents per liter
µg/g	microgram per gram
µg/L	microgram per liter
µg/ml	microgram per milliliter
µmol/L	micromole per liter
µS/cm	microsiemens per centimeter
1=F, 2=M	Code for fish sex: 1= female, 2= male
cm	centimeter
Code 1=IM to 5=post spawn	Codes for field identification of stages of fish maturation; see table FishAuxiliaryTable_Codes&Abbreviations in the WACAP Database for description of each stage
fraction	division by same units
g	gram
g/cm ³	gram per cubic centimeter
g/mm ³	gram per cubic millimeter
HistopathologyCodes	Codes used for HistopathologyNotes in the table FishAuxiliaryTable_Histopathology_Notes; See table FishAuxiliaryTable_Codes&Abbreviations in the WACAP Database for description of each code
L	liter
m	meter
mg/L	milligram per liter
mgC/cm ² /y	milligram carbon per square centimeter per year

Units	Description
mg C/L	milligram carbon per liter
mg N/L	milligram nitrogen per liter
mm	millimeter
ng/L	nanogram per liter
ng/m ²	nanogram per square meter
ng/ml	nanogram per milliliter
no/g	number per gram
no/m ² /y	number per square meter per year
NTU	nephelometric turbidity units
pg	picogram
pg/cm ² /y	picogram per square centimeter per year
pg/g	picogram per gram
pg/L	picogram per liter
pH units	pH= negative logarithm of the hydrogen ion activity on a scale from 0 to 14, increasing with decreasing acidity.
Pt-Co Units	Platinum-cobalt units
Score 0-3	Relative subjective scoring (0 to 3) of macrophage aggregates
Stage 1-7	Stages of fish maturation; see table FishAuxiliaryTable_Codes&Abbreviations for description of each stage
Wt%	weight percent (weight per 100 units)
y	year
yr	year

12.0 Summary of Data Available by Media

Table 13 summarizes the data available in the database by the fields Media, MediaSubset, AnalyteType, MediaBasis, and LabCode. A complete list of the parameters in the database is in Table 9 (Parameter Abbreviations and Descriptions) and in table "5_Parameters_Abbreviations" in the database.

13.0 Summary of Queries for Data Retrieval

The WACAP Database has a basic query established for each medium, containing the tables needed to retrieve data values, sample information, and site information. These queries are designed to be modified to retrieve different types of data, by selecting for parks, sites, analyte types, etc. Tables 14 -21 list the field names in each table, with the fields used to link the tables indicated by the same color cells. Fields that are primary keys are denoted in bold and italics. Primary keys are the fields in each table that are used to uniquely identify each record; each table has from one to five primary keys.

These tables provide an overview of the structure of the data tables for each media. For example, Table 17 lists the fields in each sediment table. The table Sediment_Data contains the data results for each sediment interval, but the Sediment_Sample_Data contains the date (in years) and the sedimentation rate in $\text{g}/\text{cm}^2/\text{y}$ for each interval, and the Sediment_Site_Data contains the elevation of the lake the core was collected from. All the information for each interval can be retrieved by using the linked tables in the Sediment_Data_Query.

14.0 Auxiliary Tables

Fish and sediment data have additional tables containing auxiliary information, such as media-specific codes, and detection limits:

Table	Description
FishAuxiliaryTable_Codes&Abbreviations	Definitions of codes and abbreviations used for fish data parameters
FishAuxiliaryTable_Histopathology_Notes	Notes from histopathological examination of fish samples
FishAuxiliaryTable_TestesCategories	Results from categorization of trout testes in current and historic fish
SedimentAuxiliaryTable_Focusing_Factors	Focusing factors for each WACAP lake site
SedimentAuxiliaryTable_Metals_Lab3_dBaseIDs	Lab 3 (Metals) database IDs for each sediment sample
SedimentAuxiliaryTable_Metals_MedianDetectionLimits	Median detection limits for sediment metals analyses
SedimentAuxiliaryTable_Notes	Notes for sediment analyses

15.0 Below Detection Limit Values

Data values that are below the method detection limit are flagged in the database, with either a flag of “BDL” to indicate the result was below the detection limit, or a flag of “ND” for SOC results where no peak was detected. The qualifier will indicate whether the result reported is the sample value or the estimated detection limit (see Table 12). The qualifier “r” used with either flag “BDL” or “ND” indicates the value reported is the estimated detection limit. The qualifier “q” used with flag “BDL” indicates the parameter was detected but below the estimated detection limit, and the reported value is the estimated detection limit. The qualifier “b” used with flag “BDL” indicates the sample value was below the method detection limit, and the reported value is the sample value.

There are also samples where the SOC was detected, with a value above the estimated detection limit but below the quantification limit, which equals the concentration of the lowest calibration standard. The actual sample value is reported, with a flag of “C” to indicate caution in the use of the data, and a qualifier of “a” to indicated the reported value is the sample value.

The policy used for data analyses in the WACAP final report when there were below detection limit values followed these guidelines:

- 1) For any average, if more than 70% of the values going into that average are detects, then substitute 1/2 EDL for values below the detection limit.
- 2) If 50-70% of values are detects, then substitute 1/2 EDL for values below the detection limit. Report the average with superscript "1" and description of meaning.
- 3) If less than 50% of values are detects, then report EDL only with superscript "2" and description of meaning.

16.0 Other Data Sources

Additional data were assembled for use with back trajectory calculations, fish physiological marker data, and other environmental and physical variables measured at the sample collection sites to interpret and predict SOC, nutrient and metal accumulation in the WACAP media. PRISM (Parameter-Elevation Regressions on Independent Slopes Model), developed at Oregon State University (<http://www.ocs.orst.edu>) uses point measurements of climate data and a digital elevation model to generate estimates of annual and monthly climatic variables. Two Microsoft Excel spreadsheets with PRISM data for 1) 30 year means and 2) individual years are provided in the folder with the Access database, and links to the files are included in the opening form.

17.0 WACAP Publications

A list of scientific publications and presentations produced by the WACAP project is available on the National Park Service website for WACAP at http://www.nature.nps.gov/air/Studies/air_toxics/wacap.cfm. A link to the website is also provided on the opening form for the Access database.

18.0 Reference

Landers, D. H., S. L. Simonich, et al. (2008). The Fate, Transport, and Ecological Impacts of Airborne Contaminants in Western National Parks (USA), EPA/600/R-07/138. U.S. Environmental Protection Agency, Office of Research and Development, NHEERL, Western Ecology Division, Corvallis, Oregon.

Table 12. WACAP Flags and Qualifiers

Flag	Flag Description	Qualifier	Qualifier Description	Data Field Result
Null	Acceptable	Null	Acceptable	Sample value
BDL	Below Detection Limit	b	Below method detection limit	Sample value
BDL	Below Detection Limit	r	Value reported is estimated detection limit	Estimated detection limit
BDL	Below Detection Limit	q	Detected but below estimated detection limit	Estimated detection limit
ND	Not Detected	r	Value reported is estimated detection limit	Estimated detection limit
C	Caution for use of data	a	Detected, above EDL but below the quantification limit, which equals the concentration of the lowest calibration standard. Value reported is actual sample value.	Sample value
C	Caution for use of data	c	Performance standard deviated by >30%	Sample value
C	Caution for use of data	d	Surrogate recovery <30% or >130%	Sample value
C	Caution for use of data	e	Lab blank >5% of the sample value.	Sample value
C	Caution for use of data	f	Field blank >20% of the sample value.	Sample value
C	Caution for use of data	g	Above the calibration range; i.e., greater than the concentration of the highest calibration standard used to make the calibration curve.	Sample value
C	Caution for use of data	h	Travel blank (for PASD samples) was >5% of the sample value.	Sample value
C	Caution for use of data	i	Interpolated value (for sedimentation rate)	Sample value
C	Caution for use of data	k	Sex was not confirmed by histology.	Sample value
C	Caution for use of data	l	Intra-assay RSD> 7%	Sample value

Flag	Flag Description	Qualifier	Qualifier Description	Data Field Result
C	Caution for use of data	o	Otolith was unreadable, age was determined by scale	Sample value
C	Caution for use of data	u	Exceeds QA objective for accuracy (Hg objective = 15% difference)	Sample value
C	Caution for use of data	scp	Due to low sediment quantity, SCPs were determined on the secondary core from this site, with the flux values calculated using sedimentation rate from same interval from the primary core from this site. Metals were analyzed on both the primary and secondary cores.	Sample value
C	Caution for use of data	w	Weight is average of all samples.	Sample value
C	Caution for use of data	q	Questionable data, with no reason provided	Sample value
C	Caution for use of data	XXX	Laboratory contamination is suspected in these samples; see SedimentAuxiliaryTable_SOC_Notes for description	Sample value
COM	Comment	text	Text of comment	Sample value
X	No Value Reported	c	Interval combined with adjacent interval for analyses (Hg and C on sediment)	Null
X	No Value Reported	d	Sediment core was not dated.	Null
X	No Value Reported	i	Otolith was not found.	Null
X	No Value Reported	m	kT is performed on male fish only.	Null
X	No Value Reported	n	No histology notes	Null
X	No Value Reported	na	Not analyzed, USGS labs code = -99	Null
X	No Value Reported	p	Not enough plasma for analysis	Null
X	No Value Reported	s	Assay not compatible in non-salmonid fishes	Null
X	No Value Reported	t	Not enough sample for analysis	Null

Flag	Flag Description	Qualifier	Qualifier Description	Data Field Result
X	No Value Reported	v	Failed QA objective(s)	Null
X	No Value Reported	x	Lab blank was >33% of the sample value.	Null
X	No Value Reported	y	Travel blank (for PASD samples) was >33% of the sample value.	Null
X	No Value Reported	z	Analyst has determined that a measurement was not able to be performed at this time.	Null
X	No Value Reported	u	missing data	Null

Table 13. Summary of Data Available

Media	MediaSubset	AnalyteType	MediaBasis	LabCode
Air		SOC		1
Atm_Modeling		Inorg/Phys		10
Fish	Fillet	Metals	dw	3
Fish	Liver	Metals	dw	3
Fish	Whole	Biology/Path		4
		Hg	ww	2
		SOC	dw, lip, ww	1
Moose	Liver	Hg	ww	2
		Inorg/Phys	dw	3
		Metals	dw	3
Moose	Meat	Hg	ww	2
		Inorg/Phys	dw,ww	1,3
		Metals	dw	3
		SOC	dw, lip, ww	1
Sediment		Hg	dw, FF_Flux	2
		Inorg/Phys	dw, FF_Flux, ww	2
		Metals	dw	3
		SOC	dw, FF_Flux, TOC, ww	1
Snow		Hg	Concentration	5, 6
		Inorg/Phys	Concentration	6, 11
		Metals	Concentration	3
		SOC	Concentration, Flux	1
Vegetation	Conifer Needles	Inorg/Phys	dw, ww	1
		SOC	dw, lip, ww	1
Vegetation	Lichen	Hg	dw	2
		Inorg/Phys	dw	1
		Metals	dw	3
		SOC	dw, lip, ww	1
Water		Inorg/Phys	Concentration	2
		Metals	Concentration	2,3
		SOC	Concentration	1

Table 14. Air Data Query

Air_Data	Air_Sample_Data	Air_Site_Data
WACAP_No	WACAP_No	
Media	Park	
AnalyteType	Site	Site
SampleType		Park
LabCode		Park_Name
Parameter		Latitude (dd)
Data		Longitude (dd)
MediaBasis		Elevation (m)
Units		Number of Sampling Days
Flag		PASDInstallationDate
Qualifier		PASDRetrievalDate
		PASDInstallationTime
		PASDRetrievalTime
		Time Zone
		Deployment Notes
		Collection Notes
		Location Directions
		TidbitNo
		Mapping Datum

Table 15. Fish Data Query

Fish_Data	Fish_Sample_Data	WACAP_Lake_Sites
WACAP_No	WACAP_No	
Media	FishNo	
MediaSubset	Park	
AnalyteType	Site	Site
SampleType	Species	Park
LabCode	DateSampled	Park_Name
Parameter	TimeCollected	Elevation (m)
Data	DateProcessed	Latitude (dd)
MediaBasis	Assay	Longitude (dd)
Units	SOCHgBiolData [Yes/No Field]	
Flag	SOC_Data [Yes/No Field]	
Qualifier	Hg_Data [Yes/No Field]	
	Biology_Data [Yes/No Field]	

Table 16. Moose Data Query

Moose_Data	Moose_Sample_Data
WACAP_No	WACAP_No
Media	Park
MediaSubset	Site
AnalyteType	Date_Collected
SampleType	Latitude (dd)
LabCode	Longitude (dd)
Parameter	Wt_of_Animal
Data	Sex_of_Animal
MediaBasis	Meat_Location
Units	Site_Description
Flag	Comments
Qualifier	Hunter_Names

Table 17. Sediment Data Query

Sediment_Data	Sediment_Sample_Data	Sediment_Site_Data
WACAP_No	WACAP_No	
Media	Park	
AnalyteType	Site	Site
SampleType	Core	Core
LabCode	Primary/Secondary	Park
Parameter	Top_Interval (cm)	Park_Name
Data	Bottom_Interval (cm)	Primary/Secondary
MediaBasis	Mid_Interval (cm)	Elevation (m)
Units	ContainerType	Latitude (dd)
Flag	Volume (cm ³)	Longitude (dd)
Qualifier	Date_MidInterval (y)	DateSampled
	Sed_Rate (g/cm ² /y)	Number_of_Intervals
	LabCode	Core_Depth (cm)
	FF	Pb210_Dating [Yes/No Field]
	Flag	SOC_Data [Yes/No Field]
	Qualifier	Hg_Data [Yes/No Field]
		Carbon_Data [Yes/No Field]
		SCP_Data [Yes/No Field]
		Metals_Data [Yes/No Field]

Table 18. Snow Data Query

Snow_Data	Snow_Sample_Data	Snow_Site_Data
WACAP_No	WACAP_No	
Media	Snow_Site	Snow_Site
AnalyteType	Park	Park
SampleType	Park_Name	Park_Name
LabCode	DateSampled	Site_Description
Parameter	TimeCollected	Latitude (dd)
Data	IRTSACC	Longitude (dd)
MediaBasis	Comments	Elevation (m)
Units		USGS_Site_Code
Flag		USGS_Site_ID
Qualifier		County_Code
		State_Code

Table 19. Vegetation Data Query

Vegetation_Data	Vegetation_Sample_Data	Vegetation_Site_Data
WACAP_No	WACAP_No	
Media	Site	Site
MediaSubset	Park	Park
AnalyteType	DateSampled	Park_Name
SampleType	MediaSubset	ParkType
LabCode	Species	TargetLake
Parameter	FieldRepNo	DateSampled
Data	Weight (g)	County
MediaBasis	NeedleYear	State
Units	LichenSubstrate	Latitude (dd)
Flag	MoistureStatus	Longitude (dd)
Qualifier	Comments	Elevation (m)
		Elevation (Ft)
		SiteName
		Locale
		MappingDatum
		GPSAccuracy(m)
		PASD
		PlotRadius(m)
		PlotLength(m)
		PlotWidth(m)
		AspectDeg
		Slope%
		Exposure
		ExposureCode
		Landform
		LandformPosition
		%CanopyCover
		CanopyGp
		HabitatNotes
		SampleNotes
		VegCover76-100%
		VegCover51-75%
		VegCover26-50%
		VegCover6-25%
		VegCover0-5%
		Observers
		TimeStart
		TimeEnd
		WillowTime
		NeedleTime
		LichenTime

Table 20. Water Data Query

Water_Data	Water_Sample_Data	WACAP_Lake_Sites
WACAP_No	WACAP_No	
Media	Park	
AnalyteType	Site	Site
SampleType	DateSampled	Park
LabCode	SampleDepth (m)	Park_Name
Parameter	SampleDepth_Comment	Elevation (m)
Data	Sample_Stratum	Latitude (dd)
MediaBasis	SOC_Volume(L)	Longitude (dd)
Units	SOC_Position	
Flag		
Qualifier		

Table 21. Atmospheric Modeling Data Query

Atm_Modeling_Data	Atm_Site_Data
Park	Park
Media	Park_Name
Cluster_Date	Start_Location_Latitude (dd)
Season	Start_Location_Longitude (dd)
LabCode	Start_Location_Elevation (m)
OneDay_Cluster	Meteorological Station Precipitation Data Source
FiveDay_Cluster	Distance from WACAP Site
TenDay_Cluster	
AnalyteType	
Parameter	
Data	
Units	
Flag	
Qualifier	

APPENDIX A. Field Name Descriptions

Field names for all tables are organized alphabetically.

Field_Name	Abbreviations	Description	Tables with Field_Name
%CanopyCover		The percent canopy cover, estimated by summing midpoints for all tree & tall shrub species recorded in VegCover classes (0-5 thru 76-100)	Vegetation_Site_Data
Abbreviation		Abbreviation used in data result or parameter name	FishAuxiliaryTable_Codes_and_Abbreviations,
AnalyteType	Biology/Path, SOC, Hg, Metals, Inorg/Phys	Describes groups of parameters; this can be used to search, sort, and retrieve data. See Table 6 in the WACAP Database User's Guide or table "2_AnalyteType_Descriptions" in the WACAP Database for the abbreviations and descriptions for the five groups of analyte types in this field.	Air_Data, Atm_Modeling_Data, Fish_Data, Moose_Data, Sediment_Data, Snow_Data, Vegetation_Data, Water_Data, FishAuxiliaryTable_Histopathology_Notes, SedimentAuxiliaryTable_Metals_MedianDetectionLimits
AspectDeg		Aspect in degrees, compass direction downhill	Vegetation_Site_Data
Assay	B	Biological data are available	Fish_Sample_Data
Assay	C	Only catch data are available (mass, FL, sex, age, CF, FieldIDStageDevelopment)	Fish_Sample_Data
Assay	FB_SOC	Sample is field blank for SOC analyses	Fish_Sample_Data
Assay	GB_Hg	Sample is grind blank for mercury analyses	Fish_Sample_Data
Assay	HB	Mercury and biological data are available	Fish_Sample_Data
Assay	HBO	Mercury, biological, and SOC data are available	Fish_Sample_Data
Assay	M	Metals data are available	Fish_Sample_Data
Assay	OH	SOC and mercury data are available	Fish_Sample_Data
Biology_Data		Yes/No field; If checked, indicates there are biological data available for this fish	Fish_Sample_Data

Field_Name	Abbreviations	Description	Tables with Field_Name
Bottom_Interval (cm)		Depth in cm from surface of core to the bottom of the interval section; one sediment sample is one interval, with core sections either 0.5, 1.0, or 2.0 cm thick	Sediment_Sample_Data
CanopyGp		Canopy cover groups, 1 = none, 2 = >0-5%, 3 = 6-25%, 4 =26-50%, 5 =51-75%, 6 =76-100%, 7 = >100%	Vegetation_Site_Data
Carbon_Data		Yes/No field, if checked, indicates carbon analyses were completed on some core intervals	Sediment_Site_Data
Cluster_Date	m/d/yyyy or mm/dd/yyyy	Date of collection in month/day/year for data used to calculate back trajectories used in clusters	Atm_Modeling_Data
CollectionNotes		Notes regarding PASD collection	Air_Site_Data
Comments		Comments as recorded on field collection sheet for Moose, Snow, or Vegetation data, or comments concerning sediment analyses	Moose_Sample_Data, SedimentAuxiliaryTable_Notes, Snow_Sample_Data, Vegetation_Sample_Data
ContainerType	G, W	Type of container sediment interval was placed in as core was sliced; G= glass jar, W= whirlpak bag	Sediment_Sample_Data
Core		Core number, assigned consecutively as cores were collected	Sediment_Site_Data, Sediment_Sample_Data, SedimentAuxiliaryTable_Metals_Lab3_dBaselDs
Core_Depth (cm)		Total depth of core, from surface interval to deepest interval	Sediment_Site_Data
County		Name of the US county in which the site is located	Vegetation_Site_Data
County_Code		USGS code for county in which the site is located	Snow_Site_Data

Field_Name	Abbreviations	Description	Tables with Field_Name
Data		Contains data result for the specified sample, sample type, parameter, and media basis.	Air_Data, Atm_Modeling_Data, Fish_Data, Moose_Data, Sediment_Data, Snow_Data, Vegetation_Data, Water_Data, FishAuxiliaryTable_Histopathology_Notes
Date_Collected		Date moose samples were harvested	Moose_Sample_Data
Date_MidInterval (y)		Date of mid-interval of sediment section, in year	Sediment_Sample_Data
DateProcessed		Date fish was ground in blender with liquid nitrogen	Fish_Sample_Data
DateSampled		Date the site was visited and samples were collected	Sediment_Site_Data, Vegetation_Site_Data, Fish_Sample_Data, Snow_Sample_Data, Vegetation_Sample_Data, Water_Sample_Data
Definition		Description of abbreviation used for data result for parameter, or for parameter name	FishAuxiliaryTable_Codes_and_Abbreviations
DeploymentNotes		Notes regarding PASD deployment	Air_Site_Data
Distance from WACAP Site		Distance to WACAP site from trajectory starting latitudes and longitudes	Atm_Site_Data
Elevation (Ft)		Elevation in feet, for reference to USGS topographic maps	Vegetation_Site_Data
Elevation (m)		Elevation in meters	Air_Site_Data, Sediment_Site_Data, Snow_Site_Data, Vegetation_Site_Data, WACAP_Lake_Sites
Exposure		Gross classification of sample exposure: full sun, partly shaded, deep shade. Treeless areas = full sun	Vegetation_Site_Data
ExposureCode		1= deep shade, 2= partly shaded, 3= slightly shaded, 4= full sun	Vegetation_Site_Data

Field_Name	Abbreviations	Description	Tables with Field_Name
FF		Focusing factor for lake, calculated for each sediment core to correct for differences in sediment focusing among WACAP lakes. See Section 3.4.6.2 in WACAP Final Report for more information	Sediment_Sample_Data
FieldRepNo	1, 2, or 3	Field replicate number; e.g., if two collections of the same species were made on the same site, the first bag is replicate 1, the second bag is replicate 2. In 2003 and 2004 we tried to obtain 3 replicates per site; in 2005 only 1 sample was collected at most sites (= replicate 1), and replicate samples were collected of each sample type at one site in every other park. Note: 1a= 2004 growth, 1b= 2003 growth collected at same time from same tree.	Vegetation_Sample_Data
Fish_Site		Name of site fish were collected from, including WACAP lake sites	FishAuxiliaryTable_TestesCategories
FishNo		Fish identification number, coded by lake, assigned by Lab 4 (Oregon State University fish laboratories); FishNo for historic fish used as fish identification number	Fish_Sample_Data, FishAuxiliaryTable_TestesCategories
FiveDay_Cluster	A ,B,C, D, E, F	Back-trajectories for a five day period of time represent a meteorological calculation of the path that an individual air particle has traveled over five days. Five-day trajectories were then grouped into 6 clusters, and labeled alphabetically, starting with A for the shortest clusters, to F for the longest clusters. These clusters provide information about the routes of contaminant transport as well as the climatology for each park.	Atm_Modeling_Data

Field_Name	Abbreviations	Description	Tables with Field_Name
Flag	null, BDL, ND, C, X, or COM	Defines the use/do not use status of the data; qualifiers define why or what is wrong. See Table 11 in the WACAP Database User's Guide or table "8_Flags_and_Qualifiers" in the WACAP Database for Units abbreviations and descriptions; null=acceptable sample value, BDL= below detection limit, C=cautions for use, X=no value reported	Air_Data, Atm_Modeling_Data, Fish_Data, Moose_Data, Sediment_Data, Snow_Data, Vegetation_Data, Water_Data, FishAuxiliaryTable_Histopathology_Notes, Sediment_Sample_Data, SedimentAuxiliaryTable_Metals_MedianDetectionLimits
GPSAccuracy(m)		Accuracy of GPS reading, in meters, for latitude and longitude	Vegetation_Site_Data
HabitatNotes		Field notes on physical characteristics and vegetation on the site	Vegetation_Site_Data
Hg_Data		Yes/No field, if checked, indicates Hg data are available	Sediment_Site_Data, Fish_Sample_Data
Hunter_Names		Names of hunters who donated moose samples	Moose_Sample_Data,
Intersex	Yes or null	Presence or absence of both male and female reproductive structures in the same fish; Yes= present, null= absent	FishAuxiliaryTable_TestesCategories
IRTSACC		USGS sample identification number	Snow_Sample_Data
Lab3_dBaseID		Lab 3 (USGS Trace Element Environmental Analytical Chemistry Laboratory, Boulder, CO) database ID for each WACAP_No	SedimentAuxiliaryTable_Metals_Lab3_dBaseIDs
LabCode	1 to 11	See Table 4 in the WACAP Database User's Guide or table "4_LabCodes" in the WACAP Database for laboratory codes and contact information.	Air_Data, Atm_Modeling_Data, Fish_Data, Moose_Data, Sediment_Data, Snow_Data, Vegetation_Data, Water_Data, FishAuxiliaryTable_Histopathology_Notes, Sediment_Sample_Data, SedimentAuxiliaryTable_Metals_MedianDetectionLimits
Landform		Landform from topographic map	Vegetation_Site_Data

Field_Name	Abbreviations	Description	Tables with Field_Name
LandformPosition		1= flatland, 2= toeslope, 3= mid-slope, 4= upper slope, 5= ridgetop	Vegetation_Site_Data
Latitude (dd)		Latitude in decimal degrees	Air_Site_Data, Sediment_Site_Data, Snow_Site_Data, Vegetation_Site_Data, WACAP_Lake_Sites, Moose_Sample_Data,
LichenSubstrate		Name and part of the plant on which the lichen was growing (if an epiphyte) or the terricolous or saxicolous substrates (if otherwise)	Vegetation_Sample_Data
LichenTime		Time in hours and minutes required to collect lichens at this site	Vegetation_Site_Data
Locale		Verbal description of the site location	Vegetation_Site_Data
LocationDirections		Specific directions describing the location of PASD	Air_Site_Data
Longitude (dd)		Longitude in decimal degrees	Air_Site_Data, Sediment_Site_Data, Snow_Site_Data, Vegetation_Site_Data, WACAP_Lake_Sites, Moose_Sample_Data,
Mapping Datum		Mapping datum reference used to locate latitude and longitude	Air_Site_Data, Vegetation_Site_Data
Meat_Location		Location on moose where meat sample was collected	Moose_Sample_Data
Media	Air, Atm_Modeling, Fish, Moose, Sediment, Snow, Vegetation, Water	Ecosystem component	Air_Data, Atm_Modeling_Data, Fish_Data, Moose_Data, Sediment_Data, Snow_Data, Vegetation_Data, Water_Data, SedimentAuxiliaryTable_Metals_MedianDetectionLimits

Field_Name	Abbreviations	Description	Tables with Field_Name
MediaBasis	Concentration, Flux, ww, dw, lip, etc.	Indicates whether the data value reported is in concentration units based on dry, or wet weight, or normalized to the lipid or total organic carbon content, or is reported in flux units. See Table 9 in the WACAP Database User's Guide or table "6_MediaBasis_Descriptions" in the WACAP Database for MediaBasis abbreviations and descriptions.	Air_Data, Fish_Data, Moose_Data, Sediment_Data, Snow_Data, Vegetation_Data, Water_Data, FishAuxiliaryTable_Histopathology_Notes, SedimentAuxiliaryTable_Metals_MedianDetectionLimits
Median_DetectionLimit		Median detection limit for parameter for sediment analyses	SedimentAuxiliaryTable_Metals_MedianDetectionLimits
MediaSubset	Fillet, Liver, Whole, Meat, Lichen, ConiferNeedles, WillowBark	Subset of media field indicates whether analysis was on whole fish, fillet or liver for fish, meat or liver for moose, and conifer needles or lichen for vegetation. WillowBark was collected, but was not analyzed.	Fish_Data, Moose_Data, Vegetation_Data, Vegetation_Sample_Data
Metals_Data		Yes/No field, if checked, indicates metals analyses were completed on some core intervals	Sediment_Site_Data
Meteorological Station Precipitation Data Source		Data source for precipitation data	Atm_Site_Data
Mid_Interval (cm)		Depth in cm from surface of core to the middle of the interval section; one sediment sample is one interval, with core sections either 0.5, 1.0, or 2.0 cm thick	Sediment_Sample_Data, SedimentAuxiliaryTable_Metals_Lab3_dBaseIDs
MoistureStatus	damp, dry, or wet	Moisture condition of sample was weather dependent: dry, damp or (if collected in the rain) wet. Wet and damp samples were never dried, but sealed in the bag in whatever condition they were found in the field. Samples were kept cool by placing them on ice and eventually frozen in the laboratory.	Vegetation_Sample_Data
NeedleTime		Time in hours and minutes required to collect willow bark at this site	Vegetation_Site_Data

Field_Name	Abbreviations	Description	Tables with Field_Name
NeedleYear	1, 2, 1 & 2, or NA	Age in years of conifer needle and leaf samples collected. 1 = the current year's growth, 2 = the prior years growth, 1 & 2 = both years collected (these samples must be clipped into first and second years growth prior to lab analysis), or NA = sample was not a needle or leaf.	Vegetation_Sample_Data
Number of Sampling Days		Number of days PASD was at site	Air_Site_Data
Number_of_Intervals		Total number of intervals in core after extruding and slicing core	Sediment_Site_Data
Observers		Full names of the people who made observations or collected samples at the site	Vegetation_Site_Data
OneDay_Cluster	A ,B,C, D, E, F	Back-trajectories for a one day period of time represent a meteorological calculation of the path that an individual air particle has traveled over one day. One-day trajectories were then grouped into 6 clusters, and labeled alphabetically, starting with A for the shortest clusters, to F for the longest clusters. These clusters provide information about the routes of contaminant transport as well as the climatology for each park.	Atm_Modeling_Data
Parameter		See Table 8 in the WACAP Database User's Guide or table "5_Parameter_Abbreviations" in the WACAP Database for parameter abbreviations and descriptions.	Air_Data, Atm_Modeling_Data, Fish_Data, Moose_Data, Sediment_Data, Snow_Data, Vegetation_Data, Water_Data, FishAuxiliaryTable_Histopathology_Notes, SedimentAuxiliaryTable_Metals_MedianDetectionLimits

Field_Name	Abbreviations	Description	Tables with Field_Name
Park		National Park Service code for the administrative unit (park, monument, preserve, wilderness), usually the first four letters of the park name, or if the name has two words, the first 2 letters of the first two words in the name. See table "WACAP_Lake_Sites" for full park names for each code. Note that in the Vegetation_Site_Data, STLE is a WACAP name for the US Forest Service Wilderness area.	Air_Site_Data, Atm_Site_Data, Sediment_Site_Data, Snow_Site_Data, Vegetation_Site_Data, WACAP_Lake_Sites, Air_Sample_Data, Fish_Sample_Data, Moose_Sample_Data, Sediment_Sample_Data, SedimentAuxiliaryTable_Metals_Lab3_dBa selDs, Snow_Sample_Data, Vegetation_Sample_Data, WACAP_Lake_Sites, Water_Sample_Data, FishAuxiliaryTable_TestesCategories
Park_Name		Full name of the administrative unit (park, monument, preserve, wilderness, national forest)	Air_Site_Data, Atm_Site_Data, Sediment_Site_Data, Snow_Site_Data, Vegetation_Site_Data, WACAP_Lake_Sites, Atm_Site_Data, Snow_Sample_Data
ParkType		1= core park, 2= secondary park	Vegetation_Site_Data
PASD		Yes if PASD was deployed at site, null if PASD was not deployed	Vegetation_Site_Data
PASDInstallationDate		Date of PASD installation	Air_Site_Data
PASDInstallationTime		Time of PASD installation	Air_Site_Data
PASDRetrievalDate		Date of PASD retrieval	Air_Site_Data
PASDRetrievalTime		Time of PASD retrieval	Air_Site_Data
Pb210_Dating		Yes/No field, if checked, indicates core was dated	Sediment_Site_Data
PlotLength(m)		Estimated length in m of collecting area if it was not roughly circular, habitat and vegcover notes apply to this area	Vegetation_Site_Data
PlotRadius(m)		Estimated radius in m of collecting area, habitat and vegcover notes apply to this area	Vegetation_Site_Data
PlotWidth(m)		Estimated width in m of collecting area if it was not roughly circular, habitat and vegcover notes apply to this area	Vegetation_Site_Data

Field_Name	Abbreviations	Description	Tables with Field_Name
Primary/Secondary		Indicates if core was primary or secondary core; primary core was dated and if stratigraphy was intact, was used for most analyses; secondary core was usually not dated, but used for some analyses if needed	Sediment_Site_Data, Sediment_Sample_Data
Qualifier	r, a, c, d, e, etc.	Used with flags to define why or what is wrong. See Table 11 in the WACAP Database User's Guide or table "8_Flags_and_Qualifiers" in the WACAP Database for Units abbreviations and descriptions.	Air_Data, Atm_Modeling_Data, Fish_Data, Moose_Data, Sediment_Data, Snow_Data, Vegetation_Data, Water_Data, FishAuxiliaryTable_Histopathology_Notes, Sediment_Sample_Data, SedimentAuxiliaryTable_Metals_ MedianDetectionLimits
Region		Geographic region where fish were collected: Arctic Alaska, Denali, Olympics/Cascades, Rockies, or Sierras	FishAuxiliaryTable_TestesCategories
Sample_Stratum	epi or hypo	epi=sample collected in epilimnion, hypo=sample collected in hypolimnion	Water_Sample_Data
SampleDepth (m)		Depth (in meters) below lake surface sample was collected or measurement made	Water_Sample_Data
SampleDepth_Comment		Comments as recorded on field collection sheet	Water_Sample_Data
SampleNotes		Notes relevant to the samples collected on the site.	Vegetation_Site_Data

Field_Name	Abbreviations	Description	Tables with Field_Name
SampleType	AREP, FB, GB, LB, R, REP, etc.	Indicates whether sample was collected as a regular sample, or field replicate, analytical replicate, field blank, laboratory blank, etc. The sample type of R, for regular sample, should be selected when retrieving data for most data analyses. All vegetation samples were collected with 2 or 3 replicates at each site, so regular samples have SampleType = REP. Fish samples are considered replicates from the same lake, so their standard sample type is "REP." See Table 7 in the WACAP Database User's Guide or table "3_SampleType_Descriptions" in the WACAP Database for SampleType abbreviations and descriptions	Air_Data, Fish_Data, Moose_Data, Sediment_Data, Snow_Data, Vegetation_Data, Water_Data, FishAuxiliaryTable_Histopathology_Notes, SedimentAuxiliaryTable_Metals_Lab3_dBaseIDs
SCP_Data		Yes/No field, if checked, indicates SCP analyses were completed on some core intervals	Sediment_Site_Data
Season	1-WI, 2-SP, 3-SU, 4-AU	1-WI= Winter, 2-SP= Spring, 3-SU= Summer, 4-AU= Autumn	Atm_Modeling_Data
Sed_Rate (g/cm ² /y)		Sedimentation rate in grams per square centimeter per year for sediment interval	Sediment_Sample_Data
Sex	M or F	Sex of moose or fish; M = male, F= female	Moose_Sample_Data, FishAuxiliaryTable_TestesCategories
Site		Lake name, or site code for air and vegetation sites, with the first four letters the ParkCode, followed by a number, usually in order by elevation (e.g. 1 is lowest, 5 is highest).	Air_Site_Data, Sediment_Site_Data, Vegetation_Site_Data, WACAP_Lakes_Sites, Air_Sample_Data, Fish_Sample_Data, Sediment_Sample_Data, SedimentAuxiliaryTable_Metals_Lab3_dBaseIDs, Vegetation_Sample_Data, Water_Sample_Data
Site/Sample		Lake site name, and sample(s) comments apply to	SedimentAuxiliaryTable_Notes

Field_Name	Abbreviations	Description	Tables with Field_Name
Site_Description		Descriptive name of sample site	Snow_Site_Data, Moose_Sample_Data
SiteName		Name of the WACAP sample collection site	Vegetation_Site_Data
Slope%		Average percent slope on the site, measured with a clinometer.	Vegetation_Site_Data
Snow_Site		Name of sample site for snow samples, including the WACAP lake names	Snow_Site_Data, Snow_Sample_Data, Moose_Sample_Data
SOC_Data		Yes/No field, if checked, indicates SOC data are available	Sediment_Site_Data, Fish_Sample_Data
SOC_Position	Deep or Shallow	Refers to area in lake where Infiltrax pump was anchored: Deep indicates sampler was anchored at deepest area in lake, Shallow indicates sampler was anchored at a point where lake depth was approximately 4 meters deep.	Water_Sample_Data
SOC_Volume (L)		Volume of lake water sampled, filtered, and extracted for SOCs in situ with an Infiltrax 100 submersible pump	Water_Sample_Data
SOCHgBiolData		Yes/No field; If checked, indicates there are SOC, Hg, and biological data available for this fish	Fish_Sample_Data
Species		Species of fish captured, or species of vegetation collected	Fish_Sample_Data, Vegetation_Sample_Data, FishAuxiliaryTable_TestesCategories
Start_Location_Elevation (m)		Elevation in meters of trajectory starting location	Atm_Site_Data
Start_Location_Latitude (dd)		Latitude in decimal degrees of trajectory starting location	Atm_Site_Data
Start_Location_Longitude (dd)		Longitude in decimal degrees of trajectory starting location	Atm_Site_Data

Field_Name	Abbreviations	Description	Tables with Field_Name
State		State code abbreviation, AK = Alaska, CA= California, CO = Colorado, WY = Wyoming, TX = Texas, NM = New Mexico, WA = Washington, OR= Oregon, MT = Montana	Vegetation_Site_Data
State_Code		USGS code for state in which the site is located	Snow_Site_Data
TargetLake		Target WACAP lake basin sampled for other WACAP matrices	Vegetation_Site_Data
TenDay_Cluster	A ,B,C, D, E, F	Back-trajectories for a ten day period of time represent a meteorological calculation of the path that an individual air particle has traveled over ten days. Ten-day trajectories were then grouped into 6 clusters, and labeled alphabetically, starting with A for the shortest clusters, to F for the longest clusters. These clusters provide information about the routes of contaminant transport as well as the climatology for each park.	Atm_Modeling_Data
TestisCategory	a, b, c, d	Grading system used to determine extent of testicular abnormalities; a= normal testis, b= poorly developed testis for fish of that size/age (i.e. does not show signs of reproductive maturity at a time of year when other fish are maturing), c= normally developing testis with primary or perinucleolar oocytes, d= poorly developed testis of degenerative testis with perinucleolar oocytes and/or vitellogenic oocytes	FishAuxiliaryTable_TestesCategories
TidbitNo		Identification number of temperature tidbit	Air_Site_Data
TimeCollected		Time of day fish or snow sample was collected	Fish_Sample_Data, Snow_Sample_Data
TimeEnd		Time of day that sample collection ended	Vegetation_Site_Data

Field_Name	Abbreviations	Description	Tables with Field_Name
TimeFrame		Current = fish collected from 2003 to 2006; Historic = fish collected before 1935 and obtained from the University of Washington School of Fisheries (Seattle) or the California Academy of Sciences in San Francisco.	FishAuxiliaryTable_TestesCategories
TimeStart		Time of day that sample collection began	Vegetation_Site_Data
TimeZone		Time zone in effect for PASD installation and retrieval times	Air_Site_Data
Top_Interval (cm)		Depth in cm from surface of core to the top of the interval section; one sediment sample is one interval, with core sections either 0.5, 1.0, or 2.0 cm thick	Sediment_Sample_Data
Units	pg/g, mgC/cm ² /y, µg/ml, etc.	See Table 10 in the WACAP Database User's Guide or table "7_Unit_Abbreviations" in the WACAP Database for Units abbreviations and descriptions.	Air_Data, Atm_Modeling_Data, Fish_Data, Moose_Data, Sediment_Data, Snow_Data, Vegetation_Data, Water_Data, FishAuxiliaryTable_Histopathology_Notes, SedimentAuxiliaryTable_Metals_MedianDetectionLimits
USGS_Site_Code		USGS code for site	Snow_Site_Data
USGS_Site_ID		USGS identification code for site	Snow_Site_Data
VegCover0-5%		Plants with a ground or canopy cover ranging from a trace to 5%.	Vegetation_Site_Data
VegCover26-50%		Plants with a ground or canopy cover ranging from 26-50%.	Vegetation_Site_Data
VegCover51-75%		Plants with a ground or canopy cover ranging from 51-75%.	Vegetation_Site_Data
VegCover6-25%		Plants with a ground or canopy cover ranging from 6-25%.	Vegetation_Site_Data
VegCover76-100%		Plants with a ground or canopy cover ranging from 76-100%.	Vegetation_Site_Data
Volume (cm ³)		Calculated volume of sediment interval in cubic centimeter; 0.5 cm interval = 29 cm ³ , 1.0 cm interval = 58 cm ³ , 2 cm interval = 116 cm ³	Sediment_Sample_Data

Field_Name	Abbreviations	Description	Tables with Field_Name
WACAP_No	range from 36001 to 66875, non-continuously	Each WACAP sample was assigned a 5 digit number, with the first digit representing the year the sample was collected, i.e., 3 for the year 2003, 4 for the year 2004, etc. The second digit is assigned as "6" or "8" and denotes the WACAP project at the WRS Analytical Laboratory. The third digit represents the media sampled. The WACAP_No field is the primary key used to link the sample with site and sampling information. The WACAP_No used with the SampleType, Parameter, and MediaBasis fields uniquely identify each sample result.	Air_Data, Fish_Data, Moose_Data, Sediment_Data, Snow_Data, Vegetation_Data, Water_Data; Air_Sample_Data, Fish_Sample_Data, FishAuxiliaryTable_Histopathology_Notes, Moose_Sample_Data, Sediment_Sample_Data, SedimentAuxiliaryTable_Metals_Lab3_dBa selIDs, SedimentAuxiliaryTable_Notes, Snow_Sample_Data, Vegetation_Sample_Data, Water_Sample_Data, FishAuxiliaryTable_TestesCategories
Weight (g)		Field weight of the sample, not including the collection bag.	Vegetation_Sample_Data
WillowTime		Time in hours and minutes required to collect conifer needles at this site	Vegetation_Site_Data
Wt_of_Animal (lbs)		Weight of moose in pounds as reported by collector	Moose_Sample_Data,
Year_Collected		Year fish were collected	FishAuxiliaryTable_TestesCategories