

# The Fate, Transport, and Ecological Impacts of Airborne Contaminants in Western National Parks (USA)

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**This report is the final report for the Western Airborne Contaminants Assessment Project (WACAP), and is available online at [http://www.nature.nps.gov/air/Studies/air\\_toxics/wacap.cfm](http://www.nature.nps.gov/air/Studies/air_toxics/wacap.cfm) and <http://www.epa.gov/nheerl/wacap/>**

Proper citation of this document is:

Landers, D.H., S.L. Simonich, D.A. Jaffe, L.H. Geiser, D.H. Campbell, A.R. Schwindt, C.B. Schreck, M.L. Kent, W.D. Hafner, H.E. Taylor, K.J. Hageman, S. Usenko, L.K. Ackerman, J.E. Schrlau, N.L. Rose, T.F. Blett, and M.M. Erway. 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.

**DISCLAIMER:** Funding for this work was provided by the National Park Service of the Department of the Interior, the U.S. Environmental Protection Agency, and the U.S. Geological Survey. It has been subjected to review by these government entities and approved for publication. Approval does not signify that the contents reflect the views of the U.S. Government, nor does mention of trade names or commercial products constitute endorsement or recommendation.

Credit for the various photos that appear throughout the document goes to:

Adam Schwindt  
Dixon Landers  
Don Campbell  
Jen Ramsey  
Ruth Jenkins  
John Warrick  
Marilyn Erway  
Neil Rose  
Tamara Blett  
Linda Geiser  
Bill Baccus

# Acknowledgements

---

The completion of WACAP represents a tremendous coordinated effort by many individuals. Each WACAP site presented unique challenges, but because each park that participated in WACAP sampling provided support and assistance in planning, collecting, and transporting samples, the sample collection effort was successfully completed. We have tried to list everyone that contributed to the success of WACAP, and apologize to anyone we have inadvertently missed. Megan Carney (USEPA), Andrew McCartney (NPS), and Nathan Truelove (USEPA) each spent one summer as a camp manager. Besides providing the organization and food, they willingly provided help to any other area when needed. Jennifer Ramsey (OSU) was a regular field participant at almost all the core park sites, and provided consistent fish dissections and blood collections, regardless of the field conditions. Doug Glavich and Adrienne Marler (USFS) sampled vegetation and deployed air samplers at 12 of the 20 WACAP parks, providing consistency in field methods and sample quality. Glen Wilson (OSU) and Dave Schmedding (OSU) were important contributors to the development of the organic contaminant analyses, in addition to providing much appreciated help in sampling at several locations. Bud Rice (NPS) and Andrea Blakesley (NPS) provided invaluable assistance in organizing and sampling in the Alaska parks. Ralph Vaga (USEPA) collected bathymetry data for many of the lake sites. Suzanne Pierson (Indus) and Barbara Rosenbaum (Indus) provided GIS and graphical summaries. Greg Brenner (Pacific Analytics) was the statistical consultant for data analyses. Scientific peer review of the research plan and final report was a critical part of this project; peer reviewers are listed below. We also thank USEPA and USGS internal reviewers who helped ensure the quality of the final report.

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### **Air Service for Alaska Sites**

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### **Gates of the Arctic National Park and Preserve**

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### **Glacier National Park**

Bill Michels  
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### **Mount Rainier National Park**

Barbara Samora  
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**Rocky Mountain National Park**

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Bob Love  
Jim Sanborn  
Terry Terrell  
Judy Visty

**Sequoia and Kings Canyon National Park**

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David Graber  
Andi Heard  
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Evan Schmidt  
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**North Cascades National Park**

Mike Larrabee  
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**Field Assistance**

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Roberta Porter (OSU)  
Alena Pribyl (OSU)  
Marge Storm (Dynamac, Inc.)

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**Willamette Research Station Analytical Laboratory (Dynamac, Inc.)**

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Lisa Marie Deskin  
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# Table of Contents

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## Volume I

Chapter	Page
Acknowledgments.....	iii
Abbreviations and Acronyms .....	xvi
<b>Executive Summary .....</b>	<b>E-1</b>
<b>1 Introduction .....</b>	<b>1-1</b>
1.1 Background .....	1-1
1.2 Approach .....	1-3
1.3 Park Selection.....	1-6
1.4 Site Selection within Parks.....	1-9
1.5 Measurements and Contaminants.....	1-14
1.6 Timeline, Implementation, and Reporting .....	1-14
1.7 Data management and Quality Assurance/Quality Control .....	1-15
1.8 WACAP Direction and Funding .....	1-16
1.9 Organization of This Report.....	1-16
<b>2 Park Summaries .....</b>	<b>2-1</b>
Introduction .....	2-1
Core Parks .....	2-1
Core Park Summary Key.....	2-2
Summary for NOAT and GAAR.....	2-4
Summary for DENA.....	2-8
Summary for GLAC.....	2-12
Summary for OLYM.....	2-16
Summary for MORA.....	2-20
Summary for ROMO.....	2-24
Summary for SEKI.....	2-28
Secondary Parks and Summary Key .....	2-32
Summary for WRST.....	2-34
Summary for GLBA.....	2-35
Summary for KATM.....	2-36
Summary for STLE .....	2-37
Summary for NOCA .....	2-38
Summary for GRTE .....	2-39
Summary for CRLA .....	2-40
Summary for LAVO.....	2-41
Summary for YOSE .....	2-42
Summary for GRSA .....	2-43
Summary for BAND .....	2-44
Summary for BIBE.....	2-45

<b>3</b>	<b>Contaminants Studied and Methods Used.....</b>	<b>3-1</b>
3.1	Introduction .....	3-1
3.2	Contaminants Studied.....	3-1
3.2.1	Semi-Volatile Organic Compounds (SOCs).....	3-1
3.2.2	Mercury.....	3-7
3.2.3	Metals.....	3-9
3.3	Data Quality Summary .....	3-10
3.3.1	SOC Data Quality .....	3-11
3.3.2	Mercury Data Quality .....	3-11
3.3.3	Metals Data Quality .....	3-14
3.4	Methods Used.....	3-15
3.4.1	Air Modeling.....	3-15
3.4.2	Snow .....	3-16
3.4.3	Air .....	3-19
3.4.4	Vegetation .....	3-21
3.4.5	Lake Water.....	3-25
3.4.6	Sediment .....	3-27
3.4.7	Fish.....	3-30
3.4.8	Moose.....	3-33
3.4.9	Other Data Sources .....	3-34
3.5	Data Handling and Statistical Methods Used.....	3-37
3.5.1	Data Handling of Contaminant Concentrations Below the Detection Limit ..	3-37
3.5.2	Evidence and Magnitude of the Cold Fractionation Effect .....	3-37
3.5.3	Comparison of Park and Site Means for SOC and Element Concentrations in Vegetation and Air.....	3-39
3.5.4	Correlations.....	3-40
3.5.5	Paired T-tests .....	3-40
<b>4</b>	<b>Contaminant Distribution .....</b>	<b>4-1</b>
4.1	Introduction .....	4-1
4.2	Semi-Volatile Organic Compounds (SOCs) .....	4-1
4.2.1	SOCs in Snow .....	4-2
4.2.2	SOCs in Air.....	4-8
4.2.3	SOCs in Vegetation.....	4-8
4.2.4	SOCs in Fish .....	4-32
4.2.5	SOCs in Sediments .....	4-33
4.2.6	Source Attribution for SOC.....	4-43
4.3	Trace Metals, Including Mercury .....	4-49
4.3.1	Mercury and Trace Metals in Snow.....	4-49
4.3.2	Mercury and Particulate Carbon in Snow .....	4-51
4.3.3	Trace Metals in Vegetation.....	4-51
4.3.4	Mercury and Trace Metals in Fish.....	4-55
4.3.5	Mercury, Trace Metals, and Spheroidal Carbonaceous Particles in Sediments.....	4-57
4.3.6	Source Attribution for Mercury, Trace Metals, and SCPs.....	4-75
4.4	Nutrient Nitrogen and Sulfur.....	4-77
4.4.1	Spatial Distributions of Nitrogen and Sulfur in Lichens .....	4-77



4.4.2	Source Attribution for Nitrogen.....	4-77
4.5	Atmospheric Transport.....	4-78
4.6	Summary .....	4-86
<b>5</b>	<b>Biological and Ecological Effects .....</b>	<b>5-1</b>
5.1	Introduction .....	5-1
5.2	Bioaccumulation and Biomagnification.....	5-1
5.2.1	Processes of Bioaccumulation and Biomagnification.....	5-1
5.2.2	Effects of Bioaccumulation and Biomagnification.....	5-2
5.2.3	Evidence of Bioaccumulation in Vegetation .....	5-14
5.2.4	Evidence of Biomagnification .....	5-20
5.3	Biological Effects .....	5-22
5.3.1	Effects of Contaminants and the Utility of Biomarkers.....	5-22
5.3.2	Overview of General Fish Health .....	5-25
5.3.3	Biomarkers.....	5-25
5.4	Ecological Effects.....	5-52
5.4.1	Mercury.....	5-52
5.4.2	Selected SOCs with Contaminant Health Thresholds for Piscivorous Biota.....	5-55
5.4.3	Human Health Risks from Consumption of SOCs in Fish .....	5-61
5.4.4	Potential Ecological Effects of SOC and Metal Contaminant Loads on Aquatic Systems in the Parks.....	5-68
5.5	Nitrogen Deposition Effects and Relationships .....	5-74
5.5.1	Ecological Effects of Enhanced Nitrogen Deposition in the Western United States .....	5-74
5.5.2	Evidence of Enhanced Nitrogen Deposition in Some Parks from Lichen N.....	5-75
5.5.3	Correlations between Agricultural Chemicals and Measures of Agricultural Intensity, Atmospheric Pollutants that Contain Nitrogen, and Human Population.....	5-75
5.6	The Influence of Environmental Factors on Fish Hg <sub>tot</sub> .....	5-78
5.7	Summary .....	5-80
5.7.1	Bioaccumulation .....	5-80
5.7.2	Adverse Biological Effects Observed in Fish.....	5-81
5.7.3	Potential Adverse Ecological Effects.....	5-81
5.7.4	Health Risks to Humans.....	5-81
<b>6</b>	<b>Recommendations and Conclusions .....</b>	<b>6-1</b>
6.1	WACAP Recommendations to NPS .....	6-1
6.1.1	Introduction.....	6-1
6.1.2	Presence of Key Contaminants .....	6-1
6.1.3	Locations of Contaminant Accumulation .....	6-2
6.1.4	Ecological Threat from Contaminants .....	6-4
6.1.5	Sources of Contaminants .....	6-6
6.1.6	Understanding Contaminant Processes in Ecosystems.....	6-6
6.2	Conclusions .....	6-7
	<b>References.....</b>	<b>R-1</b>

## List of Figures

1-1	WACAP Conceptual Diagram of Airborne Contaminant Assessment Approach .....	1-4
1-2	WACAP Sites Mapped on North American Shaded Relief Map and EPA Level 1 Ecoregions (Biomes) .....	1-10
1-3	Relationships among Latitude, Longitude, and Mean Annual Temperature in the 8 National Parks and 14 Sites Sampled in WACAP .....	1-11
1-4	Linkages among Major WACAP and Ecosystem Components, Contaminant Pools, and Pathways .....	1-13
3-1	Current Status of SOC Contamination in WACAP Parks.....	3-8
3-2	All 2,922 One-Day Back-Trajectories for MORA.....	3-15
3-3	Passive Sampler.....	3-21
3-4	Scanning Electron Micrograph of a Spheroidal Carbonaceous Particle (SCP).....	3-29
4-1	Current-Use Pesticides (CUPs): Average Concentrations and Fluxes of Sum Endosulfans, Chlorpyrifos, and Dacthal across Parks and Media.....	4-3
4-2	HCHs: Average Concentrations and Fluxes of a-HCH and g-HCH across Parks and Media .....	4-4
4-3	Historic-Use Pesticides (HUPs): Average Concentrations and Fluxes of HCB, Dieldrin, and Sum Chlordanes across Parks and Media .....	4-5
4-4	PCBs: Average Concentrations and Fluxes of Sum PCBs across Parks and Media .....	4-6
4-5	PAHs: Average Concentrations and Fluxes of Sum PAHs across Parks and Media .....	4-6
4-6	PBDEs: Average Concentrations and Fluxes of Sum PBDEs in Fish and Sediments across Parks .....	4-7
4-7	Annual Percent of Total Concentration in Snow for Current- and Historic-Use Pesticides at SEKI and MORA .....	4-7
4-8	Regional Patterns of SOCs in Ambient Air as Indicated by Concentrations Accumulated in XAD Resin in Suspended Passive Air Sampling Devices.....	4-9
4-9	Simple Linear Regression of Individual SOCs Determined in the XAD Resin by Latitude.....	4-11
4-10	Comparison of Total Pesticide Concentrations in Lichen and Conifer Needle Vegetation from WACAP Parks .....	4-12
4-11	Comparison of Total Pesticide Accumulation in Lichen Species by Park from North to South along the Pacific Coast and from North to South in the Rocky Mountains. ....	4-14
4-12	Pesticide Concentrations in Lichens from Core and Secondary WACAP Parks Overlaid on a Map of Agricultural Intensity .....	4-16
4-13	Pesticide Concentrations in Conifer Needles from Core and Secondary WACAP Parks Overlaid on a Map of Agricultural Intensity.....	4-17
4-14	Uses and Estimated Application Intensity in 2002 of the Current-Use Insecticide Chlorpyrifos in the Conterminous 48 States vs. Mean Concentration in Vegetation from WACAP Parks .....	4-19

4-15	Uses and Estimated Application Intensity in 2002 of the Current-Use Herbicide Dacthal in the Conterminous 48 States vs. Mean Concentration in Vegetation from WACAP Parks .....	4-20
4-16	Uses and Estimated Application Intensity in 2002 of the Current-Use Insecticide Endosulfan in the Conterminous 48 States vs. Mean Concentration in Vegetation from WACAP Parks .....	4-21
4-17	Uses and Estimated Application Intensity in 2002 of the Current-Use Herbicide Triallate in the Conterminous 48 States vs. Mean Concentration in Vegetation from WACAP Parks .....	4-22
4-18	Uses and Estimated Application Intensity in 2002 of the Current-Use Herbicide Trifluralin in the Conterminous 48 States vs. Mean Concentration in Vegetation from WACAP Parks .....	4-23
4-19	Concentrations of PAHs in Lichens from Core and Secondary WACAP Parks Overlaid on a Map of Population Density .....	4-24
4-20	Comparison of Total Pesticide Accumulation in Conifer Needles by Species and Park .....	4-27
4-21	Needles of (A) Subalpine Fir, (B) Sitka Spruce, (C) Douglas-fir, (D) Western Hemlock, and (E) Lodgepole Pine .....	4-28
4-22	Elevational Gradients for Sum Dacthal, Sum Endosulfan, and Sum Chlordane Concentrations in Lichens .....	4-31
4-23	Focusing Factor-Corrected Flux Profiles of Current- and Historic-Use SOCs In Matcharak Lake and Burial Lake Sediment Cores at GAAR and NOAT .....	4-34
4-24	Focusing Factor-Corrected Flux Profiles of Current- and Historic-Use SOCs in McLeod Lake and Wonder Lake Sediment Cores at DENA .....	4-35
4-25	Focusing Factor-Corrected Flux Profiles of Current- and Historic-Use SOCs in Snyder Lake and Oldman Lake Sediment Cores at GLAC .....	4-36
4-26	Focusing Factor-Corrected Flux Profiles of Current- and Historic-Use SOCs in PJ Lake and Hoh Lake Sediment Cores at OLYM .....	4-37
4-27	Focusing Factor-Corrected Flux Profiles of Current- and Historic-Use SOCs in LP19 and Golden Lake Sediment Cores at MORA .....	4-38
4-28	Focusing Factor-Corrected Flux Profiles of Current- and Historic-Use SOCs in Lone Pine Lake and Mills Lake Sediment Cores at ROMO .....	4-39
4-29	Focusing Factor-Corrected Flux Profiles of Current- and Historic-Use SOCs in Emerald Lake and Pear Lake Sediment Cores at SEKI .....	4-40
4-30	Percentage of Total Pesticide Concentration Related to Regional Sources .....	4-44
4-31	Mean Concentrations of Historic-Use and Current-Use Pesticides in Two-Year-Old Conifer Needles from WACAP Parks .....	4-45
4-32	Fraction Ratios of IcdP/(IcdP+BeP) (average $\pm$ standard deviation) Calculated From Snow, Lichen, and Pre- and Post-1955 Sediment in Snyder and Oldman Lake Catchments in GLAC Compared to Measured Ratios .....	4-47
4-33	Average Concentrations and Fluxes of Mercury across Parks and Media .....	4-50
4-34	Unfiltered Total Mercury vs. Particulate Carbon Concentrations for All WACAP Snowpack Samples, 2003-2005 .....	4-52
4-35	Comparison of Selected Elements in Lichens in WACAP Parks with Elements in Other National Parks and Forests in Western North America .....	4-54
4-36	Trace Metals in Fish Liver .....	4-56

4-37	Focusing Factor-Corrected Flux of Ni, Cu, Pb, V, Zn, Cd, and Hg in Sediment Cores from Burial Lake (NOAT) and Lake Matcharak (GAAR) .....	4-58
4-38	Focusing Factor-Corrected Flux of Ni, Cu, Pb, V, Zn, Cd, and Hg in Sediment Cores from Wonder and McLeod Lakes (DENA) .....	4-59
4-39	Focusing Factor-Corrected Flux of Ni, Cu, Pb, V, Zn, Cd, and Hg and SCP in Sediment Cores from Snyder and Oldman Lakes (GLAC).....	4-60
4-40	Focusing Factor-Corrected Flux of Ni, Cu, Pb, V, Zn, Cd, and Hg and SCP in Sediment Cores from PJ and Hoh Lakes (OLYM) .....	4-61
4-41	Focusing Factor-Corrected Flux of Ni, Cu, Pb, V, Zn, Cd, and Hg and SCP in Sediment Cores from Golden Lake and LP19 (MORA).....	4-62
4-42	Focusing Factor-Corrected Flux of Ni, Cu, Pb, V, Zn, Cd, and Hg and SCP in Sediment Cores from Mills and Lone Pine Lakes (ROMO).....	4-63
4-43	Focusing Factor-Corrected Flux of Ni, Cu, Pb, V, Zn, Cd, and Hg and SCP in Sediment Cores from Pear and Emerald Lakes (SEKI) .....	4-64
4-44	Percent Enrichment of V, Cu, Zn, Pb, Cd, Ni, and Hg in Sediment Cores from Burial Lake (NOAT) and Lake Matcharak (GAAR) .....	4-67
4-45	Percent Enrichment of V, Cu, Zn, Pb, Cd, Ni, and Hg in Sediment Cores from Wonder and McLeod Lakes (DENA) .....	4-68
4-46	Percent Enrichment of V, Cu, Zn, Pb, Cd, Ni, and Hg in Sediment Cores from Snyder and Oldman Lakes (GLAC).....	4-69
4-47	Percent Enrichment of V, Cu, Zn, Pb, Cd, Ni, and Hg in Sediment Cores from PJ and Hoh Lakes (OLYM).....	4-70
4-48	Percent Enrichment of V, Cu, Zn, Pb, Cd, Ni, and Hg in Sediment Cores from Golden Lake and LP19 (MORA) .....	4-71
4-49	Percent Enrichment of V, Cu, Zn, Pb, Cd, Ni, and Hg in Sediment Cores from Mills and Lone Pine Lakes (ROMO) .....	4-72
4-50	Percent Enrichment of V, Cu, Zn, Pb, Cd, Ni, and Hg in Sediment Cores from Pear and Emerald Lakes (SEKI) .....	4-73
4-51	1-, 5-, and 10-Day Cluster Plots for NOAT and GAAR .....	4-79
4-52	1-, 5-, and 10-Day Cluster Plots for DENA .....	4-80
4-53	1-, 5-, and 10-Day Cluster Plots for GLAC .....	4-81
4-54	1-, 5-, and 10-Day Cluster Plots for OLYM.....	4-82
4-55	1-, 5-, and 10-Day Cluster Plots for MORA .....	4-83
4-56	1-, 5-, and 10-Day Cluster Plots for ROMO .....	4-84
4-57	1-, 5-, and 10-Day Cluster Plots for SEKI .....	4-85
5-1	Diagram of Increasing Effects of Contaminants, from Individual to Ecosystem Level .....	5-3
5-2	Relationship between Fish Age and Total Whole Body Hg in Trout from All Lakes .....	5-4
5-3	Mean SOC Concentrations in Lake Water, Snow, Sediments, Lichens, Conifer Needles, and Fish from Emerald Lake (SEKI) .....	5-21
5-4	Pesticide Concentrations in XAD Resin, Conifer Needles, and Lichens from Oldman Lake (GLAC).....	5-23
5-5	Incidental Pathology Affecting Multiple Organs from Multiple Lake Trout at Matcharak Lake (GAAR).....	5-26
5-6	External Copepod Parasites and Internal Parasites in Lake Trout from Burial	

	Lake (NOAT) and Matcharak Lake (GAAR), Respectively.....	5-27
5-7	Representative Hematoxylin-Eosin Stained Brook Trout Organs Showing the Relative Difference between Fish with Very Few or No Macrophage Aggregates and Extensive Accumulations of MAs (a-f) and Outlined High Magnification Hepatic MAs (g-i) .....	5-29
5-8	Mean Percent, %MAs + 95% Confidence Intervals, for Fish with Corresponding Hg and SOC Data: (a) Spleen, (b) Kidney .....	5-30
5-9	Average Stage of Gonad Maturation $\pm$ 95% Confidence Intervals in Trout for which Corresponding SOC and Hg Data are also Available .....	5-32
5-10	Co-Linearity between (a) Splenic MAs, Hg, and Age in Brook Trout, and (b) Log-Linear Relationship between Hg and Brook Trout ( <i>Salvelinus fontinalis</i> ) Splenic MAs .....	5-33
5-11	Mean Vitellogenin + 95% Confidence Intervals and Concentrations from Individual Male Trout from Lakes or Streams in National Parks in the Western United States and Other Sites.....	5-38
5-12	Scatterplots Comparing Suspected Endocrine Disruptors and Plasma Vitellogenin (Vtg) a Commonly Used Indicator of Estrogenic Contaminants in Male Trout.....	5-39
5-13	Counties or Boroughs (Alaska) Where Museum and/or WACAP Fish Samples Were Collected and Gonads Analyzed for Sex and Intersex .....	5-40
5-14	Categories of Relative Gonad Abnormality .....	5-43
5-15	Intersex Male Greenback Cutthroat Trout from Twin Lakes, Colorado, Captured in the Late 1800s.....	5-45
5-16	Intersex Male Trout from Lone Pine Lake, ROMO (a-c) and Oldman Lake, GLAC (d) .....	5-46
5-17	Box and Whisker Plots of Select Groups of Organochlorines Analyzed by Brook Trout (a,b) or <i>Oncorhynchus</i> spp. (c,d).....	5-48
5-18	Fish Whole-Body Lake Mean and Individual Fish Total Mercury and Contaminant Health Thresholds for Various Biota.....	5-54
5-19	Fish Whole-Body Lake Mean and Individual Fish Sum PCB Concentrations, with Contaminant Health Thresholds for Various Wildlife .....	5-57
5-20	Fish Whole-Body Lake Mean and Individual Fish Sum DDT Concentrations, with Contaminant Health Thresholds for Various Wildlife .....	5-58
5-21	Fish Whole-Body Lake Mean and Individual Fish Sum Chlordane Concentrations with Contaminant Health Thresholds for Various Wildlife.....	5-59
5-22	Fish Whole-Body Lake Mean and Individual Fish Sum Dieldrin Concentrations, with Contaminant Health Thresholds for Various Wildlife .....	5-60
5-23	Concentrations of Historic-Use Pesticides for Dieldrin and a-HCH in Individual Fish and Lake Average Fish Compared to Contaminant Health Thresholds for Cancer for Fish Consumption for Recreational and Subsistence Fishers.....	5-62
5-24	Concentrations of Historic-Use Pesticides for Hexachlorobenzene (HCB) and Heptachlor Epoxide (HCLR E) in Individual Fish and Lake Average Fish Compared to Contaminant Health Thresholds for Cancer for Fish Consumption for Recreational and Subsistence Fishers.....	5-63

5-25	Concentrations of Historic-Use Pesticides (p,p'-DDE, chlordanes, mirex) in Individual Fish and Lake Average Fish Compared to Contaminant Health Thresholds for Cancer for Fish Consumption for Recreational and Subsistence Fishers .....	5-64
5-26	Concentrations of Current-Use (dacthal, endosulfans) and Historic-Use (methoxychlor) Pesticides in Individual Fish and Lake Average Fish Compared to Contaminant Health Thresholds for Chronic Disease for Fish Consumption for Recreational and Subsistence Fishers .....	5-65
5-27	Concentrations of Current-Use Contaminants PBDEs, g-HCH, and Chlorpyrifos (CLPYR) in Individual Fish and Lake Average Fish Compared to Contaminant Health Thresholds for Chronic Disease (and Cancer Thresholds for g-HCH) for Fish Consumption for Recreational and Subsistence Fishers.....	5-66
5-28	Trophic Model for Lakes with Two-Fish Guilds Representing Alaska Systems.....	5-69
5-29	Mean Annual Concentrations of Ammonium Nitrate and Ammonium Sulfate in Ambient Fine Particulates Measured by IMPROVE at WACAP Parks, 1998-2004.....	5-76
5-30	Average Total Mercury Values for Whole Fish Plotted Against Total Phosphorus (TP) in the Lake Water for All Lakes in the Core Parks .....	5-79

## List of Tables

1-1	WACAP Report Authors.....	1-5
1-2	Ecosystem Components Sampled for WACAP .....	1-6
1-3	WACAP Sites in Core Parks .....	1-8
1-4	Vegetation WACAP Sites in Core and Secondary Parks.....	1-9
1-5	WACAP Lake Sites: Selected Physical and Surface (1 m) Chemical Characteristics Collected during WACAP Site Visits According to Methods Listed in Chapter 3 .....	1-12
1-6	WACAP Timeline and Site Sampling Strategy .....	1-14
3-1	Analytical Laboratories by Media and Analyte .....	3-1
3-2	WACAP Analytical Laboratories.....	3-2
3-3	Semi-Volatile Organic Compounds (SOCs) Measured in WACAP .....	3-3
3-4	Environmentally Significant Metals.....	3-9
3-5	Summary of Data Quality Indicators for SOCs by Media .....	3-12
3-6	Summary of Data Quality Indicators for Mercury by Media.....	3-13
3-7	Summary of Data Quality Indicators for Metals by Media.....	3-14
3-8	Starting Locations for Back-Trajectories and Precipitation Data Used For Cluster Analysis.....	3-16
3-9	Summary of Passive Air Sampling Device Distribution among WACAP Parks.....	3-20
3-10	Vegetation Sample Summary .....	3-23
3-11	Species of Fish Captured.....	3-31
4-1	Compound Groupings Used in Chapter 4 .....	4-1
4-2	Mean SOC Concentrations in Lichens and Conifer Needles from Each WACAP Park .....	4-13
4-3	Linear Regression Model Results.....	4-29
4-4	Simple Linear Regression Results of Lichen SOCs on Park and Elevation .....	4-30
4-5	Comparison of SOC Data from Mills and Lone Pine Lakes .....	4-49

4-6	Total Integrated SCPs in WACAP Lake Sediment Cores.....	4-65
5-1	Comparison of Concentrations of Selected Organochlorines in Fish from the Literature to Fish from WACAP Parks .....	5-6
5-2	Comparison of Concentrations of Total Mercury in Fish from the Literature to Fish from WACAP Parks.....	5-11
5-3	SOC Concentrations in One- and Two-Year-Old Needles of White Fir ( <i>Abies Concolor</i> ) and Lodgepole Pine ( <i>Pinus contorta</i> ) from the Emerald Lake Basin of Sequoia National Park.....	5-14
5-4	Paired T-Test Results Comparing SOC Concentrations in One- and Two-Year-Old Needles of White Fir ( <i>Abies concolor</i> ) and Lodgepole Pine ( <i>Pinus Contorta</i> ) .....	5-15
5-5	Estimates of Total SOC Concentrations in Second-Year Needles from Western North American Coniferous Forests.....	5-17
5-6	Endosulfans: Per Hectare Comparison of Estimated Annual Endosulfan Accumulation in Second-Year Conifer Needles and Typical 2002 Endosulfan Application Rates of This Pesticide in the Western United States.....	5-19
5-7	Correlations between Total Pesticide Concentrations in XAD Resin, Conifer Needles, and Lichens from Wonder, Snyder, Oldman, and Lone Pine Lake Watersheds .....	5-22
5-8	Characteristics of Intersex Trout Analyzed from Current and Historic Sampling....	5-41
5-9	Categorization of Trout Testes by Abnormality, Geographic Region, and Current or Historic Sampling .....	5-44
5-10	Comparison of Sites with Intersex Fish from the Rocky Mountains .....	5-44
5-11	SOC Concentrations in Moose Meat and Liver .....	5-51
5-12	Metal Concentrations in Moose Meat and Liver.....	5-53
5-13	Species Represented in Each Guild of the Loop Analysis .....	5-56
5-14	Number of Fish Exceeding Human Cancer Thresholds.....	5-67
5-15a	Effects of a Negative Press Perturbation on Fish in a One-Fish Guild Ecosystem.....	5-71
5-15b	Effects of a Negative Press Perturbation on Fish in a Two-Fish Guild Ecosystem.....	5-71
5-16	Rank Correlations among SOC Concentrations in Vegetation, Agricultural Intensity, Mean 1998-2004 Ammonium Nitrate Concentrations in Fine Particulates Measured by IMPROVE, and Population Density for the 20 WACAP Parks.....	5-77

## Volume II - Appendices

Appendix 1A	Summary of Site Characteristics in Core and Secondary Parks .....	1A-1
Appendix 3A	Summary of Sampling and Analysis Plan by Environmental Medium .....	3A-1
Appendix 3B	Sampling Information, Methods, and Data Quality.....	3B-1
Appendix 4A	Detailed Information on Contaminants in Vegetation, Including Elevation Trends .....	4A-1
Appendix 5A	Fish Biological Data .....	5A-1
Appendix 5B	Correlations between Hg and Age .....	5B-1
Appendix 5C	Correlations between Macrophage Aggregates and Hg.....	5C-1

# Abbreviations, Acronyms, and Symbols

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°C	degrees Celsius
µeq/L	microequivalencies per liter
µL	microliter
µm	micrometer
<sup>137</sup> Cs	radionuclide of cesium
<sup>210</sup> Pb	radionuclide of lead
<sup>226</sup> Ra	radionuclide of radium
<sup>241</sup> Am	americium, radioactive decay product of <sup>241</sup> Pu (plutonium)
a-HCH	hexachlorocyclohexane-alpha (also α-HCH)
Al	aluminum
ANOVA	analysis of variance test
ARD	Air Resources Division (of the National Park Service)
As	arsenic
B	boron
Ba	barium
BAND	Bandelier National Monument
BDL	below detection limit
Be	beryllium
BeP	benzo[e]pyrene
Bi	bismuth
BIBE	Big Bend National Park
C	carbon
Ca	calcium
CAAS	combustion atomic absorption spectrophotometry
CBL	Chesapeake Bay Laboratory
Cd	cadmium
Ce	cerium
CI	confidence interval
CIC	constant initial concentration



Cl <sup>-</sup>	chloride
CLDN	chlordan
CLPYR	chlorpyrifos
cm	centimeter
cm <sup>3</sup>	cubic centimeter
Co	cobalt
Cr	chromium
CRLA	Crater Lake National Park
CRS	constant rate of supply
Cs	cesium
Cu	copper
CUP	current-use pesticide
CWSC	Colorado Water Science Center Laboratory (USGS)
DCM	dichloromethane
DCPA	dacthal
DENA	Denali National Park and Preserve
DL	detection limit
DOC	dissolved organic carbon
dw	dry weight
Dy	dysprosium
EA	ethyl acetate
ECNI	electron capture negative ionization
ECRC	Environmental Change Research Centre
ECSMTP	Standards, Measurements, and Testing Program of the European Commission
EDL	estimated detection limit
EI	electron impact
EMAP-SW	Environmental Monitoring and Assessment Program – Surface Water
ENDO	endosulfan
EPA	Environmental Protection Agency
EPA-ORD	EPA Office of Research and Development
Er	erbium
ERRC	Environmental Radioactivity Research Centre
Eu	europium

FF	focusing factor
g	gram
GAAR	Gates of the Arctic National Park and Preserve
GC/MS	gas chromatography mass spectrometry
Gd	gadolinium
GFF	glass fiber filter
g-HCH	hexachlorocyclohexane-gamma, or lindane (also $\gamma$ -HCH)
GIS	geographic information system
GLAC	Glacier National Park
GLBA	Glacier Bay National Park and Preserve
GPC	gel permeation chromatography
GRSA	Great Sand Dunes National Park and Preserve
GRTE	Grand Teton National Park
ha	hectare
HCB	hexachlorobenzene
HCl	hydrochloric acid
He	helium
HF	hydrofluoric acid
Hg	mercury
HgS	mercury sulfide
Hg <sub>tot</sub>	total mercury
HNO <sub>3</sub>	nitric acid
Ho	holmium
HUP	historic-use pesticide
IAS	inorganic ash spheres
IBC	industrial/urban use compounds
IcdP	indeno[1,2,3-cd]pyrene
ICP-AES	inductively coupled plasma-atomic emission spectrophotometry
ICP-MS	inductively coupled plasma-mass spectrometry
IMPROVE	Interagency Monitoring of Protected Visual Environments Program
JMP	statistical software package (SAS Institute, Cary, North Carolina)
K	potassium
KATM	Katmai National Park and Preserve

kg	kilogram
kg/ha/yr	kilogram per hectare per year
$K_{ow}$	octanol-water coefficient
kV	kilovolt
L	liter
La	lanthanum
LAVO	Lassen Volcanic National Park
Li	lithium
m	meter
MA	macrophage aggregate
MDL	method detection limit
MeHg	methyl mercury
Mg	magnesium
mg/kg	milligram per kilogram
mg/L	milligrams per liter
mL	milliliter
mm	millimeter
Mn	manganese
Mo	molybdenum
MORA	Mount Rainier National Park
N	nitrogen
N <sub>2</sub>	dinitrogen (or nitrogen gas)
Na	not applicable (also NA)
Na	sodium
NCEP	National Centers for Environmental Prediction
NCLR	nonachlor
Nd	neodymium
ng/g	nanogram per gram
ng/L	nanograms per liter
ng/μL	nanogram per microliter
NH <sub>4</sub> <sup>+</sup>	ammonium
NHEERL	National Health and Environmental Effects Research Laboratory
Ni	nickel

NIST	National Institute of Standards and Technology
nm	nanometer
NO <sub>3</sub> <sup>-</sup>	nitrate
NOAA	National Oceanic and Atmospheric Administration
NOAT	Noatak National Preserve
NOCA	North Cascades National Park
NO <sub>x</sub>	nitrogen dioxide
NPS	National Park Service
NRC	National Research Council
NRCC	National Research Council of Canada
O <sub>2</sub>	oxygen
OC	organochlorines
OLYM	Olympic National Park
ORNL	Oak Ridge National Laboratory
OSU	Oregon State University
PAH	polycyclic aromatic hydrocarbon
PASD	passive air sampling device
Pb	lead
PBDE	polybrominated diphenyl ether
PBT	persistent, bioaccumulative, and toxic
PC	particulate carbon
PCB	polychlorinated biphenyl
PE	percent enrichment
Pg	picogram
pg/g ww	picogram per gram wet weight
POP	persistent organic pollutant
Pr	praseodymium
PRISM	Parameter-elevation regressions on independent slopes model
PTFE	polytetrafluoroethylene
QA/QC	quality assurance/quality control
QAPP	quality assurance project plan
Rb	rubidium
Re	rhenium

RIA	radioimmunoassay
RO	reverse osmosis
ROMO	Rocky Mountain National Park
RSD	relative standard deviation
S	sulfur
Sb	antimony
SCP	spheroidal carbonaceous particle
SD	standard deviation
Se	selenium
SE	standard error
SEC	Simonich Environmental Chemistry Laboratory
SEKI	Sequoia and Kings Canyon National Parks
SiO <sub>2</sub>	silica (silicon dioxide)
Sm	samarium
SO <sub>4</sub> <sup>2-</sup>	sulfate
SOC	semi-volatile organic compound
Sr	strontium
SRM	standard reference material
STLE	Stikine-LeConte Wilderness, Tongass National Forest
SWE	snow water equivalent
Tb	terbium
TC	total carbon
Te	tellurium
TIC	total inorganic carbon
Tl	thallium
Tm	thulium
TOC	total organic carbon
U	uranium
UMNRAL	University of Minnesota Research Analytical Laboratory
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
USGS-BRD	USGS Biological Resource Division

USGS-CWSC	USGS Colorado Water Science Center
USGS-NRP	USGS National Research Program (Trace Element Environmental Analytical Chemistry Project)
USGS-WWSC	USGS Wisconsin Water Science Center
V	vanadium
Vtg	vitellogenin
W	tungsten
WACAP	Western Airborne Contaminants Assessment Project
WRS	Willamette Research Station (U.S. EPA Analytical Laboratory in Corvallis)
WRST	Wrangell-St. Elias National Park and Preserve
ww	wet weight
XAD	resin (Amberlite XAD) for passive air sampling devices
y	year
yr	yr
Y	yttrium
Yb	ytterbium
YOSE	Yosemite National Park
Zn	zinc
Zr	zirconium