AN ABSTRACT OF THE DISSERTATION OF

Sascha Usenko for the degree of Doctor of Philosophy in Chemistry presented on March 23, 2007. Title: Tracking Semi-Volatile Organic Pollutants in Remote Lake Systems

APPROVED :

Dr. Staci L. Simonich, representing Chemistry

SOCs volatility and persistence properties cause many SOCs to become ubiquitous in the environment as well as accumulate in areas with lower temperatures such as polar or orographic regions. Many anthropogenic SOCs pose a serious risk to human and ecosystem health because of their persistent, bioaccumulative, and toxic properties in the environment. Unique and sensitive ecosystems exist in polar or orographic regions. Vast improvements in our understanding of the fate and transport of many SOCs have been made with research in polar or orographic regions located in eastern North America, Europe, and parts of the arctic and Antarctica. Advancements in our understanding of the fate and transport of SOCs in western U.S are hindered by the limited number and scope of past studies, sampling strategies, and current methodologies. Described herein, the development, validation, and as well as the demonstration of a new analytical method capable of measuring 75 SOCs including current and historic-use pesticides, polycyclic aromatic hydrocarbons, polychlorinated biphenyls in large-volume lake water and snowmelt samples. A novel solid phase extraction device containing hydrophilic and hydrophobic called a “modified Speedisk” was developed to handle large volume aqueous samples (50L), capture a wide range of SOCs, and capable of interfacing with an *in situ* submersible pump. In addition, this dissertation contains the development, validation, and demonstration of an analytical method capable of quantifying 98 SOCs including polybrominated diphenyl ethers from remote lake systems. Sediment core, snow, and lake water samples were collected, extracted, and quantified for SOCs using the methods above from fourteen high-altitude and/or high-latitude remote lake systems in western National Parks (NPs). Many SOCs demonstrated a significant regression between surficial sediment fluxes and snow fluxes ($p<0.05$). These significant

regressions stress the importance of winter time SOC deposition in western NPs. SOC deposition in Rocky Mountain NP and Glacier NP is dependent on regional upslope wind directions and the location of regional sources (relative to the Continental Divide). Lake water concentrations and sediment fluxes were generally lower in the Alaska's NPs and Olympic NP, due to proximity to source regions and the prevailing westerly winds.

TRACKING SEMI-VOLATILE ORGANIC POLLUTANTS IN REMOTE LAKE SYSTEMS

by
Sascha Usenko

A DISSERTATION

submitted to

Oregon State University

in partial fulfillment of
the requirements for the
degree of

Doctor of Philosophy

Presented March 23, 2007
Commencement June 2007

Doctor of Philosophy dissertation of Sascha Usenko presented on March 23, 2007.

APPROVED :

Major Professor, representing Chemistry

Chair of the Department of Chemistry

Dean of the Graduate School

I understand that my dissertation will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my dissertation to any reader upon request.

Sascha Usenko, Author

ACKNOWLEDGEMENTS

The author expresses heartfelt appreciation to Crystal, Alex, Roalynn, and Bob for their love and support. The author is very appreciative for his major professor, Dr. Staci L. Simonich for providing guidance, support, encouragement, and trust. In addition, the author is grateful to Dr. Dixon H. Landers for guidance, support, encouragement, and trust. The author is also very thankful for support from his committee members as well as Glenn, Dave, Luke, Toby, JayLene, Shawn, Mike, Ron, Carrolyn, Janette, Kasia, Robert, Blaine, and Kate. Finally, the author would like to thank the U.S. Department of the Interior and the National Park Service for funding the Western Airborne Contaminant Assessment Project.

CONTRIBUTION OF AUTHORS

Dr. Staci L. Simonich provided leadership in all aspects of this dissertation. Dr. Dixon H Landers provided leadership in designing and sampling during the 2003-2005 sampling campaigns, interpreting results, and edited chapter 3. Dave Schmedding provide guidance in method development and validation for aqueous samples methodology and in field sampling support in 2003 sampling campaign as well as edited chapter 2. Glenn Wilson provided leadership and guidance in all aspects of instrument use and maintenance and in field sampling support in 2003 sampling campaign. Dr. Kimberly J. Hageman for analysis of the 2003 Rocky Mountain National Park snow samples and edited chapter 2. Dr. Peter G. Appleby provided all sediment data analysis and interpretations as well as edited chapter 3.

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF FIGURES

LIST OF FIGURES (Continued)

LIST OF FIGURES (Continued)

LIST OF TABLES

TRACKING SEMI-VOLATILE ORGANIC POLLUTANTS IN REMOTE LAKE SYSTEMS

CHAPTER 1. INTRODUCTION

The atmospheric transport of semi-volatile contaminants from source regions is well recognized by the scientific community. The atmospheric transport of certain contaminants has been demonstrated to be on the scale of thousands of kilometers (*1-3 4*), resulting in some contaminants now being ubiquitous in the environment. The long-range atmospheric transport (LRAT), deposition, and environmental fate is dependent on a chemical's physical and chemical properties (*4-10*).

In the recent decade, studies have identified potential ecological risks from the atmospheric transport and deposition of contaminants on non-target ecosystems (*4,5,11-19*). Non-target ecosystems such as high-altitude and high-latitude remote lake ecosystems are considered some of the most pristine and beautiful ecosystems in the world. Even though these ecosystems can be very different from each other, they have many common characteristics, such as a similar daily temperature range, solar flux, wind speed, and precipitation rates and forms, especially when compared to areas of lower altitude and lower latitude (*12*). Some semi-volatile contaminants have physical and chemical properties that, when combined with the climatic conditions of high-altitude and high-latitude ecosystems, result in the contaminant undergoing atmospheric transport and deposition to these remote ecosystems. It is important to identify and evaluate these contaminants and their potential ecological impacts on these remote ecosystems.

Semi-volatile organic compounds (SOCs) are compounds that have vapor pressures in the range of 10^{-4} to 10^{-11} atm (*20*). Contaminants with vapor pressures within this range volatilize from source regions (usually lower altitude and/or higher temperature areas) and undergo atmospheric transport. Once in the atmosphere, the contaminants travel until reaching an area of colder temperature (high altitudes and/or high latitudes) where they condense out of the atmosphere and deposit back to the earth's surface. This process of contaminants volatizing and condensing in and out of the atmosphere is described by the theory of cold condensation (*4,5,12,18*). Once deposited, the climatic conditions (i.e. low daytime temperatures) may prevent the contaminant for revolatizing back into the atmosphere, which results in cold trapping of the contaminant. Cold condensation and cold trapping predicts that, based on vapor pressure, some SOCs may preferential deposit and accumulate in high-altitude and high-latitude ecosystems.

Orographic lift occurs from two dominant forms of wind: global or large-scale regional winds and diurnal mountain winds (*12*). Global winds in the northern hemisphere consist of prevailing westerly winds, which travel eastward and are responsible for the majority of the weather patterns that move across North America. Diurnal mountain winds develop from differences in air temperature and density between orographic regions and low lining basins or plains (*12*). As daytime temperatures rise, SOCs volatilize from surrounding low lands into the atmosphere and the warm air rises from the low lands into the higher altitude areas (*12*). As nighttime air temperatures decrease, SOCs condense out of the atmosphere and the cooler air settles out of the higher altitude areas into the plains (*12*). Large-scale winds result in regional and LRAT (*2,12*), while diurnal winds are primarily responsible for regional transport (*12*).

Once in the atmosphere, SOCs may redeposit to the earth's surface by air-surface exchange, dry and/or wet deposition (*12*). Less-volatile SOCs redeposit close to sources while more-volatile SOCs can potentially undergo LRAT (*12,18*).

Snow has been shown to be an important form of precipitation in high-altitude sites in the U.S. Rocky Mountains (*16,21*). Snow has also been shown to be an efficient scavenger of SOCs from the atmosphere (*22*); however, summer time deposition in the form of rain has been shown to deposit as much as 85% of the current-use pesticides load in certain Rocky Mountain high-altitude lake catchments (*19*). Runoff from rain and annual snowmelt can deliver SOCs to high-altitude and high-latitude perched lakes (*12*) and lake water is an important route of SOC exposure to aquatic organisms (*12,23*). SOCs that are persistent and hydrophobic, partition strongly to organic matter (OM) in the water column. Over time, OM settles out of the water column and is deposited to the sediment along with SOCs sorbed to the OM (*10,24,25*).

Research on the fate and transport of SOCs in high-altitude and high-latitude ecosystems improves the understanding of the global fate and transport of SOCs. The European Mountain Lake Ecosystems: Regionalisation, diagnostic & Socio-economic

Evaluation Project and the Mountain Lake Research Program identified and evaluated SOCs and their ecological risk to certain European and Arctic remote lake ecosystems (*13,14,26-31*). However, there is very limited research on high-altitude ecosystems in North America and the southern Hemisphere. This is especially true for western North America.

The few studies in western North America to date have identified large data gaps and also the importance of summer and winter deposition of SOCs in western North America (*19,22,32-34*). Recent studies in western North America have also identified difference in regional and long-range atmospheric transport (*2,3,5,16,35*). Air masses originating in Eurasia can arrive in western North America in as little as eight to ten days (*2,3*). In addition, studies in both Europe and North America have shown that anthropogenic SOCs undergo atmospheric transport and deposition to high-altitude and high-latitude ecosystems (*4,5,11-19*).

Anthropogenic SOCs include current and historic-use pesticides (CUPs and HUPs), polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and polybrominated diphenyl ethers (PBDEs). CUPs and HUPs can serve as molecular markers of present and past agriculture practices, respectively. PAHs can serve as molecule markers for incomplete combustion of fossil fuels and biomass. PCBs can serve as molecular markers of past industrial activities and PBDEs are molecular markers for flame retardants used in consumer products. Over the past 30 years PBDE use has increased exponentially and PBDE concentration in human blood, milk, and tissue has also increased exponentially (*36*). The United States Environmental Protection Agency has classified some SOCs as persistent, bioaccumulative, and toxic (PBT) (*37*). In addition, use of many organochlorine pesticides and industrial compounds has been heavily restricted or completely restricted in the U.S. since the United Nations Environment Programme Global POP treaty of 2001 (*25,37*).

Furthermore, some pesticides and PAHs are carcinogenic or estrogenic (*5,25,37*). The deposition and accumulation of PBT SOCs to these ecosystems may have potential ecological impacts. Even though the use of some SOCs has been heavily or completely restricted in the U.S., their historical sources, including historically contaminated soils continue to release SOCs into the atmosphere (*16,38*). High-altitude and high-latitude ecosystems contain unique and sensitive plants and animals, some of which only exist in these remote ecosystems.

The Clean Air Act of 1970 set visibility goals in national parks and wilderness areas (*37*). These goals were to address regional air pollution issues and to develop long-term pollution prevention plans (*37*). The Clean Water Act of 1977 was set up to restore and protect the chemical, physical, and biological integrity of all surface waters, including lakes, steams, rivers, and estuaries (*37*). In response to the Clean Air Act and Clean Water Act, as well as the growing concern of LRAT of SOCs to high-altitude and high-latitude ecosystems the U.S. Department of the Interior-National Park Service initiated the Western Airborne Contaminant Assessment Project (WACAP). WACAP selected fourteen high-altitude and/or high-latitude remote lake catchments to conduct research on the atmospheric deposition of SOCs in eight western U.S. national parks. The sites range in latitude from 36.58N to 68.43N and longitude from -105.64W to -159.18W. These sites were selected to assess the atmospheric deposition of airborne contaminants in western national parks, providing regional and local information on exposure, impact, and probable sources (*21*).

WACAP selected six matrices in which to sample and measure SOCs; snow, lake water, fish, sediment, vegetation, and moose (*21*). Matrices were selected to provide information necessary to assess atmospheric deposition, exposure, impact, or indicate sources (*21*). Direct atmospheric SOC deposition was evaluated using annual snowpack. Lake water was selected to examine the more hydrophilic CUPs as well as a potential route of exposure to aquatic organisms. Fish were select to determine bioaccumulation, aquatic food web impacts as well as fish and human health risks. The SOC analysis of dated sediment cores provided the historical deposition of SOCs to the catchments over the past 150 years. Lichen, conifer needles, and moose were sampled and analyzed for SOCs to determine terrestrial food web impacts and bioaccumulation. Matrices were also selected to allow comparison to ongoing or previous studies (*21*). My research focused on analyzing SOCs in lake water and sediment.

Potential ecological risk is not the only concern in high-altitude ecosystems, there is also a potential human risk associated with atmospheric transport, deposition, and accumulation of SOCs in high-altitude and high-latitude ecosystems. Twenty-two percent of the world's population resides in orographic regions (*39*) and high-altitude lake ecosystems, residing in orographic regions, are the head waters for a large portion of the world's fresh water (*39*). Water originating from orographic regions can be used for human and livestock consumption, as well as being used for crop irrigation. The recreational and indigenous consumption of fish and livestock originating in orographic regions may also pose a potential human health risk.

In any large-scale lacustrine basin analysis, the historical atmospheric deposition of organic pollutants, such as SOCs, is crucial in assessing and monitoring the condition of the ecosystem. Lake sediment preserves and records the chronological history of atmospheric pollutants in a lake system (*14,15,25,27,28,40-42*). Dating recent sediments (<150 years) by ^{210}Pb is vital to accurately interpreting these natural records (*40*). The constant rate of supply (CRS) model is most commonly used dating model and assumes a constant sedimentation rate (*40*). In the situation where this assumption is inaccurate, other models, such as the constant initial concentration (CIC) model, can be used (*40*).

Previous analytical methods did not quantitatively measure a wide range of SOCs (i.e. CUPs, HUPs, PAHs, PCBs, and PBDEs) with such a wide range of physical and chemical properties, at ppb and ppt concentrations expected in high-altitude and high-latitude ecosystems from a single extract (*11,14,27*). Previous analytical methods developed for the trace analysis of SOCs were limited by high detection limits, limited analyte lists, sample matrix interferences, and sample collected from remote locations. Additional limitations for aqueous matrices included sample volume (1-5 L) (*32,43*) and the use of only hydrophobic solid phase extraction sorbents (*43*) or liquid-liquid extraction (*11,44*). Hydrophobic sorbents, such as C18, divinylbenzene, and XAD resin, have limited ability to capture more polar SOCs such as CUPs.

The purpose of this research was to improve the overall understanding of the fate and transport of SOCs in high-altitude and high-latitude ecosystems of western North America. This was accomplished by developing and validating analytical methods with lower detections limits capable of measuring low ppb or low ppt SOC concentrations for aqueous (lake water and precipitation) and solid (sediment) matrices (*16,17*). Analytical methods for aqueous matrices (snow and lake water) were also improved by increasing sample volume to 50 L to lower detection limits and *in situ* collection of lake water

(*16,17*). Finally, the recovery of a wide range of SOCs was improved by developing a new SPE device that contains multiple sorbents (*16,17*). The overall understanding of the fate and transport of SOCs was also improved by filling existing knowledge gaps in regional and large-scale spatial and temporal distribution of SOC in remote ecosystems in western North American.

LITERATURE CITED:

(1) Galloway, J. N.; Cowling, E. B. The effects of precipitation on aquatic and terrestrial ecosystems - a proposed precipitation chemistry network. *Journal of Air Pollution Control Association* **1978**, *28*, 229-235.

(2) Jaffe, D., Bertschi, I., Jaegle, L., Novelli, P., Reid, J., Tanimoto, H., Vingarzan, R., Westphal, D. Long-Range transport of Siberian biomass burning emissions and impact on surface ozone in western North America. *Geophys. Res. Let.* **2004**, *31*.

(3) Jaffe, D.; Anderson, T.; Covert, D.; Kotchenruther, R.; Trost, B.; Danielson, J.; Simpson, W.; Berntsen, T.; Karlsdottir, S.; Blake, D.; Harris, J.; Carmichael, G.; Uno, I. Transport of Asian air pollution to North America. *Geophys. Res. Let.* **1999**, *26*, 711-714.

(4) Simonich, S. L.; Hites, R. A. Global distribution of persistent organochlorine compounds. *Science* **1995**, *269*, 1851-1854.

(5) Wania, F. a. M., D. Tracking the distribution of persistent organic pollutants. *Environ. Sci. Technol.* **1996**, *30*, 390A-396A.

(6) Hinckley, D. A.; Bidleman, T. F.; Foreman, W. T. Determination of Vapor Pressures for Nonpolar and Semipolar Organic Compounds from Gas Chromatographic Retention Data. *Journal of Chemical & Engineering Data* **1990**, *35*, 232-237.

(7) Beyer, A.; Wania, F.; Gouin, T.; Mackay, D.; Matthies, M. Temperature dependence of the characteristic travel distance. *Environ. Sci. Technol.* **2003**, *37*, 766-771.

(8) Beyer, A.; Mackay, D.; Matthies, M.; Wania, F.; Webster, E. Assessing long-range transport potential of persistent organic pollutants. *Environ. Sci. Technol.* **2000**, *34*, 699-703.

(9) Webster, E.; Mackay, D.; Wania, F. Evaluating environmental persistence. *Environ. Toxicol. Chem.* **1998**, *17*, 2148-2158.

(10) Schwarzenbach, R.; Gschwend, P.; Imboden, D. *Environmental Organic Chemistry*; 2nd ed.; Wiley-Interscience: New York, 2003.

(11) Blais, J. M.; Schindler, D. W.; Muir, D. C. G.; Kimpe, L. E.; Donald, D. B.; Rosenberg, B. Accumulation of persistent organochlorine compounds in mountains of western Canada. *Nature* **1998**, *395*, 585-588.

(12) Daly, G. L.; Wania, F. Organic Contaminants in Mountains. *Environ. Sci. Technol.* **2005**, *39*, 385-398.

(13) Grimalt, J. O.; Fernandez, P.; Berdie, L.; Vilanova, R. M.; Catalan, J.; Psenner, R.; Hofer, R.; Appleby, P. G.; Rosseland, B. O.; Lien, L.; Massabuau, J. C.; Battarbee, R. W. Selective trapping of organochlorine compounds in mountain lakes of temperate areas. *Environ. Sci. Technol.* **2001**, *35*, 2690-2697.

(14) Grimalt, J. O.; van Drooge, B. L.; Ribes, A.; Vilanova, R. M.; Fernandez, P.; Appleby, P. Persistent organochlorine compounds in soils and sediments of European high altitude mountain lakes. *Chemosphere* **2004**, *54*, 1549-1561.

(15) Grimalt, J. O.; Drooge, B. L. V.; Ribes, A.; Fernandez, A. E.; Appleby, P. Polycyclic aromatic hydrocarbon composition in soils and sediments of high altitude lakes. *Environ. Pollut.* **2004**, *131*, 13-24.

(16) Hageman, K. J.; Simonich, S. L.; Campbell, D. H.; Wilson, G. R.; Landers, D. H. Atmospheric Deposition of Current-Use and Historic-Use Pesticides in Snow at National Parks in the Western United States. *Environ. Sci. Technol.* **2006**, *40*, 3174-3180.

(17) Usenko, S.; Hageman, K. J.; Schmedding, D. W.; Wilson, G. R.; Simonich, S. L. Trace Analysis of Semi-Volatile Organic Compounds in Large Volume Samples of Snow, Lake Water, and Groundwater. *Environ. Sci. Technol.* **2005**, *39*, 6006-6015.

(18) Wania, F.; Mackay, D. Global fractionation and cold condensation of low volatility organo-chlorine compounds in polar regions. *Ambio* **1993**, *22*, 10-12.

(19) Mast, A.; Foreman, W. T.; Skaates, S. Current-Use Pesticides and Organochlorine Compounds in Precipitation and Lake Sediment from Two High-Elevation National Parks in the Western United States. *Archives of Environmental Contamination and Toxicology* **2006**, In Press.

(20) Bidleman, T. F. Atmospheric processes. *Environ. Sci. Technol.* **1988**, *22*, 361-367.

(21) Landers, D. H.; Simonich, S. L.; Campbell, D. H.; Erway, M. M.; Geiser, L.; Jaffe, D.; Kent, M.; Schreck, C.; Blett, T.; Taylor, H. E. Western Airborne Contaminants Assessment Project Research Plan. **2003**, *Western Airborne Contaminants Assessment Project Research Plan. EPA/600/R-03/035. U.S. EPA, ORD, NHEERL, WED, Corvallis, OR(www2.nature.nps.gov/air/Studies/air_toxics/wacap.htm)*.

(22) Wania, F.; Mackay, D.; Hoff, J. T. The importance of snow scavenging of polychlorinated biphenyl and polycyclic aromatic hydrocarbon vapors. *Environ. Sci. Technol.* **1999**, *33*, 195-197.

(23) Cook, P. M.; Robbins, J. A.; Endicott, D. D.; Lodge, K. B.; Guiney, P. D.; Walker, M. K.; Zabel, E. W.; Peterson, R. E. Effects of aryl hydrocarbon receptor-mediated early life stage toxicity on lake trout populations in Lake Ontario during the 20th century. *Environ. Sci. Technol.* **2003**, *37*, 3864-3877.

(24) Baker, J. I.; Hites, R. A. Siskiwit Lake revisited: Time trends of polychlorinated dibenzo-p-dioxin and dibenzofuran deposition at Isle Royale, Michigan. *Environ. Sci. Technol.* **2000**, *34*, 2887-2891.

(25) Blais, J. M.; Muir, D. C. G. In *Tracking Environmental Change Using Lake Sediments*; Last, W. M., Smol, J. P., Eds.; Kluwer Academic Publishers, 2001; Vol. 2, pp 271-298.

(26) Hofer, R.; Lackner, R.; Kargl, J.; Thaler, B.; Tait, D.; Bonetti, L.; Vistocco, R.; Flaim, G. Organochlorine and metal accumulation in fish (Phoxinus phoxinus) along a north-south transect in the Alps. *Water Air Soil Pollut.* **2001**, *125*, 189-200.

(27) Fernandez, P.; Vilanova, R. M.; Grimalt, J. O. Sediment fluxes of polycyclic aromatic hydrocarbons in European high altitude mountain lakes. *Environ. Sci. Technol.* **1999**, *33*, 3716-3722.

(28) Fernandez, P.; Vilanova, R. M.; Martinez, C.; Appleby, P.; Grimalt, J. O. The historical record of atmospheric pyrolytic pollution over Europe registered in the

sedimentary PAH from remote mountain lakes. *Environ. Sci. Technol.* **2000**, *34*, 1906-1913.

(29) Vilanova, R. M.; Fernandez, P.; Martinez, C.; Grimalt, J. O. Polycyclic aromatic hydrocarbons in remote mountain lake waters. *Water Res.* **2001**, *35*, 3916-3926.

(30) Vilanova, R. M.; Fernandez, P.; Grimalt, J. O. Polychlorinated biphenyl partitioning in the waters of a remote mountain lake. *Sci. Total Environ.* **2001**, *279*, 51-62.

(31) Vilanova, R.; Fernandez, P.; Martinez, C.; Grimalt, J. O. Organochlorine pollutants in remote mountain lake waters. *J. Environ. Qual.* **2001**, *30*, 1286-1295.

(32) McConnell, L. L.; LeNoir, J. S.; Datta, S.; Seiber, J. N. Wet deposition of current-use pesticides in the Sierra Nevada mountain range, California, USA. *Environ. Toxicol. Chem.* **1998**, *17*, 1908-1916.

(33) LeNoir, J. S.; McConnell, L. L.; Fellers, G. M.; Cahill, T. M.; Seiber, J. N. Summertime transport of current-use pesticides from California's Central Valley to the Sierra Nevada Mountain Range, USA. *Environ. Toxicol. Chem.* **1999**, *18*, 2715-2722.

(34) Datta, S.; McConnell, L. L.; Baker, J. E.; Lenoir, J.; Seiber, J. N. Evidence for atmospheric transport and deposition of polychlorinated biphenyls to the Lake Tahoe basin, California - Nevada. *Environ. Sci. Technol.* **1998**, *32*, 1378-1385.

(35) Shen, L.; Wania, F.; Lei, Y. D.; Teixeira, C.; Muir, D. C. G.; Bidleman, T. F. Atmospheric distribution and long-range transport behavior of organochlorine pesticides in north America. *Environ. Sci. Technol.* **2005**, *39*, 409-420.

(36) Zhu, L. Y.; Hites, R. A. Brominated Flame Retardants in Sediment Cores from Lake Michigan and Erie. *Environ. Sci. Technol.* **2005**, *39*, 3488-3494.

(37) U.S. Environmental Protection Agency. **2007**, http://www.epa.gov/pbt/index.htm.

(38) Meijer, S. N.; Shoeib, M.; Jantunen, L. M. M.; Jones, K. C.; Harner, T. Air-soil exchange of organochlorine pesticides in agricultural soils. 1. Field measurements using a novel in situ sampling device. *Environ. Sci. Technol.* **2003**, *37*, 1292-1299.

(39) Mountain Watch Report. *UNEP World Conservation Monitoring Centre* **2002**.

(40) Appleby, P. G. In *Tracking Environmental Change Using Lake Sediments*; Last, W. M., Smol, J. P., Eds.; Kluwer Academic Publishers, 2001; Vol. 1.

(41) Appleby, P. G.; Piliposian, G. T. Radiometric dating of sediment records from mountain lakes in the Tatra Mountains. *Biologia* **2006**, *61*, S51-S64.

(42) Appleby, P. G.; Nolan, P. J.; Gifford, D. W.; Godfrey, M. J.; Oldfield, F.; Anderson, N. J.; Battarbee, R. W. ^{210}Pb Dating by low background gamma counting. *Hydrobiologia* **1986**, *141*, 21-27.

(43) Zuagg, S. D.; Sandstrom, M. W.; Smith, S. G.; Fehlberg, K. M. "Methods of analysis by the U.S. Geological Survey National Water Quality Laboratory--Determination of pesticides in water by C-18 solid-phase extraction and capillary-column gas chromatography/mass spectrometry with selected-ion monitoring," U.S. Geological Survey Open-File Report 95-181, 1995.

(44) Wilkinson, A. C.; Kimpe, L. E.; Blais, J. M. Air-water gas exchange of chlorinated pesticides in four lakes spanning a 1,205 meter elevation range in the Canadian Rocky Mountains. *Environ. Toxicol. Chem.* **2005**, *24*, 61–69.

CHAPTER 2. TRACE ANALYSIS OF SEMI-VOLATILE ORGANIC COMPOUNDS IN LARGE VOLUME SAMPLES OF SNOW, LAKE WATER, AND GROUNDWATER

SASCHA USENKO, KIMBERLY J. HAGEMAN, DAVE W. SCHMEDDING, GLENN R. WILSON, AND STACI L. SIMONICH

Environmental Science and Technology
American Chemical Society
Member & Subscriber Services
PO Box 3337
Columbus, OH 43210, USA
Environ. Sci. Technol.; 2005; 39(16); 6006-6015

ABSTRACT

An analytical method was developed for the trace analysis of a wide range of semi-volatile organic compounds (SOCs) in 50-L high-elevation snow and lake water samples. The method was validated for 75 SOCs from seven different chemical classes (polycyclic aromatic hydrocarbons, organochlorine pesticides, amides, triazines, polychlorinated biphenyls, thiocarbamates, and phosphorothioates) that covered a wide range of physical-chemical properties, including eight orders of magnitude of octanol-water partition coefficient (log K_{ow} = 1.4 to 8.3). The SOCs were extracted using hydrophobically and hydrophilically modified divinylbenzene solid phase extraction (SPE) device (modified Speedisk). The average analyte recoveries from 50-L of reverse osmosis water, using the modified Speedisk, was 99% with an average relative standard deviation of 4.8 %. Snow samples were collected from the field, melted, and extracted using the modified Speedisk and a PTFE remote sample adapter in the laboratory. Lake water was sampled, filtered, and extracted *in situ* using an Infiltrex 100 fitted with a 1-μm glass fiber filter to trap particulate matter and the modified Speedisk to trap dissolved SOCs. The extracts were then analyzed using GC/MS with electron impact ionization (EI) and electron capture negative ionization (ECNI) using isotope dilution and selective ion monitoring. Estimated method detection limits for the snow and lake water were approximately 0.2-125 pg/L and 0.5-400 pg/L, respectively. U.S. historic and current-use pesticides were identified and quantified in snow and lake water samples collected from Rocky Mountain National Park, CO using this method. The application of the analytical method to the analysis of SOCs in large volume groundwater samples is also shown.

INTRODUCTION

Previous studies suggest that some semi-volatile organic compounds (SOCs) undergo long-range atmospheric transport (LRAT) and redeposition to colder areas such as high-elevations (*1-5*) and high-latitudes (*1,6-10*). This is explained by the theory of cold condensation or orographic cold trapping (*5,8,10*). This theory suggests that less volatile SOCs remain near sources, while more volatile SOCs volatilize into the atmosphere, undergo LRAT to higher latitudes or elevations, and redeposit to the earth's surface (*10*). SOCs may redeposit to the earth's surface by air-surface exchange, dry deposition, and wet deposition (*5,11-16*). Snow is an efficient scavenger of SOCs from the atmosphere (*13,14*) and is the dominant form of precipitation for some high-elevation ecosystems in North America (*17*). During annual snowmelt, SOCs may be released from the snow pack into high-elevation and high-latitude perched lakes (*9,15*). Lake water is an important route of SOC exposure to aquatic organisms in these ecosystems (*18,19*).

The deposition of SOCs to high-elevation and high-latitude ecosystems through snow and their presence in lake water has been studied (*2,4,9,16,20-25)* . Organochlorine pesticides (OCPs), polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs) have been measured in snow and lake water collected from European High Mountains (*2,4,9,20-24*). OCPs have been measured in Arctic snow and lake water (*9,26*) and in snow and lake water collected from the Canadian Rocky Mountains (*1,15*). Current-use pesticides have been measured in snow and surface water collected the Sierra Nevada Mountain Range, USA (*16,25*). However, the deposition of historic and current-use SOCs and their fates in high-elevation and high-latitude ecosystems across the U.S. have not been thoroughly studied. The Western Airborne Contaminant Assessment Project (WACAP) was developed to study the atmospheric deposition of SOCs to, and their environmental fate in, high-elevation and high-latitude ecosystems located in eight western national parks in the U.S., from 2003-2005 (*17*).

Historically, analytical methods used for the trace analysis of SOCs in aqueous matrices have been limited by high detection limits, limited analyte lists, sample matrix interferences, and logistical limitations of sampling in remote locations. Some of these limitations have been due to small sample volumes (1-5 L) (*25,27*) and the use of only hydrophobic solid phase extraction (SPE) sorbents (*27*) or solvents in liquid-liquid extractions (*1,15*). Hydrophobic sorbents such as C_{18}, divinylbenzene (DVB), and XAD resin, have limited ability to capture the more polar SOCs, such as current-use pesticides, from aqueous matrices.

The objective of this research was to develop a quantitative analytical method for measuring a wide range and number of SOCs in large volume snow and lake water samples at low concentrations (pg/L). Seventy-five SOCs were chosen as target analytes and serve as molecular markers for incomplete combustion, agricultural, and industrial sources. These SOCs cover seven chemical classes: PAHs, OCPs, amides, triazines, PCBs, thiocarbamates, and phosphorothioates and are given in Table 2.1. Because the log K_{ow} of the target SOCs range from 1.4 to 8.3 (Table 2.1), a solid phase extraction technology with both hydrophobic and hydrophilic properties was needed. Large volume extractions (50 L) were conducted in order to lower detection limits to pg/L by increasing the overall contaminant mass extracted. This also increased the mass of potential matrix inferences and required the snow and lake water extract to undergo extract purification procedures. The use of the same SPE technology to extract SOCs from both snow and lake water allows for a direct comparison between the concentrations in annual snow pack and lake water, within a lake catchment. This method will be used to measure SOC concentrations in high-elevation snow and lake water samples collected from selected national parks in the western U.S. We have also explored the usefulness of this method for the trace analysis of SOCs in ground water.

EXPERIMENTAL

Chemicals and Materials

All SOC standards (Table 2.1) were acquired from the EPA repository or purchased from Chem Services Inc (West Chester, PA), Restek (Bellefonte, PA), Sigma-Aldrich Corp (St. Louis, MO), or AccuStandard (New Haven, CT). The solvents were Fisher Scientific (Fairlawn, NJ) Optima grade and the sodium sulfate was Mallinckrodt Baker (Phillipsburg, NJ) Pesticide grade. Isotopically labeled standards were purchased from CDN Isotopes (Pointe-Claire, Quebec, Canada) or Cambridge Isotopes Labs (Andover, MA). The SPE technologies investigated were C_{18} Empore disks from 3M (St. Paul, MN), Abselut Nexus from Varian (Palo Alto, CA), Amberlite XAD-2 resin from Axys Environmental Systems Ltd (Sidney, British Columbia, Canada) and three types of

Speedisks (C_{18}, hydrophobic DVB, and a hydrophilic DVB) from Mallinckrodt Baker. Recovery surrogates were: d_{10}-Fluorene, d_{10}-Phenanthrene, d_{10}-Pyrene, d_{12}-Triphenylene, d_{12}-Benzo[a]pyrene, d_{12}-Benzo[ghi]perylene, d_{14}-EPTC, d_5-Atrazine, d_{10}-Diazinon, d_7-Malathion, d_{10}-Parathion, d_8-p,p'-DDE, d_8-p,p'-DDT, d_6-Methyl Parathion, d_{13}-Alachlor, d_{11}-Acetochlor, $^{13}C_{12}$-PCB 101 (2,2',4,5,5'-Pentachlorobiphenyl), $^{13}C_{12}$-PCB 180 (2,2', 3,4,4',5,5'-Heptachlorobiphenyl), d_{10} - Chlorpyrifos, $^{13}C_6$-HCB, d_6-γ-HCH, d_4-Endosulfan I, d_4-Endosulfan II , and d_{14}-Trifluralin. Internals standards were: d_{10}-Acenaphthene, d_{12}-Benzo[k]fluoranthene, d_{10}-Fluoranthene, and $^{13}C_{12}$-PCB 138 (2,2',3,4,4',5'-Hexachlorobiphenyl). Standards were stored at 4°C and remade as needed, or at least once a year, to insure stability.

Solid Phase Extraction Disk and Conditioning

The extraction efficiency of four different types of SPE technologies was examined for a diverse analyte list in 1-L reverse osmosis (R.O.) aqueous samples. The SPE technologies examined were C_{18} Empore disks, Abselut Nexus, Amberlite XAD-2 resin, and three types of Speedisks (C_{18}, DVB, and a hydrophilic DVB). Empore disks are composed of sorbent particles trapped in a matrix of polytetrafluoroethylene (PTFE). Nexus uses a non-conditioning proprietary sorbent in a polypropylene syringe cartridge (20 mL). The Speedisks are a fairly new SPE technology that come in a variety of sorbents, and have been used to extract high particulate aqueous samples (*28,29*). The XAD-2, a styrene-divinylbenzene resin, comes in a PTFE column and is sized to be no smaller than 300 micron for use in an Infiltrex 100 *in situ,* battery powered, microprocessor controlled sampler (Axys). *In situ* extractions of lake water help alleviate sample transport problems due to the large weight and volume of the samples (50 L) and can help avoid sample contamination and analyte degradation in transit to the laboratory.

The SPE technologies were also evaluated on their ability to handle high particulate loads while maintaining adequate flow rates (~200 mL/min). Snow, lakes water (oligotrophic), and groundwater samples typically have low particulate matter. However, due to the large volume of water being extracted (50 L), the total mass of particulate matter can become significant. Maintaining adequate flow rates helps reduce the total extraction time. This is especially important for *in situ* extractions of lake water. A representative subset of the target SOCs listed in Table 2.1 was spiked into 1-L and 50-L

RO water and extracted using the four different SPE technologies. Based on analyte recoveries, logistical requirements (flow rate and ability to interface with the Infiltrex 100), and cost efficiency, the modified Speedisk was selected for this analytical method (see Results and Discussion).

The Speedisks used for snow, lake water, and groundwater samples were modified in the laboratory. The modified Speedisks were prepared by combining a 1-g hydrophobic DVB Speedisk with a 1-g hydrophilic DVB Speedisk. The hydrophilic DVB contains a proprietary polar functional group to improve the extraction efficiency of more polar compounds (*30*). The two Speedisks were combined by removing the collet and polypropylene mesh of both Speedisks and then wetting each sorbent with methanol. While wet, the content, including the filter of the hydrophilic Speedisk, was directly transferred to the cartridge of the hydrophobic DVB Speedisks and stacked on top of the hydrophobic DVB. The hydrophobic DVB cartridge then contained a glass fiber filter (GFF) followed by 1-g hydrophilic DVB, then another GFF, and 1-g hydrophobic DVB. The polypropylene mesh was returned to the hydrophobic cartridge and the combined DVB sorbents were secured with the collet to create the modified Speedisk.

The modified Speedisks were conditioned using 20 mL each of ethyl acetate (EA) (used to wet sorbent), dichloromethane (DCM), EA, methanol, and RO water (40 mL), in order, prior to use. The solvents used for conditioning the modified Speedisks were pulled through the extraction disk using a vacuum manifold with a flow rate of ~2 mL/min. DCM and methanol were allowed to soak into the extraction disk for 1 minute before being completely pulled though with the vacuum. The modified Speedisks were not allowed to go dry during the conditioning steps or prior to sample extraction.

Sample Collection

Snow. Annual snow pack samples were collected during the time of maximum accumulation from north facing open areas by a U.S. Geological Survey team. Snow pits were dug down to a level that represented that year's annual snowfall. A vertical face of the pit was shaved using a clean Lexan shovel. 50-kg samples where collected over the entire vertical column and stored in 60 X 60 cm solvent rinsed PTFE bags. The bags were twisted and sealed using two zip ties. The snow samples were placed in a black low density polyethylene bags to protect them from ultra-violate light. Finally, the snow samples were placed in high density polypropylene bags for increased protection and shipped in 94.6-L coolers with dry ice overnight to the laboratory. Once in the laboratory, the snow samples were stored at -20 °C until extraction. Field blanks were taken during sample collection and consisted of RO water being poured over the Lexan shovels used for sample collection. RO water used in the field blank was collected in a PTFE bag and transported back to the laboratory in a cooler containing snow samples.

Lake Water. Lake water was sampled, filtered, and extracted *in situ* using an Infiltrex 100 (Axys) during the ice-free summer season. The Infiltrex 100 contained a 1-µm GFF (14.2 cm diameter) to trap SOCs sorbed to particulate matter followed by a modified Speedisk to extract SOCs dissolved in the aqueous phase. Field blanks were taken during sample collection and consisted of a GFF and modified Speedisk. The GFF and modified Speedisk were placed in the Infiltrex 100 and were not submerged or exposed to lake water. The GFF and modified Speedisk were removed from the Infiltrex 100 and treated identically to the GFF and modified Speedisk used for sampling (see below).

The Infiltrex 100 was programmed, using an HP200LX, for a flow rate of 200 mL/min and a pumping volume of 50 L. The sampler was lowered to depth at each location within the lake with fresh batteries, a GFF, and a modified Speedisk. The HP200LX was also used to query the microprocessor to verify extraction volumes upon completion of sampling.

Prior to sampling, the GFFs were baked at 350 °C for 12 hrs and stored in baked aluminum foil during transport. The modified Speedisks were prepared and conditioned in the laboratory, and then sealed with a PTFE remote sample adapter (Mallinckrodt Baker) and a polypropylene syringe needle cap and stored individually in a clean polypropylene jar until the extraction date. Modified Speedisks were conditioned as close to the extraction date as possible.

After the *in situ* extraction, the GFF was removed from the Infiltrex 100 and stored in a 40-mL clean glass vial. The modified Speedisk was also removed from the Infiltrex 100 and resealed with a PTFE cap and a polypropylene syringe needle cap and stored in a clean polypropylene jar. The GFF and modified Speedisk were placed on dry ice and stored in coolers in the field and during overnight transport to the laboratory. Once in the laboratory the GFF and modified Speedisk were stored at -12 °C.

Groundwater. 40 L of water was collected from a local groundwater well, ~13 m deep. The well is located in the Willamette Valley near an orchard, golf course, and a variety of field crops, such as grass seed. Groundwater samples were collected using PTFE tubing into Pyrex and Nalgene carboys. The glass carboys were baked at 350 °C for 12 hrs prior to use and all carboys were solvent rinsed prior to use. The carboys were capped during transport to and from the laboratory.

Snow Extraction

Snow samples (~50 kg each), contained in PTFE bags, were melted in a fume hood (16-20 hrs) without additional heat and covered with black low density polyethylene bags for minimal exposure to ultraviolet light. Once completely melted, 1 mL of methanol spiked with 15 µL of 10 ng/µL isotope labeled surrogate-EA solution was dispersed among the PTFE bags. Extractions were conducted using a pre-weighed modified Speedisk, with sample flow rates of ~200 mL/min, using a vacuum manifold and remote sample adapter. The remote sample adapter allowed the melted snow sample to be drawn from the PTFE bag via a PTFE line onto the modified Speedisk and eliminated the need to pour the sample into the sampling reservoir of the modified Speedisk. Sample extraction volumes were limited to 50 L per modified Speedisk. The melted snow samples were not filtered prior to extraction because of the change in SOC partitioning between the particulate and dissolved phase when snow is melted (*13*). The extracts reflected the total analyte concentration in snow (sum of the particulate phase and the dissolved phase). After the snow sample was extracted, each PTFE bag was rinsed with 40 mL each of DCM, DCM:EA (1:1), and EA and each solvent was collected into separate beakers. Any water collected along with the solvent was removed with a glass pasteur pipette and extracted with the modified Speedisk. The analytes were eluted from the modified Speedisk with the solvent rinses from the PTFE bags using the same remote sampling adapter to make sure the PTFE line of the remote sample adapter was thoroughly rinsed. The solvent elution order of the modified Speedisk was EA, DCM: EA, and DCM. Once they had passed through the modified Speedisk, the solvent fractions were combined. The modified Speedisk was dried at 105 °C for 6 hrs, before the extraction of the sample and after the elution of the target SOCs to estimate the particulate mass in the snow sample.

The combined snow extract was dried with sodium sulfate which had been baked at 400 °C for 3 hrs and then cooled in a desiccator. Once dry, the extract was concentrated with a nitrogen stream to 0.5 mL and solvent exchanged to hexane using a Zymark TurboVap II (Hopkinton, MA) (40 °C). The snow extracts were then purified on 20-g silica SPE cartridge (Varian). Analytes were eluted from the silica SPE cartridge using 50 mL DCM and 50 mL DCM:EA. The eluant was then combined, concentrated, and solvent exchanged to DCM. After concentrating to 0.2 mL, the snow extracts were filtered with a 0.45-μm PTFE syringe filter. High molecular weight interferences were removed from the snow extract using a Waters Gel Permeation Chromatography (GPC) Cleanup System (Milford, MA) equipped with a guard column, a 15 cm (dia 1.9 cm) and 30 cm (dia 1.9 cm) Waters Envirogel analytical column, in series, and a DCM mobile phase with a flow rate of ~5 mL/min. The analyte fraction eluted from 12.25-21.25 min and was collected. This fraction was concentrated to 0.2 mL under a stream of nitrogen using a TurboVap II.

Just prior to analysis, the snow extracts were spiked with 15 μL of 10 ng/μL isotope labeled internal standards-EA solution and analyzed for target SOCs (Table 2.1) by GC/EI-MS and GC/ECNI-MS as discussed below.

The analytical method for snow extraction was validated in triplicate using a locally available snow pack (see Results and Discussion). Snow samples were collected from a remote site in Oregon's Cascade Range (1423 m) in accordance to the method used by the U.S. Geological Survey (see above). Spike recovery experiments for SOCs were conducted using the analytical method described above and corrected using the actual SOC concentration measured in the snow. Target SOCs were spiked via methanol solution prior to extraction into three ~50-L melted snow samples. Isotope labeled surrogates were added to the extract just after extraction, to measure SOC recoveries from the modified Speedisk. Stable isotope labeled internal standards were added just prior to analysis. The validation concentration for the triplicate 50-L melted snow recoveries was 6 ng/L of snow.

Lake Water Extraction

In the laboratory, the GFF and modified Speedisk used to extract lake water were stored at -12 °C. Storage of the GFFs and modified Speedisks prior to elution did not exceed ten days. A freezer stability study confirmed the target SOCs were stable over this time period. The sealed modified Speedisks was allowed to come to room temperature and was spiked with 15 µL of 10 ng/µL isotope labeled surrogate-EA solution. The surrogate-EA solution was allowed to soak into the modified Speedisk for 1 minute. Elution of analytes and surrogates from the modified Speedisk was accomplished using the same solvents, volumes, and elution order as the snow extraction procedure (see above), without the use of a PTFE bag and remote sampling adapter.

The GFF, containing the particulate matter from the lake water sample, was removed from the storage freezer and transferred to a 100 mL accelerated solvent extraction (ASE) cell from Dionex (Sunnyvale, CA) containing ~40 g of sodium sulfate. Once in the ASE cell, the GFF was spiked with 15 µL of 10 ng/µL isotope labeled surrogate-EA solution. After spiking the surrogates, the remainder of the cell was filled with sodium sulfate. The sodium sulfate and GFF were packed tightly into the cell to help remove water from the GFF. The cell was then extracted with the ASE 300 (Dionex) using EA followed by DCM (100 °C, 1500 psi for 10 minutes). These GFF extracts were then combined.

Eluant from both the Speedisk and GFF were dried separately using sodium sulfate. Extracts were concentrated to 0.5 mL in the TurboVap II with nitrogen and solvent exchanged to hexane. The 0.5-mL hexane extracts were purified on a 20-g silica SPE cartridge using the same procedure as snow (see above). GPC purification of lake water extracts was not required. Target SOCs were eluted from the silica SPE, concentrated, spiked with internal standards, identified, and quantified identically to the snow sample procedure (see above and below).

The analytical method for lake water extractions was validated in triplicate using the modified Speedisk and was conducted using 1-L and 50-L extraction volumes (see Results and Discussion). In the RO water recovery experiment, six 1-L water samples were spiked with target SOCs using a methanol solution. Three of the l-L RO water samples were immediately extracted using the modified Speedisks, and eluted off with 40 mL each of EA, DCM:EA, and DCM. The three remaining 1-L RO water samples were pulled onto the modified Speedisk and were immediately followed by an additional 49 L of RO water (unspiked) before being eluted from the modified Speedisk. We believe this represented the worst-case scenario for analyte breakthrough because of the large volume of water (49 L) that followed the spiked 1 L. The SOC concentration distribution in an actual 50-L sample is more homogenously distributed. The 1-L and 50-L RO water recovery experiments were validated at 300 ng/L and 6 ng/L, respectively (see Results and Discussion).

In situ lake water spike and recovery experiments could not be conducted in the field with the Infiltrex 100 because of the possibility of contaminating the lake with SOCs that could potentially breakthrough the modified Speedisk and be discharged to the lake. The spike and recovery experiments described above were preformed using a vacuum manifold. We assumed that a modified Speedisk would perform identically on a vacuum manifold as it would in line on an Infiltrex 100. This assumption was tested with a single large volume RO water extraction using the Infiltrex 100 (see Results and Discussion).

Groundwater Extraction

In the laboratory, groundwater samples were extracted immediately using a modified Speedisk, remote sampling adapter, and vacuum manifold. A 1-L aliquot of the sample was spiked with 15 μL of 10 ng/μL isotope labeled surrogate-EA solution. This aliquot was extracted first, followed by the remainder of the sample (39 L). Target SOCs and surrogates were eluted off the modified Speedisk with 40 mL each of EA, DCM: EA, and finally DCM. These three fractions were then combined. Silica gel and GPC purification were not required for the analysis of groundwater samples. Extracts were dried with sodium sulfate and concentrated to ~200 μL. Finally, the extracts were spiked with 15 μL of 10 ng/μL isotope labeled internal standards-EA solution and were analyzed by GC/EI-MS and GC/ECNI-MS as discussed below. Surrogate recoveries and analyte concentrations were determined in the groundwater (see Results and Discussion).

Extract Analysis

Because of our need for pg/L detection limits, we decided to split the analysis of the 75 SOCs listed in Table 2.1 between GC/EI-MS and GC/ECNI-MS, depending on the mode of ionization that resulted in the lowest instrumental detection limits for a given SOC. The snow, lake water, and groundwater extracts were analyzed by gas chromatographic mass spectrometry (GC/MS) on an Agilent 6890 GC coupled with an Agilent 5973N MSD, using both electron impact (EI) ionization and electron capture negative ionization (ECNI) modes (Table 2.2). One microliter of the 0.2 mL extract was injected in pulsed splitless mode with a HP 7683 auto-sampler (pulse of 20 psi until 0.6 min). Chromatographic separations were achieved on a DB-5MS column (J&W Scientific, 30m x 0.25 mm id.; 0.25 μm film thickness) with helium carrier gas. The following GC oven temperature program was used for the GC/EI-MS: 60 °C for 1 min, ramped at 6 °C/min to 300 °C, held 3 min, ramp 20 °C to 320, held 9 min for a total runtime of 54 minutes. The GC/ECNI-MS used the following GC oven temperature program: 120 °C for 1 min, ramped at 4 °C/min to 275 °C, ramped at 6 °C/min to 320 °C, held 5 min, total runtime of 52.25 min. The selected ion monitoring programs for the GC/EI-MS and GC/ECNI-MS analysis are given in Table 2.3 and 2.4. Instrument detections limits for GC/EI-MS and GC/ECNI-MS were approximately 5-600 pg/μL and 2-60 pg/μL, respectively, depending on the SOC (Table 2.2).

RESULTS AND DISCUSSION

Selection of SPE Device

A direct comparison of the extraction efficiency of the 0.1-g C_{18} Empore disk (47 mm), 70 g of XAD-2 resin (>300 micron), 1-g C_{18} Speedisk, 1-g hydrophobic DVB Speedisk, 1-g hydrophilic DVB Speedisk, and the 0.5-g Nexus Abselut was conducted using 1-L of RO water. The 1-g C_{18} Speedisk was combined from two 0.5-g C_{18} Speedisk. 1-L samples of RO water were spiked with ~5 mL of methanol containing 30 μL of 10 ng/μL target SOC-EA solution. The 1-L RO water samples were extracted at ~200 mL/min using the vacuum manifold. The Nexus was extracted at ~50 mL/min, due to the manufacturer's recommendation to use low vacuum pressures (~125 mm Hg) (*31*). After the extraction and prior to the elution of the target SOCs, the SPE devices were spiked with 15 μL of 10 ng/μL isotope labeled surrogate-EA solution. Target SOCs were eluted off the Nexus, C_{18} Speedisk, hydrophobic DVB Speedisk, hydrophilic DVB Speedisk, and Empore C_{18} disk with 2 rinses (~25 mL each) of EA, DCM: EA, and DCM. The XAD-2 was extracted with the ASE (100 °C, 1500 psi for 10 minutes) using 2 rinses of acetone and hexane (1:1).

Individual analyte recoveries varied depending on the solid phase sorbent type and the polarity of the target SOCs (Figure 2.1). The target SOCs shown in Figure 2.1 were selected to be a representative subset of the entire analyte list because of the different chemical classes, as well as the wide log K_{ow} range (1.4 to 8.3). The recoveries of atrazine were comparable for the six sorbents (79.2 to 88.9%). However, the recoveries of atrazine desisopropyl and atrazine desethyl, two of the polar degradation products of atrazine, using the two DVB Speedisk sorbents were higher than the other SPE sorbents (Figure 2.1). Recoveries for atrazine desisopropyl and desethyl (log K_{ow} = 1.4 and 1.8, respectively) were 87.3 and 82.7% for the hydrophilic DVB Speedisk and 92.6 and 98.8% for the hydrophobic DVB Speedisk (Figure 2.1). The recovery of these same compounds, using the other solid phase sorbents, ranged from 23.3 to 32.4% for atrazine desisopropyl and from 32.7 to 70.6% for atrazine desethyl. In general, the two DVB Speedisks had higher extraction efficiencies for the polar SOCs than the other SPE sorbents tested. In a preliminary study, the percent recovery of disulfoton, demeton, ethion, and diazinon from 1-L RO water was 20% higher for the 0.5-g hydrophilic DVB Speedisk, than that of the 0.5-g hydrophobic DVB Speedisk. This study also showed the hydrophobic DVB had a 15% higher recovery than that of the hydrophilic DVB for some PAHs. Recoveries were improved by increasing the amount of hydrophobic and hydrophilic DVB sorbent to 1 g.

Because, out of the six SPE sorbents tested, no one sorbent was able to efficiently capture all of the target SOCs from such a diverse analyte list and we planned to scale-up sample volumes from 1 L to 50 L, we decided to combine several sorbent types into the same SPE device and increase sorbent mass. Due to the differences in recoveries between the two DVB sorbents and the overall improvement of recoveries we observed by increasing the amount of sorbent from 0.5 g to 1 g, a procedure was developed to combine the 1-g hydrophilic DVB Speedisk with the 1-g hydrophobic DVB Speedisk into a modified Speedisk (see above).

The Speedisk technology has distinct advantages over the other SPE technologies we tested for extracting large volume aqueous samples. The Speedisk contains a progressively graded glass prefiber filter that decreases plugging due to high particulate loading (*30*). The remote sampling adapter facilitates extraction of large sample volumes out of unique sample vessels (*30*) (such as PTFE bags) and allows the modified Speedisk to be adapted to an Infiltrex 100. The Speedisk technology can be modified in the laboratory to contain multiple sorbent types (see above). This also allows the user to double or triple the mass of sorbent present in the Speedisk, which can reduce analyte breakthrough during the extraction of large water volumes. The use of multiple sorbent types in the same modified Speedisk expands the capacity of the modified Speedisk to extract a wide range of chemical classes.

The Nexus and Empore technologies we tested were unacceptable for our analytical method due to low recovery of the polar SOCs, inability to handle high particulate matter loads without plugging, no remote sampling adapter, and the inability to interface with the Infiltrex 100. Nexus was also undesirable due to manufacturer's recommendation to use low vacuum pressures (~125 mm Hg) which caused significantly slower flow rates (~50 mL/min) (*31*).

The sized XAD-2 was also unacceptable for our analytical method because of the low recovery of the polar SOCs (Figure 2.1). The sized XAD-2 also showed low recoveries for some of the more hydrophobic PAHs and OCPs with log K_{ow} > 6.0 (Figure 2.1). XAD-2 recoveries were also low for the seven PCBs listed in Table 2.1 (log K_{ow} > 6.3), with recoveries ranging from 31 to 65%. It should be noted that when XAD-2 is used with the Infiltrex 100 it follows a GFF. The GFF would retain the particulate phase of the water sample, which is where the more hydrophobic SOCs reside. Therefore, the apparent low recovery of the hydrophobic SOCs by the sized XAD-2 may not be an issue for *in situ* lake water extraction with the Infiltrex 100. However, it could be an issue for the snow and groundwater extractions where the sample is not filtered prior to extraction. XAD-2 was also unacceptable due to the cost and labor associated with producing sized XAD-2, which is necessary for the Infiltrex 100.

Method Validation

Triplicate recoveries of target SOCs over modified Speedisks were measured in 1-L and 50-L samples of RO water (Table 2.1). The average SOC recoveries for all compounds were 89% and 99% in 1-L and 50-L samples, respectively, indicating the general suitability of modified Speedisks for extracting SOCs with a wide range of K_{ow} values. While recoveries varied between compounds, no significant correlations between recovery and log K_{ow} were observed. Average percent relative standard deviations (%RSDs) between triplicate samples were 13% and 5% for 1-L and 50-L samples, indicating that the in-house modification of disks and the steps involved in the extraction are reproducible. A standard two-sample t-test confirmed that there was no statistical difference ($p<0.05$) between the recoveries of 69 of the 75 target SOCs in the 1-L and 50-L aliquots. The lack of significant difference in recoveries between 1-L and 50-L aliquots indicated that scale-up to large-volume samples was feasible.

Due to minimal matrix effects, SOC recoveries from RO water represent the best-case scenario for recovery from an aqueous matrix. To assess the performance of the extraction method in an environmentally-relevant aqueous matrix, triplicate recoveries of target SOCs were measured in snow (Figure 2.5) by the method described in the Experimental Section. Note that because the target SOCs were spiked into melted snow before the solid phase extraction and the surrogates were spiked into extracts immediately following the elution step, recoveries in Figure 2.5 are for the extraction step only and do not include losses from clean-up steps (silica and GPC). The average recovery for all target SOCs was 68.3% and the average RSD was 14.8%. Triplicate recoveries of target SOCs from snow were also measured (data not shown) over the entire analytical method, i.e. the target SOCs were spiked into melted snow and the surrogates were spiked into final extracts following the completion of clean-up steps. The average recovery for all target SOCs over the entire analytical method was 53.1% with an average RSD of 12.7%, indicating that ~15% of analyte mass is lost during clean-up steps.

Potential loss mechanisms encountered during the extraction of snow, but not during the extraction of RO water, may explain differences in average SOC recoveries in snow (68.3%) (Figure 2.5) vs. those in RO water (89.4%) (Table 2.1). Loss mechanisms unique to the extraction of snow include (a) partitioning to the complex and varied forms of particulate matter found in snow, (b) partitioning to the Teflon bags in which snow samples are contained, and (c) volatilization during extraction, which takes up to 4 hours. Note that the potential for volatilization from RO water was minimal because target analytes were spiked into a 1-L aliquot that was extracted before the remainder of the sample. Although the particulate matter and Teflon bags were thoroughly rinsed with all elution solvents and the headspace over the snow sample was minimized by closing the Teflon bag openings around the remote sampling tubes, the combination of effects from these different loss mechanisms likely caused reduced recovery in snow relative to that in RO water. The observed loss of target SOCs from snow, relative to RO water, does not diminish the usefulness of this method because of the use of appropriate surrogates to account for target SOC losses.

Atrazine desisopropyl, atrazine desethyl, and simazine were unique in that they were not recovered from snow (Figure 2.5). Results (data not shown) from silica-recovery experiments indicate that these three compounds are lost during the silica clean-up. While more-polar solvents can be used to elute these three compounds from silica, more-polar solvents also elute polar matrix interferences that hinder quantification by GC-MS. Thus, we chose to prioritize optimal silica clean-up capabilities but sacrifice the quantification of atrazine desisopropyl, atrazine desethyl, and simazine in snow. Note that these compounds were successfully recovered in RO water (Table 2.1) and measured in groundwater (see below and Figure 2.2) because silica clean-up was not needed.

Finally, we compared the target SOC recoveries using the modified Speedisk and 50-L RO water on a vacuum manifold and in-line with the Infiltrex 100 and found no statistical difference (two-sample t-test, $p<0.05$) between the two extractions. This provides evidence that the modified Speedisk performs identically, whether it is used in an Infiltrex 100 (*in situ* lake water extraction) or on a vacuum manifold (snow and groundwater extraction).

Sample-specific estimated method detection limits (MDLs) were determined for all target SOCs in snow, lake water, and groundwater samples. MDLs were calculated from EPA-method 8280A (*32*). Representative snow and lake water samples from Sequoia National Park were used to calculate MDLs. MDLs for groundwater were calculated using a local groundwater sample (see above). MDLs for individual SOCs in snow are shown in Figure 2.5. MDLs for lake water and groundwater samples were 0.5-385 and 0.4-240 pg/L, respectively, depending on the SOC. Estimated MDLs for lake water and groundwater were similar to the estimated MDLs for snow.

Application of Analytical Method

Snow and Lake Water Samples. A snow and lake water sample were collected from Lone Pine Lake catchment in Rocky Mountain National Park (ROMO) at 3024 m above sea level (masl) (40.22°N, 105.73°W) and analyzed for SOCs using this analytical method. The snow sample was collected in April 2003 and the lake water sample was collected and extracted *in situ* in September 2003. Both U.S. current-use (dacthal, triallate, endosulfan I, and endosulfan II) and historical-use pesticides (α-HCH, γ-HCH, dieldrin, cis, and trans-nonachlor) were measured in Lone Pine Lake snow and Lake water concentrations ranging from ~10 to 1500 pg/L (Figure 2.3). SOC concentrations measured in snow and lake water were field blank corrected.

All of the SOCs detected in the lake water were also detected in the snow pack, indicating the importance of atmospheric deposition (in this case, snow) as a major route of entry for SOCs into this high-elevation aquatic ecosystem. A larger number of SOCs were detected in snow and were measured at 2 to 10 times higher concentration than in the lake water. Lower lake water concentrations may be a result of SOCs undergoing volatilization, biological degradation, photolysis, dilution, outflow, and/or hydrolysis in the lake water over the course of the summer.

In snow, dacthal, a current use herbicide used on onions and broccoli (*33*), was measured in the highest concentration (~1500 pg/L) and roughly 34 times higher than the concentration measured in lake water (Figure 2.3). α-hexachlorocyclohexane (HCH) and γ-HCH were not detected in lake water, but were measured in snow at concentrations of 78.6 and 66.3 pg/L, respectively. Triallate a current-use herbicide was measured in higher concentrations in the lake water (53.2 pg/L) than in the snow (12.8 pg/l), possibly indicating additional atmospheric inputs to the lake after snowmelt.

In a similar study, dieldrin, endosulfan I, α-HCH, and γ-HCH were measured in snow from the Canada Rockies 1996 (*1*). The concentrations ranged from 50 to 700 pg/L over a 2330 m transect, with α/γ-HCH ratios ranging from 1.2 to 3.1 (*1*). These compounds were also measured in lake water collected from the Canadian Rockies in 1998 – 2000 at Bow Lake (1975 masl), average concentration ranging from 5.5 to 530 pg/L (*15*). In our 2003 samples the HCH concentrations measured in snow from ROMO were slightly lower and the α/γ-HCH ratios were ~1.2 (Figure 2.3). Also in our study, endosulfan I was measured in snow and lake water at 470 and 8.5 pg/L, respectively. These concentrations of endosulfan I in snow are similar to the measured concentrations in the Canadian Rockies (~490 pg/L) at similar elevations (3100 masl) (*1)*. Lake water concentrations of endosulfan I from our 2003 samples were also similar to concentration of Endosulfan I in Bow Lake from 1998-2000 which ranged from 5.7 to 19 pg/L (*15*).

However, in our study, dieldrin concentrations in lake water were ~10 times higher than the average concentrations at Bow Lake (15.8 pg/L) during 1998-2000 (*15*).

Groundwater samples. U.S. historic and current-use pesticides were measured in a local groundwater using the analytical method we developed and required no extract purification. The average surrogate recovery for triplicate ~40 L groundwater samples were: d_{10}-Fluorene 98.8%, d_{10}-Phenanthrene 96.4%, d_{10}-Pyrene 85.3%, d_{12}-Triphenylene 89.1%, d_{12}-Benzo[a]pyrene 97.6%, d_{12}-Benzo[ghi]perylene 87.3% , d_{14}-EPTC 90.8%, d_5-Atrazine 73.4%, d_{10}-Diazinon 126.3%, *d7*-Malathion 75.3%, d_{10}-Parathion 100.0%, d_8-p,p'-DDE 91.3%, d_8-p,p'-DDT 72.2%, d_6-Methyl Parathion 48.3%, d_{13}-Alachlor 81.6%, d_{11}-Acetochlor 84.7%, $^{13}C_{12}$-PCB 101, $^{13}C_{12}$-PCB 180, d_{10}-Chlorpyrifos 129.7%, $^{13}C_6$-HCB 110.9%, d_6-γ-HCH 104.0%, d_4-Endosulfan I 70.7%, d_4-Endosulfan II 52.7%, and d_{14}-Trifluralin 96.3%. Surrogate recoveries from groundwater were similar to target SOC recoveries in RO water (Table 2.1), providing further evidence that snow represents the worst-case scenario for SOC recoveries (Figure 2.5). Atrazine, a current-use herbicide, and atrazine desethyl, one of its degradation products, were measured at concentrations of 230 and 50 ng/L, respectively, in the groundwater (Figure 2.2). Other herbicides, including metribuzin, simazine, metolachlor, and triallate, were also measured. We were able to measure simazine and atrazine desethyl in groundwater because the silica clean-up procedure used to measure SOCs in snow was not needed (see above).

Atrazine, atrazine desethyl, simazine, and metolachlor were measured at high concentrations in the groundwater and are consistent with usage patterns around the well site. In the same drainage basin, these four agriculture herbicides were the most frequently detected compounds in 16 agricultural streams (*34*). The atrazine, simazine, and metolachlor concentrations we measured are consistent with measured concentrations of these compounds in over 2200 wells and springs throughout the U.S. (*35*).

Comparison to Other Methods

We have developed an analytical method for the trace analysis of a diverse list of 75 SOCs in ~50-L snow, lake water, and groundwater samples. This method was validated at lower concentrations and with a broader analyte list than previous methods for measuring SOCs in aqueous matrices. A previous SPE method that covered a fairly broad analyte list (41 pesticides and pesticide metabolites) used a C_{18} SPE device to extract 1-L aqueous samples (*27*). However, the target SOCs in this previous SPE method were only determined in the dissolved phase due to pre-filtering and MDLs (1 to 18 ng/L) were limited by a single non-polar sorbent and fairly low sample volumes (*27*). The previous SPE method's MDLs would not be low enough to measure SOCs in snow and lake water from high-elevation and high-latitude ecosystems (Figure 2.3). The previous SPE method, based on C_{18} SPE, is less suitable for measuring polar SOCs such as atrazine desisopropyl and atrazine desethyl (Figure 2.1) and resulted in recoveries for atrazine desethyl of 12% (*27)*. Our SPE method results in an average recovery, over the modified Speedisk, of 82% for atrazine desethyl and 89% for atrazine desisopropyl in 50-L of RO water. Our recoveries were determined at lower concentrations (6 ng/L) in roughly 50 times the sample volume than the previous SPE method.

The application of our method has been shown using a snow and lake water sample collected from ROMO. Our method has also been used to measure SOCs in groundwater samples, demonstrating its applicability to other aqueous matrices. This analytical method results in lower detection limits for a diverse analyte list, due to the use of more sensitive modes of MS ionization (EI and ECNI), increased sample volumes, and multiple sorbent types present in the same SPE device for increased extraction efficiency.

ACKNOWLEDGEMENTS

This work is part of WACAP (Western Airborne Contaminants Assessment Project), a collaborative venture between the National Park Service, the Environmental Protection Agency, the U.S. Geological Survey, Oregon State University, University of Washington, and the U.S.D.A. Forest Service. It was funded primarily through cooperative and interagency agreements with the National Park Service, and also included in-kind contributions from all of the project partners. Further information about WACAP can be found on the WACAP web site at: http://www2.nature.nps.gov/air/Studies/air_toxics/wacap.htm. This document has been subjected to appropriate institutional peer review and/or administrative review and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

This publication was made possible in part by grant number P30ES00210 from the National Institute of Environmental Health Sciences, NIH. Its contents are solely the responsibility of the authors and do not necessarily represent the official view of the NIEHS, NIH.

The authors would like to thank Don Campbell and crew at the U.S. Geological Survey for collecting the snow sample from Rocky Mountain National Park.

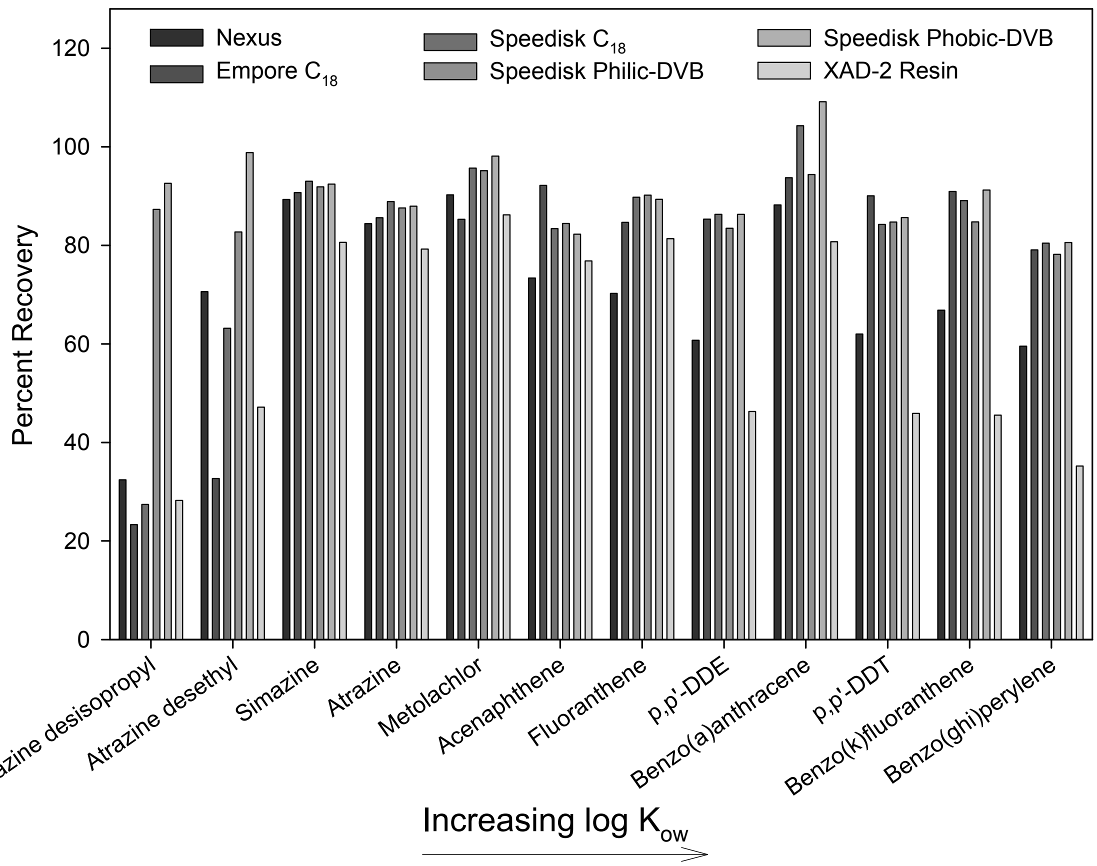


Figure 2.1. Comparison of a representative subset of the target analyte recoveries with different SPE technologies (n=1).

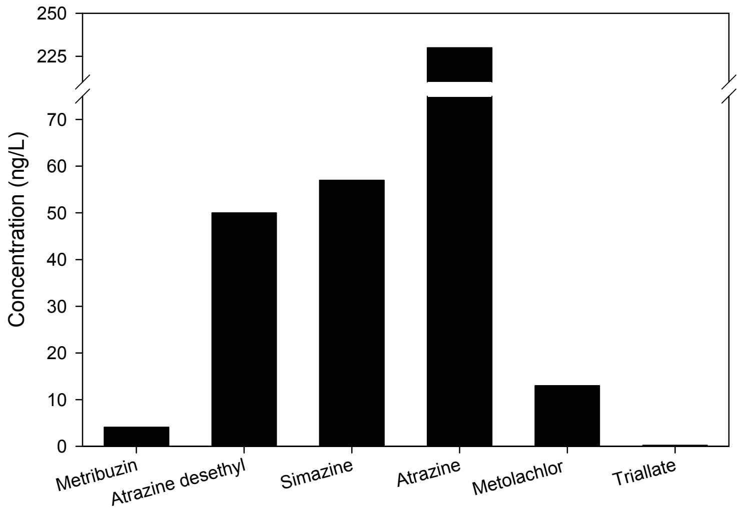


Figure 2.2. SOCs measured in groundwater.

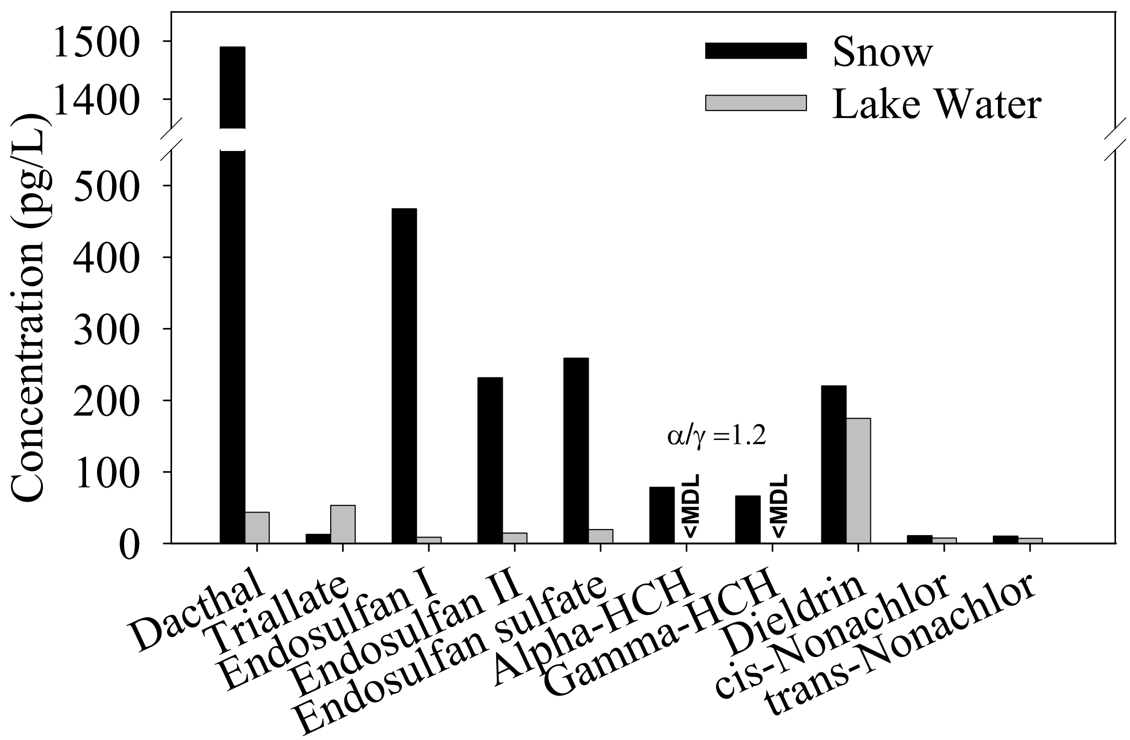


Figure 2.3. Concentrations of SOCs measured in snow and lake water collected from Lone Pine Lake catchment in Rocky Mtn. National Park.

Table 2.1. Recovery of target SOCs from reverse osmosis water using a modified Speedisk.

Chemical Class / Compounds	log K_{ow}	1 L RO Water[3] Avg. % Rec	1 L RO Water[3] Avg. % RSD	50 L RO Water[3] Avg. % Rec	50 L RO Water[3] Avg. % RSD
Amide Pesticides					
Propachlor[2]	2.4	110.2	7.0	111.3	1.9
Alachlor[2]	2.6	101.5	4.0	104.6	0.8
Acetochlor[2]	3.03[1]	96.9	2.9	102.4	2.7
Metolachlor[2]	3.1	109.9	4.8	114.7	1.0
Organochlorines Pesticides and Metabolites					
HCH, gamma[2,4]	3.8	99.2	3.5	103.5	1.0
HCH, alpha[2]	3.8	105.1	7.8	115.9	1.4
HCH, beta[2]	4.0	103.0	5.7	113.8	2.2
HCH, delta[2]	4.1	108.4	4.9	118.9	2.0
Methoxychlor[2]	4.5	127.7	21.3	158.8	2.4
Heptachlor epoxide[2]	4.6	57.5	19.2	72.1	6.3
Endrin aldehyde[2]	4.8	78.3	15.1	74.4	32.0
Endrin[2]	5.2	147.2	30.1	138.6	3.8
Heptachlor[2]	5.2	132.3	28.0	157.4	4.0
o,p'-DDE[2,5]	5.5	86.4	14.9	101.9	0.8
Chlordane, oxy[2]	5.5	55.1	21.7	71.8	4.2
Dieldrin[2]	5.5	100.8	12.6	74.5	3.5
Chlordane, cis[2]	5.9	44.5	18.4	60.6	3.3
p,p'-DDD[2,6]	5.9	105.1	20.8	122.0	3.7
Nonachlor, trans	6.1	49.4	14.1	66.3	2.6
o,p'-DDD[2]	6.1	91.5	18.3	110.1	2.0
Chlordane, trans	6.1	42.4	12.4	55.5	3.0
Nonachlor, cis[2]	6.4	62.5	18.8	75.7	1.4
Aldrin[2]	6.5	57.7	21.0	70.6	1.7
o,p'-DDT[7]	6.8	73.4	3.1	91.5	3.5
p,p'-DDE[2]	6.9	83.2	11.5	97.9	0.8
Mirex[2]	6.9	110.3	10.2	118.3	5.5
p,p'-DDT[2]	6.9	82.3	11.6	97.5	0.4
Organochlorine Sulfide Pesticides and Metabolites					
Endosulfan sulfate[2]	3.7	88.4	19.8	93.3	5.2
Endosulfan I[2]	4.7	55.8	17.8	69.0	6.8
Endosulfan II[2]	4.8	88.1	19.2	98.7	2.8
Phosphorothioate Pesticides					
Methyl parathion[2]	2.7	107.9	5.2	114.4	2.4
Malathion[2]	2.9	97.5	4.9	111.2	4.7
Diazinon[2]	3.7	100.9	9.5	114.5	3.0
Parathion[2]	3.8	97.3	7.3	106.1	4.1
Ethion[2]	5.1	99.6	24.4	115.4	3.8
Chlorpyrifos[2]	5.1	81.9	20.4	96.2	4.3
Thiocarbamate Pesticides					
EPTC[2]	3.2	100.6	1.3	104.2	1.9
Pebulate[2]	3.8	125.3	4.6	128.9	3.2
Triallate[2]	4.6	61.1	20.0	79.7	7.4

Chemical Class / Compounds	log K_{ow}	1 L RO Water[3] Avg. % Rec	1 L RO Water[3] Avg. % RSD	50 L RO Water[3] Avg. % Rec	50 L RO Water[3] Avg. % RSD
Triazine Herbicides and Metabolites					
Atrazine desisopropyl	1.36[1]	106.0	6.3	89.3	2.4
Atrazine desethyl	1.78[1]	62.8	7.3	82.8	2.7
Simazine[2]	2.2	115.2	3.6	117.8	0.6
Cyanazine[2]	2.2	60.5	10.9	62.7	4.6
Atrazine[2]	2.3	102.1	2.1	104.6	0.7
Prometon[2]	2.7	68.7	42.7	90.5	8.9
Miscellaneous Pesticides					
Metribuzin[2]	1.70[1]	86.3	14.7	96.1	4.3
Etridiazole[2]	2.6	124.6	4.1	127.7	2.0
Dacthal[2]	4.3	98.7	8.6	104.1	2.9
Trifluralin[2]	5.3	71.2	5.0	62.9	7.8
Hexachlorobenzene[2]	5.5	81.0	13.8	89.1	3.3
Polycyclic Aromatic Hydrocarbons					
Acenaphthylene[2]	3.9	60.3	9.0	63.8	10.9
Acenaphthene[2]	4.0	86.1	5.6	91.9	1.6
Fluorene[2]	4.2	96.9	0.4	102.2	2.5
Anthracene[2]	4.5	41.1	73.6	24.7	69.5
Phenanthrene	4.5	118.3	3.5	104.8	1.3
Pyrene[2]	5.1	84.5	8.6	89.3	1.3
Fluoranthene[2]	5.2	101.2	9.3	105.1	2.7
Chrysene + Triphenylene[2]	5.7	92.1	11.5	106.0	0.9
Benzo(a)anthracene[2]	5.9	76.7	22.3	76.8	20.1
Retene[2]	6.4	121.9	9.6	142.0	3.4
Benzo(k)fluoranthene[2]	6.5	84.6	11.8	100.8	5.3
Benzo(a)pyrene[2]	6.5	98.6	9.1	117.4	5.7
Benzo(b)fluoranthene[2]	6.6	99.9	14.2	117.2	7.4
Indeno(1,2,3-cd)pyrene[2]	6.7	87.9	15.7	103.4	0.5
Dibenz(a,h)anthracene[2]	6.8	102.4	9.4	113.2	2.7
Benzo(e)pyrene[2]	6.9	112.4	19.9	126.4	9.2
Benzo(ghi)perylene[2]	7.0	87.1	9.1	96.9	3.0
Polychlorinated Biphenyls					
PCB 74[2]	6.3	74.5	21.8	106.6	0.9
PCB 101[2]	6.4	66.2	22.3	95.1	1.2
PCB 138[2]	6.7	94.9	3.6	105.1	3.4
PCB 153[2]	6.9	99.3	4.3	110.0	3.5
PCB 118[2]	7.0	57.1	24.8	82.6	0.9
PCB 187[2]	7.2	80.5	5.3	88.5	3.5
PCB 183[2]	8.3	85.3	4.5	94.1	3.9
Average Recoveries and %RSD		89.4	13.1	99.0	4.8
Max		147.2	73.6	158.8	69.5
Min		41.1	0.4	24.7	0.4

[1]log K_{ow} estimated by Estimation Program Interface Suite. Note: All other log K_{ow} values were selected from reference 36-38.
[2]Recoveries not statistically different: two sided t-test ($p<0.01$).
[3]Recoveries were determined at 300 ng total of each compound (300 ng/L for 1 L experiment and 6 ng/L for 50 L experiment).
[4]Hexachlorocyclohexane
[5]Dichlorodiphenyldichloroethylene
[6]Dichlorodiphenyldichloroethane
[7]Dichlorodiphenyltrichloroethane

Table 2.2: SOC Instrument Detection Limits (IDLs).

Chemical Class Compounds	IDLs pg/µl	Instrumentation		IDLs pg/µl	Instrumentation
Amide Pesticides			***Triazine Herbicides and Metabolites***		
Propachlor	0.998	GC/EI-MS[1]	Atrazine desisopropyl	6.744	GC/EI-MS[1]
Alachlor	1.266	GC/EI-MS[1]	Atrazine desethyl	3.265	GC/EI-MS[1]
Acetochlor	0.805	GC/EI-MS[1]	Simazine	1.971	GC/EI-MS[1]
Metolachlor	0.527	GC/EI-MS[1]	Cyanazine	3.460	GC/EI-MS[1]
			Atrazine	1.371	GC/EI-MS[1]
Organochlorines Pesticides and Metabolites			Prometon[2]	3.169	GC/EI-MS[1]
HCH, gamma	0.649	GC/ECNI-MS[2]			
HCH, alpha	0.886	GC/ECNI-MS[2]	***Miscellaneous Pesticides***		
HCH, beta	1.085	GC/ECNI-MS[2]	Metribuzin	0.077	GC/ECNI-MS[2]
HCH, delta	0.716	GC/ECNI-MS[2]	Etridiazole	4.316	GC/EI-MS[1]
Methoxychlor	0.251	GC/EI-MS[1]	Dacthal	0.010	GC/ECNI-MS[2]
Heptachlor epoxide	0.516	GC/ECNI-MS[2]	Trifluralin	0.011	GC/ECNI-MS[2]
Endrin aldehyde	0.092	GC/ECNI-MS[2]	Hexachlorobenzene	0.024	GC/ECNI-MS[2]
Endrin	0.571	GC/ECNI-MS[2]			
Heptachlor	0.092	GC/ECNI-MS[2]	***Polycyclic Aromatic Hydrocarbons***		
o,p'-DDE	0.352	GC/EI-MS[1]	Acenaphthylene	0.206	GC/EI-MS[1]
Chlordane, oxy	0.131	GC/ECNI-MS[2]	Acenaphthene	0.173	GC/EI-MS[1]
Dieldrin	0.509	GC/ECNI-MS[2]	Fluorene	0.174	GC/EI-MS[1]
Chlordane, cis	0.107	GC/ECNI-MS[2]	Anthracene	0.365	GC/EI-MS[1]
p,p'-DDD	0.331	GC/EI-MS	Phenanthrene	0.185	GC/EI-MS[1]
Nonachlor, trans	0.028	GC/ECNI-MS[2]	Pyrene	0.084	GC/EI-MS[1]
o,p'-DDD	0.222	GC/EI-MS[1]	Fluoranthene	0.069	GC/EI-MS[1]
Chlordane, trans	0.029	GC/ECNI-MS[2]	Chrysene + Triphenylene	0.063	GC/EI-MS[1]
Nonachlor, cis	0.022	GC/ECNI-MS[2]	Benzo(a)anthracene[2]	0.104	GC/EI-MS[1]
Aldrin	0.098	GC/ECNI-MS[2]	Retene[2]	0.251	GC/EI-MS[1]
o,p'-DDT	0.652	GC/EI-MS[1]	Benzo(k)fluoranthene	0.172	GC/EI-MS[1]
p,p'-DDE	0.152	GC/EI-MS[1]	Benzo(a)pyrene	0.109	GC/EI-MS[1]
Mirex	0.102	GC/ECNI-MS[2]	Benzo(b)fluoranthene	0.151	GC/EI-MS[1]
p,p'-DDT	1.202	GC/EI-MS[1]	Indeno(1,2,3-cd)pyrene	0.152	GC/EI-MS[1]
			Dibenz(a,h)anthracene	0.272	GC/EI-MS[1]
Organochlorine Sulfide Pesticides and Metabolites			Benzo(e)pyrene	0.247	GC/EI-MS[1]
Endosulfan sulfate	0.034	GC/ECNI-MS[2]	Benzo(ghi)perylene	0.116	GC/EI-MS[1]
Endosulfan I	0.041	GC/ECNI-MS[2]			
Endosulfan II	0.036	GC/ECNI-MS[2]	***Polychlorinated Biphenyls***		
			PCB 74	0.730	GC/ECNI-MS[2]
Phosphorothioate Pesticides			PCB 101	0.269	GC/ECNI-MS[2]
Methyl parathion	3.650	GC/EI-MS[1]	PCB 138	0.019	GC/ECNI-MS[2]
Malathion	1.163	GC/EI-MS[1]	PCB 153	0.016	GC/ECNI-MS[2]
Diazinon	0.837	GC/EI-MS[1]	PCB 118	0.011	GC/ECNI-MS[2]
Parathion	2.852	GC/EI-MS[1]	PCB 187	0.016	GC/ECNI-MS[2]
Ethion	0.946	GC/EI-MS[1]	PCB 183	0.014	GC/ECNI-MS[2]
Chlorpyrifos	0.087	GC/ECNI-MS[2]			
Thiocarbamate Pesticides			***Average IDLs***	0.745	
EPTC	1.910	GC/EI-MS[1]			
Pebulate	1.913	GC/EI-MS[1]	Max	6.744	
Triallate	0.915	GC/ECNI-MS[2]	Min	0.010	

[1]Gas Chromatographic Mass Spectrometry with Election Impact Ionization
[2]Gas Chromatographic Mass Spectrometry with Electron Capture Negative Ionization

Table 2.3. Quantitation information for each SOC analyzed using Electron Impact Ionization including selective ion monitoring (SIM) windows.

Analyte	Retention Time (min)	Quantitation Ion (m/z)	Confirmation Ion (m/z)	Confirmation Ion (m/z)	Quantitation Compound
SIM Window 1					
d_{14}-EPTC	15.13	142	203		d_{10}-Acenaphthene
EPTC	15.33	128.1	132.1	189.1	d_{14}-EPTC
SIM Window 2					
Etridiazole	17.37	210.9	212.9	182.9	d_{14}-EPTC
SIM Window 3					
Acenaphthylene	17.50	152.1	151.1	76	d_{10}-Fluorene
Pebulate	17.58	128.1	203.1	161.1	d_{14}-EPTC
SIM Window 4					
d_{10}-Acenaphthene	18.06	164	162		Internal Standard
Acenaphthene	18.18	154.1	153.1	152.1	d_{10}-Fluorene
SIM Window 5					
Fluorene-$_{d10}$	20.12	176	174		d_{10}-Acenaphthene
Fluorene	20.22	166.1	165.1	163.1	d_{10}-Fluorene
SIM Window 6					
Propachlor	20.55	120.1	176.1	93.1	d_5-Atrazine
SIM Window 7					
Atrazine desisopropyl	21.59	173	175	158	d_5-Atrazine
Atrazine desethyl	21.74	172	174	187.1	d_5-Atrazine
SIM Window 8					
d_{10}-Phorate	22.00	131	270		d_{10}-Acenaphthene
Phorate	22.14	260.1	231	121.1	d_{10}-Phorate
SIM Window 9					
Demeton-S	22.79	88	170	258.1	d_{10}-Phorate
SIM Window 10					
Prometon	23.12	210.1	225.2	183.1	d_5-Atrazine
Carbofuran	23.13	164.1	149.1	131	d_5-Atrazine
Simazine	23.19	201.1	203.1	186.1	d_5-Atrazine
d_5-Atrazine	23.24	205	220		d_{10}-Acenaphthene
Atrazine	23.31	200.1	202.1	215.1	d_5-Atrazine

SIM Window 11					
d_{10}-Diazinon	23.80	314	138		d_{10}-Acenaphthene
d_{10}-Phenanthrene	23.86	188	189		d_{10}-Acenaphthene
Phenanthrene	23.93	178.1	176.1	179.1	d_{10}-Phenanthrene
Diazinon	23.93	179.1	199.1	304.1	d_{10}-Diazinon
Anthracene	24.14	178.1	176.1	179.1	d_{10}-Phenanthrene
Disulfoton	24.20	88.1	89.1	186	d_{10}-Diazinon
SIM Window 12					
Triallate	24.45	268	270	86.1	d_7-Malathion
SIM Window 13					
d_{11}-Acetochlor	25.27	173	245		d_{10}-Fluoranthene
Acetochlor	25.40	146.1	162.1	223.1	d_{11}-Acetochlor
SIM Window 14					
d_{13}-Alachlor	25.53	200	251		d_{10}-Fluoranthene
d_6-Methyl parathion	25.65	269	115		d_{10}-Fluoranthene
Alachlor	25.69	188.1	160.1	237.1	d_{13}-Alachlor
Methyl parathion	25.72	263	125	109	d_6-Methyl parathion
SIM Window 15					
Carbaryl	25.99	144.1	115.1	116.1	d_7-Malathion
SIM Window 16					
d_7-Malathion	26.77	174	131		d_{10}-Fluoranthene
Malathion	26.85	173.1	158	127	d_7-Malathion
Metolachlor	26.91	162.1	238.1	240.1	d_{13}-Alachlor
SIM Window 17					
d_{10}-Parathion	27.16	115			d_{10}-Fluoranthene
Parathion	27.29	291	155	109	d_{10}-Parathion
Cyanazine	27.36	225.1	227.1	240.1	d_5-Atrazine
SIM Window 18					
d_{10}-Fluoranthene	28.52	212	213		Internal Standard
Fluoranthene	28.59	202.1	200.1	203.1	d_{10}-Pyrene
SIM Window 19					
o,p' DDE[1]	29.18	318	316	320	d_8-p,p'-DDE
SIM Window 20					
d_{10}-Pyrene	29.36	212	213		d_{10}-Fluoranthene

Pyrene	29.43	202.1	203.1	200.1	d_{10}-Pyrene
SIM Window 21					
d_8-p,p'-DDE	30.13	326	324		d_{10}-Fluoranthene
p,p' DDE	30.18	317.9	315.9	319.9	d_8-p,p'-DDE
o,p' DDD[2]	30.41	235	237	165.1	d_8-p,p'-DDE
SIM Window 22					
Retene	30.76	219.1	234.2	204.1	d_{10}-Pyrene
SIM Window 23					
Ethion	31.51	231	384	153	d_{10}-Parathion
p,p' DDD	31.52	235	237	165.1	d_8-p,p'-DDE
o,p' DDT[3]	31.58	235	237	165.1	d_8-p,p'-DDT
d_8-p,p'-DDT	32.58	243	245		d_{12}-Benzo(k)fluoranthene
p,p' DDT	32.65	235	237	165.1	d_8-p,p'-DDT
SIM Window 24					
d_{12}-Triphenylene	34.17	240	241		d_{12}-Benzo(k)fluoranthene
Benzo(a)anthracene	34.19	228.1	226.1	229.1	d_{12}-Triphenylene
Chrysene+Triphenylene	34.28	228.1	226.1	229.1	d_{12}-Triphenylene
Methoxychlor	34.39	227.1	228.1	274.1	d_8-p,p'-DDT
SIM Window 25					
Benzo(b)fluoranthene	38.11	252.1	250.1	253.1	d_{12}-Benzo(a)pyrene
d_{12}-Benzo(k)fluoranthene	38.13	264	265		Internal Standard
Benzo(k)fluoranthene	38.20	252.1	250.1	253.1	d_{12}-Benzo(a)pyrene
Benz(e)pyrene	39.00	252.1	250.1	253.1	d_{12}-Benzo(a)pyrene
d_{12}-Benzo(a)pyrene	39.10	264	265		d_{12}-Benzo(k)fluoranthene
Benzo(a)pyrene	39.18	252.1	250.1	253.1	d_{12}-Benzo(a)pyrene
SIM Window 26					
Indeno(1,2,3-cd)pyrene	42.62	276.1	274.1	277.1	d_{12}-Benzo(ghi)perylene
Dibenz(a,h)anthracene	42.75	278.1	276.1	279.1	d_{12}-Benzo(ghi)perylene
SIM Window 27					
d_{12}-Benzo(ghi)perylene	43.34	288	289		d_{12}-Benzo(k)fluoranthene
Benzo(ghi)perylene	43.42	276.1	274.1	277.1	d_{12}-Benzo(ghi)perylene

---

[1]Dichlorodiphenyldichloroethylene
[2]Dichlorodiphenyldichloroethane
[3]Dichlorodiphenyltrichloroethane

Table 2.4. Quantitation information for each SOC analyzed using Electron Capture Negative Ionization including selective ion monitoring (SIM) windows.

Analyte	Retention Time (min)	Quantitation Ion (m/z)	Confirmation Ion (m/z)	Confirmation Ion (m/z)	Quantitation Compound
SIM Window 1					
d_6-Trifluralin	13.69	349.2	350.2	319.2	$^{13}C_{12}$-PCB #138
Trifluralin	13.90	335.1	336.1	305.1	d_6-Trifluralin
SIM Window 2					
HCH, alpha[1]	14.61	71.0	73.0	70.0	d_6-gamma-HCH
$^{13}C_6$-Hexachlorobenzene	14.69	291.8	293.8	289.9	$^{13}C_{12}$-PCB #138
Hexachlorobenzene	14.70	283.8	285.8	281.8	$^{13}C_6$-Hexachlorobenzene
HCH, beta	15.94	71.0	73.0	70.0	d_6-gamma-HCH
d_6-gamma-HCH	16.01	72.0	74.0	263.0	$^{13}C_{12}$-PCB #138
HCH, gamma	16.19	71.0	73.0	70.0	d_6-gamma-HCH
SIM Window 3					
Chlorothalonil	17.18	266.0	268.0	264.0	d_6-gamma-HCH
HCH, delta	17.70	71.0	252.9	254.9	d_6-gamma-HCH
Triallate	17.72	160.0	161.1		d_6-gamma-HCH
SIM Window 4					
Metribuzin	19.15	198.0	199.1	184.0	d_6-gamma-HCH
Heptachlor	19.61	266.0	268.0	299.9	d_6-gamma-HCH
SIM Window 5					
Chlorpyrifos oxon	21.14	297.0	298.0	299.0	d_{10}-Chlorpyrifos
d_{10}-Chlorpyrifos	21.19	322.0	324.0	213.9	$^{13}C_{12}$-PCB #138
Aldrin	21.24	237.0	238.8	329.9	d_6-gamma-HCH
Chlorpyrifos	21.37	313.0	315.0	213.9	d_{10}-Chlorpyrifos
Dacthal	21.54	332.0	330.0	334.0	d_6-gamma-HCH
SIM Window 6					
Chlordane, oxy	23.12	424.0	426.0	352.0	d_4-Endosulfan I
Heptachlor epoxide	23.13	390.0	388.0	392.0	d_4-Endosulfan I
PCB # 74[2]	23.28	292.0	294.0	290.0	$^{13}C_{12}$-PCB #101

SIM Window 7					
Chlordane, trans	24.26	409.9	407.9	411.8	d_4-Endosulfan I
$^{13}C_{12}$-PCB #101	24.68	338.0	336.0	340.0	$^{13}C_{12}$-PCB #138
PCB # 101	24.69	326.0	328.0	324.0	$^{13}C_{12}$-PCB #101
d_4-Endosulfan I	24.72	378.0	376.0	374.0	$^{13}C_{12}$-PCB #138
Endosulfan I	24.82	403.9	371.9	369.9	d_4-Endosulfan I
Chlordane, cis	24.83	266.0	264.0	268.0	d_4-Endosulfan I
Nonachlor, trans	24.98	443.8	445.8	441.8	d_4-Endosulfan I
SIM Window 8					
Dieldrin	26.07	345.9	347.9	379.9	d_4-Endosulfan I
Endrin	27.00	345.9	347.9	379.9	d_4-Endosulfan II
SIM Window 9					
PCB # 118	27.51	326.0	328.0	324.0	$^{13}C_{12}$-PCB #101
d_4-Endosulfan II	27.48	412.0	414.0	410.0	$^{13}C_{12}$-PCB #138
Endosulfan II	27.56	405.9	407.9	371.9	d_4-Endosulfan II
Nonachlor, cis	27.79	443.8	445.8	441.8	d_4-Endosulfan II
SIM Window 10					
Endrin aldehyde	28.24	379.9	381.9	345.9	d_4-Endosulfan II
PCB # 153	28.48	360.0	362.0	358.0	$^{13}C_{12}$-PCB #180
SIM Window 11					
Endosulfan sulfate	29.33	385.9	387.9	421.8	d_4-Endosulfan II
PCB # 138	29.65	360.0	362.0	358.0	$^{13}C_{12}$-PCB #180
$^{13}C_{12}$-PCB #138	29.65	372.0	374.0	370.0	Internal Standard
SIM Window 12					
PCB # 187	30.29	393.9	359.9	397.9	$^{13}C_{12}$-PCB #180
PCB # 183	30.54	393.9	359.9	397.9	$^{13}C_{12}$-PCB #180
$^{13}C_{12}$-PCB #180	32.60	405.9	407.9	409.9	$^{13}C_{12}$-PCB #138
Mirex	34.10	367.8	369.8	403.8	$^{13}C_{12}$-PCB #180

[1]Hexachlorocyclohexane
[2]Polychlorinated Biphenyls

Figure 2.5: Recovery of target SOCs from melted snow using the modified Speedisk.

Chemical Class Compounds	log K_{ow}	50 L Melted Snow[2] Avg. % Rec	Avg. % RSD	MDL[3] pg/L
Amide Pesticides				
Propachlor	2.4	139.5	19.5	3.7
Alachlor	2.6	79.7	1.0	43.4
Acetochlor	3.03[1]	65.6	6.9	25.2
Metolachlor	3.1	89.0	1.4	13.8
Organochlorines Pesticides and Metabolites				
HCH, gamma	3.8	87.9	6.3	12.3
HCH, alpha	3.8	71.7	7.4	18.2
HCH, beta	4.0	100.7	7.2	32.1
HCH, delta	4.1	111.8	5.2	20.7
Methoxychlor	4.5	59.1	20.9	16.4
Heptachlor epoxide	4.6	31.8	32.0	14.7
Endrin aldehyde	4.8	40.6	13.8	23.2
Endrin	5.2	90.2	26.8	47.6
Heptachlor	5.2	49.9	19.6	121.7
o,p'-DDE	5.5	55.3	12.9	24.7
Chlordane, oxy	5.5	28.1	31.5	9.4
Dieldrin	5.5	109.1	23.5	105.6
Chlordane, cis	5.9	32.7	29.1	16.3
p,p'-DDD	5.9	66.5	14.6	44.0
Nonachlor, trans	6.1	56.4	16.7	0.9
o,p'-DDD	6.1	41.5	25.7	24.7
Chlordane, trans	6.1	60.9	15.3	0.4
Nonachlor, cis	6.1	30.2	27.3	0.6
Aldrin	6.4	43.7	25.9	107.6
o,p'-DDT	6.5	36.4	5.6	23.4
p,p'-DDE	6.8	50.1	19.6	10.3
Mirex	6.9	51.5	10.6	27.1
p,p'-DDT	6.9	61.9	24.3	26.2
Organochlorine Sulfides and Metabolites				
Endosulfan sulfate	3.7	65.4	17.3	1.0
Endosulfan I	4.7	51.3	17.7	4.9
Endosulfan II	4.8	53.3	18.1	2.0
Phosphorothioate Pesticides				
Methyl parathion	2.7	74.6	1.0	52.0
Malathion	2.9	54.8	13.6	8.4
Diazinon	3.7	75.0	11.7	9.1
Parathion	3.8	56.9	9.6	3.2
Ethion	5.1	46.7	30.0	6.2
Chlorpyrifos	5.1	59.7	22.5	6.9
Thiocarbamate Pesticides				
EPTC	3.2	64.8	25.2	45.0
Pebulate	3.8	99.9	33.2	63.8
Triallate	4.6	73.6	18.5	10.1

Chemical Class Compounds	log K_{ow}	50 L Melted Snow[2] Avg. % Rec	Avg. % RSD	MDL[3] pg/L
Triazine Herbicides and Metabolites				
Atrazine desisopropyl	1.36[1]	nd[5]	nd[5]	na[6]
Atrazine desethyl	1.78[1]	nd[5]	nd[5]	na[6]
Simazine	2.2	nd[5]	nd[5]	na[6]
Cyanazine	2.2	107.8	2.3	26.2
Atrazine	2.3	105.8	4.2	11.5
Prometon	2.7	62.8	15.6	34.6
Miscellaneous Pesticides				
Metribuzin	1.70[1]	77.4	2.1	24.5
Etridiazole	2.6	206.2	26.1	22.5
Dacthal	4.3	109.9	10.5	1.7
Trifluralin	5.3	47.6	30.2	0.7
Hexachlorobenzene	5.5	55.3	14.6	0.2
Polycyclic Aromatic Hydrocarbons				
Acenaphthylene	3.9	52.7	1.8	19.8
Acenaphthene	4.0	101.3	2.1	11.3
Fluorene	4.2	93.2	4.7	8.3
Anthracene	4.5	73.0	7.3	19.9
Phenanthrene	4.5	82.7	5.1	8.8
Pyrene	5.1	74.4	10.5	4.9
Fluoranthene	5.2	77.9	10.7	4.0
Chrysene + Triphenylene	5.7	71.2	11.2	13.3
Benzo(a)anthracene	5.9	70.5	11.1	14.6
Retene	6.4	61.0	4.0	33.4
Benzo(k)fluoranthene	6.5	66.7	10.3	5.0
Benzo(a)pyrene	6.5	59.3	10.9	7.9
Benzo(b)fluoranthene	6.6	68.4	11.4	6.9
Indeno(1,2,3-cd)pyrene	6.7	61.5	9.1	31.5
Dibenz(a,h)anthracene	6.8	62.9	8.5	28.9
Benzo(e)pyrene	6.9	59.3	10.9	8.9
Benzo(ghi)perylene	7.0	59.2	9.4	16.5
Polychlorinated Biphenyls (PCBs)				
PCB 74	6.3	45.5	23.2	124.8
PCB 101	6.4	48.5	21.4	31.0
PCB 138	6.7	53.3	18.1	2.8
PCB 153	6.9	51.3	17.7	1.3
PCB 118	7.0	52.8	21.8	1.3
PCB 187	7.2	56.0	18.1	0.9
PCB 183	8.3	55.1	17.8	1.2
Average Recoveries and Standard Deviations[4]				
Average		68.3	14.8	21.9
Max		206.2	33.2	124.8
Min		28.1	1.0	0.2

[1]log K_{ow} estimated by Estimation Program Interface Suite. Note: All other log K_{ow} values were selected from reference 36-38.
[2]Recoveries validated at 6 ng/L
[3]Sample-Specific Estimated Method Detection Limits
[4]Average recoveries and standard deviations do not include compounds that were not detected or not applicable
[5]Not Detected
[6]Not Applicable

LITERATURE CITED:

(1) Blais, J. M.; Schindler, D. W.; Muir, D. C. G.; Kimpe, L. E.; Donald, D. B.; Rosenberg, B. Accumulation of persistent organochlorine compounds in mountains of western Canada. *Nature* **1998**, *395*, 585-588.

(2) Grimalt, J. O.; Fernandez, P.; Berdie, L.; Vilanova, R. M.; Catalan, J.; Psenner, R.; Hofer, R.; Appleby, P. G.; Rosseland, B. O.; Lien, L.; Massabuau, J. C.; Battarbee, R. W. Selective trapping of organochlorine compounds in mountain lakes of temperate areas. *Environ. Sci. Technol.* **2001**, *35*, 2690-2697.

(3) Vilanova, R.; Fernandez, P.; Martinez, C.; Grimalt, J. O. Organochlorine pollutants in remote mountain lake waters. *J. Environ. Qual.* **2001**, *30*, 1286-1295.

(4) Vilanova, R. M.; Fernandez, P.; Martinez, C.; Grimalt, J. O. Polycyclic aromatic hydrocarbons in remote mountain lake waters. *Water Res.* **2001**, *35*, 3916-3926.

(5) Daly, G. L.; Wania, F. Organic Contaminants in Mountains. *Environ. Sci. Technol.* **2005**, *39*, 385-398.

(6) Fellin, P.; Barrie, L. A.; Dougherty, D.; Toom, D.; Muir, D.; Grift, N.; Lockhart, L.; Billeck, B. Air monitoring in the arctic: Results for selected persistent organic pollutants for 1992. *Environ. Toxicol. Chem.* **1996**, *15*, 253-261.

(7) Gregor, D. J.; Gummer, W. D. Evidence of atmospheric transport and deposition of organochlorine pesticides and polychlorinated biphenyls in Canadian Arctic snow. *Environ. Sci. Technol.* **1989**, *23*, 561-565.

(8) Simonich, S. L.; Hites, R. A. Global distribution of persistent organochlorine compounds. *Science* **1995**, *269*, 1851-1854.

(9) Helm, P. A.; Diamond, M. L.; Semkin, R.; Strachan, W. M. J.; Teixeira, C.; Gregor, D. A mass balance model describing multiyear fate of organochlorine compounds in a high Arctic lake. *Environ. Sci. Technol.* **2002**, *36*, 996-1003.

(10) Wania, F.; Mackay, D. Global fractionation and cold condensation of low volatility organo-chlorine compounds in polar regions. *Ambio* **1993**, *22*, 10-12.

(11) Wania, F. On the origin of elevated levels of persistent chemicals in the environment. *Environ. Sci. Pollut. Res.* **1999**, *6*, 11-19.

(12) Franz, T. P.; Eisenreich, S. J.; Holsen, T. M. Dry deposition of particulate polychlorinated biphenyls and polycyclic aromatic hydrocarbons to Lake Michigan. *Environ. Sci. Technol.* **1998**, *32*, 3681-3688.

(13) Wania, F.; Mackay, D.; Hoff, J. T. The importance of snow scavenging of polychlorinated biphenyl and polycyclic aromatic hydrocarbon vapors. *Environ. Sci. Technol.* **1999**, *33*, 195-197.

(14) Franz, T. P.; Eisenreich, S. J. Snow scavenging of polychlorinated biphenyls and polycyclic aromatic hydrocarbons in Minnesota. *Environ. Sci. Technol.* **1998**, *32*, 1771-1778.

(15) Wilkinson, A. C.; Kimpe, L. E.; Blais, J. M. Air-water gas exchange of chlorinated pesticides in four lakes spanning a 1,205 meter elevation range in the Canadian Rocky Mountains. *Environ. Toxicol. Chem.* **2005**, *24*, 61–69.

(16) LeNoir, J. S.; McConnell, L. L.; Fellers, G. M.; Cahill, T. M.; Seiber, J. N. Summertime transport of current-use pesticides from California's Central Valley to the Sierra Nevada Mountain Range, USA. *Environ. Toxicol. Chem.* **1999**, *18*, 2715-2722.

(17) Landers, D. H.; Simonich, S. L.; Campbell, D. H.; Erway, M. M.; Geiser, L.; Jaffe, D.; Kent, M.; Schreck, C.; Blett, T.; Taylor, H. E. Western Airborne Contaminants Assessment Project Research Plan. **2003**, *Western Airborne Contaminants Assessment Project Research Plan. EPA/600/R-03/035. U.S. EPA, ORD, NHEERL, WED, Corvallis, OR(www2.nature.nps.gov/air/Studies/air_toxics/wacap.htm)*.

(18) Catalan, J.; Ventura, M.; Vives, I.; Grimalt, J. O. The Roles of Food and Water in the Bioaccumulation of Organochlorine Compounds in High Mountain Lake Fish. *Environ. Sci. Technol.* **2004**, *38*, 4269-4275.

(19) Kidd, K.; Bootsma, H.; Hesslein, R.; Muir, D. C. G.; Hecky, R. Biomagnification of DDT through the Benthic and Pelagic Food Webs of Lake Malawi, East Africa: Importance of Trophic Level and Carbon Source. *Environ. Sci. Technol.* **2001**, *35*, 14-20.

(20) Carrera, G.; Fernandez, P.; Vilanova, R. M.; Grimalt, J. O. Persistent organic pollutants in snow from European high mountain areas. *Atmos. Environ.* **2001**, *35*, 245-254.

(21) Carrera, G.; Fernandez, P.; Grimalt, J. O.; Ventura, M.; Camarero, L.; Catalan, J.; Nickus, U.; Thies, H.; Psenner, R. Atmospheric deposition of organochlorine

compounds to remote high mountain lakes of Europe. *Environ. Sci. Technol.* **2002**, *36*, 2581-2588.

(22) Fernandez, P.; Grimalt, J. O.; Vilanova, R. M. Atmospheric gas-particle partitioning of polycyclic aromatic hydrocarbons in high mountain regions of Europe. *Environ. Sci. Technol.* **2002**, *36*, 1162-1168.

(23) Fernandez, P.; Vilanova, R. M.; Grimalt, J. O. Sediment fluxes of polycyclic aromatic hydrocarbons in European high altitude mountain lakes. *Environ. Sci. Technol.* **1999**, *33*, 3716-3722.

(24) Vilanova, R. M.; Fernandez, P.; Grimalt, J. O. Polychlorinated biphenyl partitioning in the waters of a remote mountain lake. *Sci. Total Environ.* **2001**, *279*, 51-62.

(25) McConnell, L. L.; LeNoir, J. S.; Datta, S.; Seiber, J. N. Wet deposition of current-use pesticides in the Sierra Nevada mountain range, California, USA. *Environ. Toxicol. Chem.* **1998**, *17*, 1908-1916.

(26) Helm, P. A.; Diamond, M. L.; Semkin, R.; Bidleman, T. F. Degradation as a loss mechanism in the fate of alpha- hexachlorocyelohexane in arctic watersheds. *Environ. Sci. Technol.* **2000**, *34*, 812-818.

(27) Zuagg, S. D.; Sandstrom, M. W.; Smith, S. G.; Fehlberg, K. M. "Methods of analysis by the U.S. Geological Survey National Water Quality Laboratory--Determination of pesticides in water by C-18 solid-phase extraction and capillary-column gas chromatography/mass spectrometry with selected-ion monitoring," U.S. Geological Survey Open-File Report 95-181, 1995.

(28) Simonich, S. L.; Begley, W. M.; Debaere, G.; Eckhoff, W. S. Trace analysis of fragrance materials in wastewater and treated wastewater. *Environ. Sci. Technol.* **2000**, *34*, 959-965.

(29) Simonich, S. L.; Federle, T. W.; Eckhoff, W. S.; Rottiers, A.; Webb, S.; Sabaliunas, D.; De Wolf, W. Removal of fragrance materials during US and European wastewater treatment. *Environ. Sci. Technol.* **2002**, *36*, 2839-2847.

(30) Mallinchkrodt Baker. http://www.jtbaker.com/ **2005**.

(31) VarianInc. Abselut Nexus Instruction Guide. www.varianinc.com.

(32) Method-8280A, E. P. A. The analysis of polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans by high resolution gas chromatography/low

resolution mass spectrometry (HRGC/LRMS). http://www.epa.gov/epaoswer/hazwaste/test/pdfs/8280a.pdf.

(33) USGS Annual Use Maps. http://ca.water.usgs.gov/pnsp/use92/ **1998**.

(34) Anderson, C. W.; Wood, T. M.; Morace, J. L. Distribution of Dissolved Pesticides and Other Water Quality Constituents in Small Streams, and their Relation to Land Use, in the Willamette River Basin, Oregon,. *U.S. Geological Survey, Water-Resources Investigations* **1996**, *Report 97–4268*.

(35) Barbash, J. E.; Thelin, G. P.; Kolpin, D. W.; Gilliom, R. J. Major Herbicides in Ground Water: Results from the National Water-Quality Assessment. *J. Environ. Qual.* **2001**, *30*, 831-845.

(36) Mackay, D.; Shiu, W.-Y.; Ma, K.-C. *Illustrated Handbook of Physical-Chemical Properties and Environmental Fate for Organic Chemicals (Monoaromatic Hydrocarbons, Chlorobenzenes, and PCBs)*; CRC Press LLC Lewis Publishers: New York, 1992; Vol. 1.

(37) Mackay, D.; Shiu, W.-Y.; Ma, K.-C. *Illustrated Handbook of Physical-Chemical Properties and Environmental Fate for Organic Chemicals (PAHs, PCDD, and PCDFs)*; CRC Press LLC Lewis Publishers: New York, 1992; Vol. 2.

(38) Mackay, D.; Shiu, W.-Y.; Ma, K.-C. *Illustrated Handbook of Physical-Chemical Properties and Environmental Fate for Organic Chemicals (Pesticides Chemical)*; CRC Press LLC Lewis Publishers: New York, 1997; Vol. Volume 5.

CHAPTER 3. CURRENT AND HISTORICAL DEPOSITION OF PBDES, PESTICIDES, PCBS, AND PAHS TO ROCKY MOUNTAIN NATIONAL PARK, USA: DOES THE CONTINENTAL DIVIDE MAKE A DIFFERENCE?

SASCHA USENKO[†], DIXON H. LANDERS[§], PETER G. APPLEBY[⊥]
, AND STACI L. SIMONICH[†,‡]

[†]Department of Chemistry, [‡]Department of Environmental & Molecular Toxicology, Oregon State University, Corvallis, Oregon 97331

[§]United States Environmental Protection Agency-Western Ecology Division, Corvallis, OR 97333, USA

[⊥]Environmental Radioactivity Research Centre, University of Liverpool, Liverpool L69 3BX, UK

ABSTRACT

An analytical method was developed for the trace analysis of 98 semi-volatile organic compounds (SOCs) in remote, high elevation lake sediment. Sediment cores from Lone Pine Lake (West of the Continental Divide) and Mills Lake (East of the Continental Divide) in Rocky Mountain National Park (ROMO), CO were dated using ^{210}Pb and analyzed for polybrominated diphenyl ethers (PBDEs), organochlorine pesticides, phosphorothioate pesticides, thiocarbamate pesticides, amide herbicides, triazine herbicides, polychlorinated biphenyls (PCBs), and polycyclic aromatic hydrocarbons (PAHs) using this method. SOC historical deposition profiles were reconstructed for U.S. historic-use pesticides (HUPs) and current-use pesticides (CUPs), as well as PBDEs, PCBs, and PAHs. Sediment records indicate that the deposition of CUPs has increased in recent years, while the deposition of HUPs increased after introduction into U.S. and decreased after U.S. restriction. However, the deposition of HUPs in recent years (surficial sediment) has not yet reached zero due to the revolatilization of HUPs from soils, atmospheric transport and deposition. Differences in the magnitude of SOC sediment fluxes, flux profiles, time trends within those profiles, and isomeric ratios suggest that SOC deposition in ROMO is dependent on regional upslope wind directions and the location of regional sources (East vs. West of the Continental Divide).

INTRODUCTION

Semi-volatile organic compounds (SOCs) are ubiquitous throughout the environment due to anthropogenic activities and have the potential to accumulate in polar and mountainous regions (*1-8*). In mountainous regions, diurnal winds have the potential to transport SOCs from lower elevation source regions to higher elevations (*3*). The U.S. Environmental Protection Agency has also classified certain SOCs as being persistent, bioaccumulative, and toxic (PBT) chemicals (*9*). Due to the potential for transport and deposition of these PBT SOCs to sensitive remote ecosystems, the Western Airborne Contaminant Assessment Project (WACAP) was developed to study the atmospheric deposition of SOCs to high-elevation and high-latitude lake catchments in eight national parks throughout the western U.S. from 2002-2007 (*10*).

Hageman et al. (*7*) showed that regional cropland intensity within a 150 km radius of western national parks, including Rocky Mountain National Park (ROMO), is significantly correlated with log snowpack concentrations of dacthal, ΣEndosulfan (endosulfan I, II, and endosulfan sulfate), γ-HCH, and dieldrin. The same study estimated that 50% to 98% of the pesticides in ROMO 2002-2003 snowpack was due to regional sources (*7*). This was attributed to revolatilization of pesticides from soils, atmospheric transport, and deposition.

Westerly winds predominate in the Colorado Rocky Mountains (*11*). However, evidence of significant atmospheric deposition of nitrogen, in the form of NO_x and NH_3, has been shown to originate from fossil fuel combustion and agriculture sources in major metropolitan areas <150 km east of ROMO (Denver, Boulder, and Fort Collins), and are linked to diurnal mountain winds during the summer (*11*). In the atmosphere NO_x and NH_3 can be converted to NO_3^- and NH_4^+, respectively (*11*). Snow samples collected from 1992-1997 on both sides of the Continental Divide did not show significant differences in NH_4^+ concentrations. (*12*). This same study found that NO_3^- and SO_4^{2-} concentrations were statistically higher on the west side of the Continental Divide (*12*).

Lake sediments preserve the chronology of SOC deposition to lake catchments and radiometric dating of an undisturbed sediment core permits reconstruction of the historical deposition (*13-16*). The objectives of this research were to develop and validate an analytical method for quantifying 98 SOCs in sediment, to quantify SOCs in sediment from two high elevation lake catchments located on either side of the Continental Divide in ROMO, to reconstruct the history of SOC deposition, and to identify possible SOC source regions to the two ROMO lakes.

MATERIALS AND METHOD

Chemicals.

All SOC standards were acquired from the EPA repository or purchased from Chem Services Inc. (West Chester, PA), Restek (Bellefonte, PA), Sigma-Aldrich Corp. (St. Louis, MO), or AccuStandard (New Haven, CT). Standard Reference Material (SRM) #1941b was acquired from the National Institute of standards and Technology (NIST) (Gaithersburg, MD). Solvents were Fisher Scientific (Fairlawn, NJ) Optima grade and the anhydrous sodium sulfate was Mallinckrodt Baker (Phillipsburg, NJ) pesticide grade. Isotopically labeled standards were purchased from CDN Isotopes (Pointe-Claire, Quebec, Canada) or Cambridge Isotope Labs (Andover, MA). The isotopically-labeled recovery surrogates were d_{10}-fluorene, d_{10}-phenanthrene, d_{10}-pyrene, d_{12}-triphenylene, d_{12}-benzo[a]pyrene, d_{12}-benzo[ghi]perylene, d_{14}-EPTC, d_5-atrazine, d_{10}-diazinon, d_7-malathion, d_{10}-parathion, d_8-p,p'-DDE, d_8-p,p'-DDT, d_6-methyl parathion, d_{13}-alachlor, d_{11}-acetochlor, $^{13}C_{12}$-PCB 101 (2,2',4,5,5'-pentachlorobiphenyl), $^{13}C_{12}$-PCB 180 (2,2', 3,4,4',5,5'-heptachlorobiphenyl), d_{10} - chlorpyrifos, $^{13}C_6$-HCB, d_6-γ-HCH, d_4-endosulfan I, d_4-endosulfan II , d_{14}-trifluralin, $^{13}C_{12}$-BDE 28 (2,4,4'-tribromodiphenyl ether), $^{13}C_{12}$-BDE 47 (2,2',4,4'-tetrabromodiphenyl ether), $^{13}C_{12}$-BDE 99 (2,2',4,4',5-tetrabromodiphenyl ether), $^{13}C_{12}$-BDE 100 (2,2',4,4',6-tetrabromodiphenyl ether), $^{13}C_{12}$-BDE 118 (2,3',4,4',5-tetrabromodiphenyl ether), $^{13}C_{12}$-BDE 138 (2,2',3,4,4',5'-tetrabromodiphenyl ether), $^{13}C_{12}$-BDE 153 (2,2',4,4',5,5'-tetrabromodiphenyl ether), and $^{13}C_{12}$-BDE 183 (2,2',3,4,4',5',6-tetrabromodiphenyl ether). The isotopically-labeled internal standards were d_{10}-acenaphthene, d_{12}-benzo[k]fluoranthene, d_{10}-fluoranthene, and $^{13}C_{12}$-PCB 138 (2,2',3,4,4',5'-hexachlorobiphenyl). All standards were stored at 4°C and remade, as needed, to insure stability. The organophosphate standards were stored separately from other chemical classes in ethyl acetate (EA) to minimize degradation.

Sample Collection.

Sediment cores were collected from the deepest point in each lake during the ice-free summer season using a pontoon raft equipped with an UWITEC gravity corer containing an 86 mm internal diameter polycarbonate core tube. Vertically-planed sediment cores (25-50 cm in depth), with an intact surface layer, were sectioned in the field with a clean stainless steel blade. The first 10 cm of each core was sectioned into 0.5 cm increments (12-18 g wet wt increment) and the remainder of the core was sectioned into 1.0 cm increments (30-40 g wet wt increment). Each sediment slice was stored in a 250 mL solvent rinsed glass jar. A pre-baked piece of aluminum foil was placed over the mouth of the jar to separate the sample from the cap. Sediment samples were shipped overnight in ~50-L coolers with cold packs to the laboratory where they were stored at 4 ºC for physical and elemental analysis.

A sediment core was collected in July 2003 from Waldo Lake, Oregon (1650 masl, 43.75°N, 122.00°W) for method validation. In ROMO, sediment cores were collected in September 2003 from Lone Pine Lake (3024 masl, 40.22°N, 105.73°W) and Mills Lake (3030 masl, 40.29°N, 105.64°W). Lone Pine Lake, west of the Continental Divide and Mills Lake, east of the divide, are ~1150 m lower in elevation than the Continental Divide and are approximately 10 km apart. The lake bathymetry and coring site locations from both lakes are shown in Supporting Information (Figure 3.1).

Physical and Elemental Analysis.

Aliquots of the freeze-dried sediment were used for the analyses of total carbon (TC), total organic carbon (TOC), ^{210}Pb, ^{137}Cs, ^{226}Ra, and ^{241}Am. Destructive carbon analysis (TC and TOC) was preformed using flash combustion and a Carlo Erba 1108A CN analyzer. Carbonate was removed, using HCl fumes for 18hrs, prior to combustion for TOC analysis. Freeze-dried sediment sample aliquots were analyzed for ^{210}Pb, ^{226}Ra, ^{137}Cs, and ^{241}Am by direct gamma assay at the Liverpool University Environmental Radioactivity Laboratory, using an Ortec HPGe GWL series well-type coaxial low background intrinsic germanium detector by Peter G. Appleby of the University of Liverpool (*17-21*). Radiodating of ^{210}Pb and ^{226}Ra was determined by the gamma emissions at 46.5 keV and 295 keV, respectively. ^{137}Cs and ^{241}Am were measured by their emissions at 662 keV and 59.5 keV, respectively. The total and supported ^{210}Pb activity for each core along with the sedimentation rate versus age plots are provided in Figure 3.2, and Figure 3.3.

SOC Extraction and Isolation.

Sediment intervals were selected for extraction based on known U.S. restriction and registration dates. In addition, the surficial sediment intervals were selected as well as one interval was selected to represent pre-industrialization expansion into the western U.S. (1875-1910). Samples were allowed to thaw in sealed grass jars in the dark for ~15 minutes and were ground with sodium sulfate (1:15 ratio) that had been baked at 400 ºC for 3 hrs and cooled, to remove excess water. The sample was packed into three or four 66-mL Accelerated Solvent Extractor (ASE) cells (Dionex, Sunnyvale, CA) with each cell containing ~80 g of the sediment/sodium sulfate mixture. Once in the ASE cells, 15 μL of 10 ng/μL isotopically labeled surrogate-ethyl acetate (EA) solution was distributed equally among the tops of the cells containing sample. The sample was extracted using an ASE 300 and dichloromethane (DCM) (100 °C, 1500 psi, 3 cycles of 3 minutes, 150% flush volume).

The sediment extract was concentrated to 0.5 mL in the TurboVap II (Zymark, Hopkinton, MA) with nitrogen and solvent exchanged to hexane. Polar matrix interferences were removed using a 20-g silica solid phase extraction (SPE) cartridge (Varian). Analytes were eluted from the silica SPE using 100 mL DCM:EA. The eluate was then concentrated and solvent exchanged to DCM. Elemental sulfur and the high molecular weight interferences were removed using a Waters Gel Permeation Chromatography (GPC) Cleanup System (Milford, MA) as previously described (*6*). The target fraction was concentrated to 0.3 mL under a gentle stream of nitrogen and spiked with 15 μL of 10 ng/μL isotopically labeled internal standard-EA solution just prior to GC/MS injection.

The sediment extracts were analyzed for target SOCs by gas chromatographic mass spectrometry (GC/MS), using both electron impact (EI) ionization and electron capture negative ionization (ECNI) with selective ion monitoring as described in detail by Usenko et al (*6*) and Ackerman et al (*22*). Sodium sulfate was used as the laboratory blank and was carried through the entire analytical method (extraction, cleanup, and concentrating), starting at the grinding step, the laboratory blank was spiked with the same quantity of isotopically labeled surrogate and internal standards as mention above. The minimum number of samples to laboratory blanks was 3:1.

Quantification and Validation.

The sediment extracts were analyzed for target SOCs by gas chromatographic mass spectrometry (GC/MS), using both electron impact (EI) ionization and electron capture negative ionization (ECNI) with selective ion monitoring as described in detail by Usenko et al (*6*) and Ackerman et al (*22*). Target SOCs were quantified using the mode of ionization that resulted in the lowest instrumental detection limits (IDLs) (*6*). IDLs ranged from 0.063-6.7 pg/µL for GC/EI-MS and from 0.006-1.1 pg/µL for GC/ECNI-MS. Quantification was preformed with a surrogate standard calibration curve (4-12 points) and SOC concentrations were calculated relative to surrogates. Sample-specific estimated method detection limits (EDLs), calculated using EPA-method 8280A (*23*), were determined for all target SOCs. A representative sediment sample (0.5-1.0 cm) from Waldo Lake was used to calculate EDLs, which ranged from 0.1-200 ng/g dry wt, depending on the SOC (Table 3.1). The analytical method was validated for efficiency with triplicate spike and recovery experiments using Waldo Lake sediment. These recoveries were corrected for background SOC concentrations in sediment and represent the efficiency of the entire analytical method because the target SOCs were spiked prior to extraction and the isotopically-labeled surrogates were spiked just prior to analysis. The accuracy and precision of the analytical method were determined using NIST SRM 1941b.

Analysis and Quality Control.

Target SOCs were identified using the following criteria; GC retention time (±0.05 min of standard), quantification and confirmation ion ratios (±20% of standard), and a signal-to-noise ratio of 10:1. SOC concentrations in sediment were surrogate recovery (concentration calculated relative to surrogate) and laboratory blank corrected. All WACAP quality assurance objectives were met (*10*).

PRISM.

The Parameter-elevation Regressions on Independent Slopes Model (PRISM) was designed to estimate the orographic climate parameters (*24*). PRISM provides 2×2 km resolution monthly annual precipitation estimates from 1895 to February 2007. PRISM also provides the average precipitation for a month from 1971-2000 with 800×800 m resolution.

RESULTS AND DISCUSSION

Method Validation.

Analyte recoveries over the entire analytical method were measured with triplicate spike and recovery experiments using sediment from Waldo Lake (Table 3.1). Target SOC concentrations were spiked at 12 to 36 ng g^{-1} ww sediment, and were corrected for background concentrations in the sediment. The average SOC recoveries and percent relative standard deviations (RSD) for the entire analytical method were 60.3% and 8.5%, respectively. While the recoveries varied among the compounds, no significant correlation between recovery and $\log K_{ow}$ was observed.

The precision and accuracy of the entire analytical method was validated in triplicate using NIST SRM1941b marine sediment that was collected from Baltimore Harbor (*25*). SRM1941b was chosen because it is certified for more than one third of the target SOCs measured with this method. In addition, isotope dilution mass spectrometry and pressurized liquid extraction were used in the analytical methods used for the validation of SRM 1941b (*26*).

The concentrations of 37 SOCs were measured in three ~2.0 g (dry wt) samples of SRM1941b using this analytical method. NIST certified values, with 95% confidence intervals, for 27 SOCs (14 PAHs, 6 PCBs, and 7 OCPs) were used to determine the accuracy of our analytical method. The average percent difference and %RSDs of our measured concentrations from that of the certified concentrations were 16.8% and 23.6%, respectively, and ranged from 0.0% (PCB 187, phenanthrene, p,p'-DDD, p,p'-DDE, benzo[b]fluoranthene) to 55.4% (cis-nonachlor) (Figure 3.4, Figure 3.5, and Table 3.1). We measured average concentrations and %RSDs for PBDE-47, PBDE-99, and PBDE-100 in SRM1941b of 1.33 ng/g and 4.8%, 0.56 ng/g and 0.64%, and 0.85 ng/g and 0.88%, respectively (Table 3.1).

Sedimentation Rate and Focusing Factors

Total ^{210}Pb activity in the Lone Pine Lake core reached equilibrium with the supporting ^{226}Ra at a depth of 11.5 cm (Figure 3.2). Unsupported ^{210}Pb (calculated by subtracting ^{226}Ra activity from total ^{210}Pb) declines more or less exponentially with depth, suggesting relatively uniform sedimentation accumulation during the past 100 yrs or so. ^{210}Pb dates were calculated using the constant rate of supply (CRS) model, though since the ^{210}Pb and ^{137}Cs plots suggest that records in this core may have been influenced by a moderate degree of mixing, small corrections were made to take account of this possibility. The resulting chronology placed 1963 at 4.5 cm, in reasonably good agreement with the depth suggested by the ^{137}Cs record (Figure 3.2B). The mean dry mass sedimentation rate in Lone Pine Lake for the past century is calculated to be 0.014 g cm^{-2} y^{-1}, and the mean volumetric rate 0.09 cm y^{-1}.

In the Mills Lake core, equilibrium between the total ^{210}Pb activity and the ^{226}Ra activity was reached at a depth of 12.0 cm (Figure 3.3). The unsupported ^{210}Pb record can be divided into two distinct parts. In the top 4 cm of the core there is no net decline, below 4 cm it declines rapidly and more or less exponentially with depth. These data could indicate either fairly intensive mixing of the surficial sediments, or a recent substantial increase in the sedimentation rate. Comparisons with the ^{137}Cs record suggest that the latter is more likely. Dates calculated using the CRS model place 1963 at 6.25 cm, in good agreement with the depth indicated by the well-resolved peak in the $^{137}Cs/^{210}Pb$ activity ratio (Figure 3.3B). Although the ^{137}Cs profile does not itself have a clearly defined peak, since dilution effects caused by rapid changes in the sedimentation rate affect both radionuclides, the normalized ^{137}Cs profile provides an alternative means of identifying the 1963 depth. In support, it should also be noted that the rapid increase in activity between 8.5 cm and 7 cm suggests that all sediments above 7 cm post-date the period of greatest fallout in the early 1960s. The CRS results indicate episodes of accelerated sedimentation in Mills Lake in the early 1960s and again during the 1990s. The mean sedimentation rate for the past 80 yrs is calculated to be 0.024 g cm^{-2} y^{-1} (0.14 cm y^{-1}).

In order to compare the SOC fluxes measured in Lone Pine Lake to Mills Lake cores, dry weight sediment concentrations (ng g^{-1} dw) were multiplied by the mass sedimentation rate (g cm^{-2} y^{-1}) and divided by the unitless focusing factors (FF) to arrive at the focus-corrected flux (ng m^{-2} y^{-1}). FF were derived from the ratio of measured/expected unsupported ^{210}Pb inventories in the core (*27*). Because the lakes are only 10 km apart and are at similar latitudes and elevations, we assumed that the atmospheric ^{210}Pb flux was the same at both lakes, and that the expected ^{210}Pb inventory supported by this flux was 3200 Bq m^{-2} (19.2 dpm cm^{-2}) (18). The FF of the Lone Pine Lake core site was 1.87 and Mills Lake core site was 1.48 (Table 3.2).

SOC Sediment Flux

Current-use Pesticides. The current-use pesticides (CUPs) and their degradation products measured in ROMO sediment included ΣEndosulfans (endosulfan I, II, and endosulfan sulfate) and dacthal. The ΣEndosulfan flux profile, which was primarily comprised of endosulfan sulfate, has steadily increased in both Lone Pine Lake and Mills Lake sediment since the U.S. introduction of technical endosulfan in 1954, reaching a maxima in the surficial sediments (2003) (Figure 3.6B). The doubling time of ΣEndosulfan in Mills Lake and Lone Pine Lake, since introduction in 1954, was 12.8 ± 0.005 yrs (r^2=0.93, $p<0.001$) and 19.1 ± 0.004 yrs (r^2=0.92, $p<0.001$), respectively (Figure 3.7 and Table 3.3). The surficial ΣEndosulfan flux at Mills lake (500 ng m^{-2} y^{-1}) was significantly different from ($p<0.01$, two-sided t-test) and approximately six times higher than Lone Pine Lake (86 ng m^{-2} y^{-1}). Throughout both sediment cores, the endosulfan sulfate flux was ~10 times higher than the endosulfan I and II flux.

The dacthal surficial sediment flux in Mills Lake (19.5 ng m^{-2} y^{-1}) was significantly different from ($p<0.01$, two-sided t-test) and higher than at Lone Pine Lake (5.1 ng m^{-2} y^{-1}) (Figure 3.6D). The doubling time of dacthal in Mills Lake, since introduction in 1955, was 30.7 ± 0.02 (r^2=0.64, $p<0.02$) (Figure 3.7D and Table 3.3). The doubling time for dacthal in Lone Pine Lake was not calculated because the dacthal flux was not correlated with sediment interval year (Figure 3.7D).

The SOC focus-corrected fluxes of sediment time intervals that overlapped were compared to examine the difference in SOC deposition between the two lake catchments (2003, 1990, 1987, 1974, and 1954) (Table 3.4). The Mills Lake intervals had consistently higher fluxes of ΣEndosulfan and dacthal as compared to Lone Pine Lake (Table 3.4). This suggests that Mills Lake has consistently received a greater flux of ΣEndosulfan and dacthal over the past ~50 yrs (Table 3.4).

Historic-use Pesticides. The major constituents of technical chlordane (trans-chlordane (TC), cis-nonachlor (CN), and trans-nonachlor (TN)) were detected in both lakes; however, cis-chlordane, heptachlor, and heptachlor epoxide were not detected (*28*).

Technical chlordane was used as an insecticide in the U.S. from 1948 to 1979, but only for termite control from 1979 to 1988 (*29*). The TC, CN, and TN fluxes in Lone Pine Lake increased from the time of technical chlordane introduction until restriction, with a doubling time of 27.5 ± 0.01 (r^2=0.92, p<0.01) (Figure 3.7A). TC, CN, and TN fluxes in Lone Pine Lake peaked in the early 1980s and have been declining, with a half-life of 28.5 ± 0.01 yrs, since 1982 (r^2=0.80, p<0.03) (Figure 3.7A).

The reconstructed flux profiles of TC, CN, and TN in Mills Lake were significantly different from Lone Pine Lake (Figure 3.6A). In general, the TC, CN, and TN fluxes in Mills Lake increased from U.S. introduction until U.S. restriction, with a doubling time of 10.9 ± 0.02 yrs (r^2=0.76, p<0.03) (Figure 3.7A). After U.S. restriction, there is no evidence of a decline in the flux of TC, CN, or TN to Mills Lake. Over the past 50 yrs Mills Lake received a greater flux of TC, CN, and TN, than Lone Pine Lake (Figure 3.6A).

The ratio of TN/(TN+CN) for Mills Lake and Lone Pine Lake averaged 0.50 ± 0.05 and 0.32 ± 0.06, respectively, and were statistically different from each other (p<0.01, two-sided t-test) (Figure 3.8). The ratio of TN/(TN+CN) in technical chlordane was 0.78 (*28*). Ratios less than 0.78 suggest that TN has undergone more degradation than CN. The TN/(TN+CN) ratios in Mills Lake and Lone Pine Lake sediment decreased with time (r^2=0.53 and 0.49, respectively, p<0.03) and the slopes of the regressions were not statistically different from each other (p=0.22) (Figure 3.8). This suggests that, in both sediment cores, TN was preferentially degraded over CN at a similar rate and that the rate of degradation has been constant since the introduction of technical chlordane. Therefore, the difference in isomeric ratios between the two cores was not caused by differences in sediment degradation rates. One possible explanation for the statistical differences in the TN/(TN+CN) ratios between the two cores may be a difference in the emission source regions.

Technical DDT was detected in sediment from both lakes. Technical DDT, which was restricted in the US in 1972, undergoes reductive dechlorination to DDD under anoxic conditions and dehydrochlorination to DDE under oxic conditions (*30,31*). In both sediment cores, o,p-DDT and p,p'-DDT were not detected. However, o,p-DDD + p,p'-DDD (ΣDDDs) and o,p-DDE + p,p'-DDE (ΣDDEs), the major degradation products of technical DDT, were detected (Figure 3.6E). Consistent with the composition of technical DDT, the dominant degradation products were p,p'-DDD and p,p'-DDE.

In Lone Pine Lake sediment, ΣDDD and ΣDDE fluxes increased from the time of technical DDT's widespread U.S. use (1942) to U.S. restriction (1972), with a doubling time of 46.3 ± 0.01 yrs (r^2=0.76, p<0.05), and peaked in the early 1980s (Figure 3.7E) (*9*). Since 1980, the flux of ΣDDDs and ΣDDEs in Lone Pine Lake have declined with a half-life of 16.0 ± 0.01 yrs (r^2=0.81, p<0.03), (Figure 3.7E). ΣDDDs and ΣDDEs were measured in two sediment samples dating prior to 1940 (Figure 3.6E), which was before the wide spread use of technical DDT in the United States (*29*). This irregularity in the sediment core may be attributed to downward molecular diffusion, bioturbation, and/or sediment smearing during sampling (*32*). Despite this irregularity, the reconstructed profiles for ΣDDDs and ΣDDEs in Lone Pine Lake are consistent with technical DDT introduction and restriction in the U.S.

The ΣDDDs and ΣDDEs fluxes in Mills Lake also increased from the U.S. introduction of technical DDT, reaching a maximum in the mid 1960s (Figure 3.6E). Over the last 45 yrs, the deposition of ΣDDDs and ΣDDEs in Mills Lake has been fairly constant and has not shown a statistically significant decrease since the U.S. restriction in 1972 (Figure 3.7E). Over the past 50 yrs, Mills Lake received a greater flux of ΣDDDs and ΣDDEs than Lone Pine Lake (Table 3.4). The ratio of ΣDDE/(ΣDDE+ΣDDD) for Mills Lake and Lone Pine Lake were statistically different from each other (p<0.02, two-sided t-test) (Figure 3.8), which may be caused by a difference in the emission source regions.

Dieldrin was measured in sediment intervals from both lakes after U.S. introduction in 1949 (Figure 3.6C). Dieldrin flux was not correlated with time in either lake (Figure 3.7C). The maximum dieldrin flux was in the surficial sediment of both lakes and the flux of dieldrin to Mills Lake has been greater than Lone Pine Lake over the past 30 yrs (Table 3.4).

Polycyclic Aromatic Hydrocarbons. ΣPAH fluxes in Lone Pine Lake sediment peaked around 1949 (36600 ng m^{-2} y^{-1}) and have decreased over time to 12800 ng m^{-2} y^{-1} (2003) (Figure 3.6F). From 1967 to 2003, the ΣPAH flux in Lone Pine Lake decreased, with a half-life of 28.3 ± 0.01 ($r^2 = 0.94$, $p < 0.01$) (Figure 3.7F). The deposition of ΣPAH to Mills Lake increased with a doubling time of 22.6 ± 0.01 yrs (r^2=0.88, p<0.01) from 1987 to 2003 (Figure 3.7F). The ΣPAH flux was greater in Mills Lake than Lone Pine Lake throughout the sediment cores (Figure 3.6F and Table 3.4). The BaP/(BaP+BeP) and Fla/(Fla+Pyr) ratios calculated for Mills Lake and Lone Pine Lake were statistically different (p<0.05 and p<0.02, respectively) (Figure 3.8).

Polychlorinated Biphenyls. The sediment cores from both lakes contained PCB 118 (penta), PCB 138 (hexa), PCB 153 (hexa), PCB 183 (hepta), and PCB 187 (hepta). The ΣPCB flux increased from U.S. introduction (1929) to U.S. restriction (1977); however, no significant correlations between ΣPCB flux and time at Lone Pine Lake were identified (Figure 3.7G). The ΣPCB flux in Lone Pine Lake peaked around 1990 (53 ng m^{-2} y^{-1}) and has since declined slightly (35 ng m^{-2} y^{-1}). The ratio of PCB congeners in Lone Pine Lake remained fairly constant throughout the sediment profile (Figure 3.6G).

From 1938 to 1974, the ΣPCB flux to Mills Lake increased with a doubling time of 8.3 ± 0.01 yrs (r^2=0.90, p<0.01) to 114 ng/m^2·y in 1974 (Figure 3.6G and Figure 3.7G). After U.S. restriction in 1977, the ΣPCB flux in Mills Lake has continued to increase but at a slower rate, with a doubling time of 13.6 ± 0.01 yrs (r^2=0.86, p<0.01), reaching a maximum flux in the surficial sediment of 213 ng m^{-2} y^{-1} (Figure 3.6G and Figure 3.7G). No individual PCB congener was responsible for the continued increase in sediment flux to Mills Lake and the relative ratio of all five congeners was constant throughout the core. This suggests the flux of ΣPCB to Mills Lake has not decreased in recent yrs. Similarly to CUPs, HUPs, and ΣPAHs, the ΣPCB flux to Mills Lake has been greater than Lone Pine Lake, over the past 50 yrs (Table 3.4).

Polybrominated Diphenyl Ethers. Of the 31 PBDEs measured (Table 3.1), only PBDE-47, PBDE-99, PBDE-100, PBDE-153, and PBDE-154 were detected in both sediment cores. These compounds are the five most prevalent congeners in the commercial penta-BDE formulation (*33*). The ΣPBDE flux in Mills Lake was highest in the surficial sediment (2790 ng m^{-2} y^{-1}) and increased with a doubling time of 5.4 ± 0.001 yrs (r^2=0.99, p<0.001) since U.S. introduction in 1977 (Figure 3.7H). The ΣPBDE doubling time in Mills Lake sediment is similar to ΣPBDE doubling times in the Great

Lakes (Table 3.3) (*34,35*). The two most abundant PBDE congeners in the Mills Lake sediment were the most abundant PBDE congeners in the penta formulation, BDE-47 and BDE-99, representing >87% of the ΣPBDE flux. PBDEs were only detected in three sediment intervals in Lone Pine Lake and were at or below the quantitation limit. The ΣPBDE flux to Mills Lake in 2003 was 24 times greater than that of Lone Pine Lake (Table 3.4). PBDEs had the highest flux of any organohalogen SOC in Mills Lake surficial sediment (Figure 3.6H).

Physical and Chemical Limnological Characteristics

The lake catchment characteristics that might explain the difference in SOC sediment fluxes between the two lake catchments include catchment area, elevation, hydraulic resident time (HRT), primary productivity, and total organic carbon. The difference in these characteristics are relatively small between the two lakes (Table 3.2) and were likely not responsible for the difference in SOC sediment fluxes between the two catchments. Lake catchment size does not explain the SOC sediment flux difference, because the Mills Lake catchment is 30% smaller than Lone Pine Lake catchment (Table 3.2) (*36*). In addition, the HRT of Mills Lake is slightly shorter (3.3 days) than Lone Pine Lake (4.4 days) (Table 3.2). Mills Lake and Lone Pine Lake are both considered oligotrophic lakes based on total nitrogen, total phosphorus, chlorophyll a, and turbidity (*37*). Productivity parameters for Mills Lake and Lone Pine Lake were 0.38 and 0.17 mg of nitrogen/L, 2.8 and 2.7 μg of phosphorus/L, 2.1 and 2.0 μg of chlorophyll a/L, and 0.6 and 0.3 nephelometric turbidity units, respectively (Table 3.2) (*36*). Based on this, no difference in lake productivity was evident. Finally, for the sediment intervals used for the SOC analysis, the percent total organic carbon of the sediment intervals was measured and there was no significant difference between the two lake sediments.

Source Regions

Mills Lake and Lone Pine Lake are only 10 km apart, so their distance from source regions is very similar. However, because these two lakes are on opposite sides of the Continental Divide and approximately 1150 m lower in elevation, they may potentially receive different magnitudes of SOC deposition and/or SOCs from different source regions. An east vs. west difference in total N deposition has been previously shown for Colorado's front range (*11*). Mills Lake, on the east side, may receive upslope winds that originate from the eastern low lands and Lone Pine Lake, which is on the west side, may receive upslope winds that originate from the western low lands (*3,12*). Similar SOC sources, including agricultural and urban sources, exist on either side of the Continental Divide. However, the number of sources and emission from these sources is greater on the east side of the Continental Divide (*38,39*). This may explain the increased SOC focus-corrected sediment fluxes in Mills Lake relative to Lone Pine Lake.

Atmospheric PAH concentrations are positively correlated with population density (*40,41*) and PBDEs are widely used in consumer and commercial products and are closely linked to urban areas (*34*). The population within a radius of 150 km around the center of ROMO showed greater than 98% of the population resides east of the Continental Divide (*39*). The population of the Colorado counties just east of ROMO has risen at an exponential rate over the last century (*42*). These demographic statistics, which are associated with pollution, may explain the increased SOC focus-corrected sediment fluxes in Mills Lake relative to Lone Pine Lake.

The ΣPBDEs, ΣPAH, and ΣPCB fluxes were greater in Mills Lake than Lone Pine Lake (Figure 3.6). The difference in the population within a 150 km of ROMO (98% on the east) (*39*) and the Mills Lake ΣPBDE profile support the conclusion that Mills Lake is impacted to a greater extent by eastern urban SOC sources than Lone Pine Lake. The ΣPAH flux in Lone Pine Lake has decreased over the past ~35 yrs (Figure 3.6F), while the ΣPAH flux in Mills Lake has not. In addition, the ΣPCB flux in Mills Lake has been increasing over the past 15 yrs, even after the restriction of PCBs in 1977, and the ΣPCB flux in Lone Pine Lake has not. Differences in the last 15-35 yrs (Figure 3.6F and 1G) ΣPBDE, ΣPCB, and ΣPAH fluxes and trends within these sediment profiles, suggest that the two lake catchments may be receiving SOCs from different urban source regions.

In 1997, 92% of the cropland intensity within a 150 km circle of ROMO was on the east side of the Continental Divide (*43*). In addition, 100% of the 1997 dacthal and endosulfan use within a 150 km circle of ROMO was on the east side (*44*). The vast majority of the agricultural and urban SOC sources are present on the east side of ROMO. This may result in enhanced deposition of SOCs to Mills Lake. Differences in CUP and HUP doubling times, half-lives, and fluxes between the two lakes may be the result of differences in SOC emission source outputs from the western low lands and the eastern low lands. Nitrogen in the form of NH_3, which is also linked to agricultural activities, has been shown to originate east of the Continental Divide in Colorado's Rocky Mountain Front Range (*11*).

Snow SOC Flux and Load

The majority of the pesticides in remote ROMO lake catchments arrive via atmospheric transport from regional sources (*7*) and are deposited in the form of rain (*8*), snow (*7,8*), and dry deposition. During the winter months, the dominant form of precipitation is snow, which is associated with westerly air masses (*8,11*). To understand the deposition of SOCs to Lone Pine Lake and Mills Lake catchments via annual snow pack, SOCs were measured in snow samples, collected in April 2003, from both Mills Lake and Lone Pine Lake catchments (*7*). Snow is an efficient scavenger of SOCs from the atmosphere (*45-47*). In 2003, the Mills Lake snow concentrations of dacthal, trans-chlordane, and ΣPAH were not statistically different than Lone Pine Lake ($p>0.05$, using a two-sided t-test) (Table 3.4) (*7*). In a different study of the same Front Range area from 1992 to 1997, snow concentrations of NH_4^+ also showed no difference between sites east and west of the Continental Divide (*11*).

By multiplying the snow SOC concentrations (ng m^{-3}) by the snow depth in snow water equivalents (SWE) (cm), we calculated an SOC snow flux (ng m^{-2} y^{-1}) (*7*). The ratio of the Mills Lake to Lone Pine Lake SWE in the 2003 snow samples was 2.3. In 2003, the ΣEndosulfan, dacthal, TC, dieldrin, and ΣPAH snow flux to Mills Lake catchment was greater than Lone Pine Lake by a factor 1.7 to 3.7 (Table 3.4).

The ecosystem SOC load from snow for 2003 was calculated by multiplying the snow flux by the lake catchment area (Table 3.4). The ratio of the Mills Lake to Lone Pine Lake catchment area was 0.71 (Table 3.2). The SOCs, which consistently had higher fluxes in Mills Lake surficial sediment, had higher snow fluxes and ecosystem loads during the 2003 snow accumulation season (Table 3.4). This suggests that the difference in SOC sediment flux between the two lakes may be partially explained by SOC snow flux. The 2003 lake water concentrations of ΣEndosulfans and dacthal, collected at the same time as the sediment cores, in Mills Lake were greater than Lone Pine Lake by a factor of 4.0 and 1.5, respectively (Table 3.4).

During the late spring and summer months, rain is the dominant form of precipitation to ROMO, and air masses arrive from the south and east (*8*). The deposition of SOCs in the summer months has not been measured for Lone Pine Lake and Mills Lake catchments. However, in 2002, it was determined that ~85% of the annual atmospheric CUP deposition to Bear Lake occurred via rain during the summer months (*8*). Bear Lake resides on the east side of the Continental Divide, three km north and ~135 m lower in elevation from Mills Lake. In addition, a significant portion of Lock Vale catchment's total N deposition occurred during the summer from upslope winds originating from the east (*11*). The Loch Vale catchment resides on the east side of the Continental Divide, 1.5 km north and ~130 m higher in elevation from Mills Lake. These previous studies emphasize the importance of SOC deposition to ROMO during the summer months, as well as the potential for SOCs to undergo atmospheric transport to ROMO from eastern source regions.

Precipitation Rates

Because there is no long-term measured precipitation data for Mills Lake and Lone Pine Lake, the Parameter-elevation Regressions on Independent Slopes Model (PRISM), was used to estimate the average annual precipitation to Lone Pine Lake and Mills Lake from 1971 to 2000 on an 800×800 m grid (*24*). The annual average precipitation for Lone Pine Lake catchment and Mills Lake catchment from 1971 to 2000 was 97.6 cm and 107.1 cm, respectively (Table 3.2). For the years that correspond to the five paired sediment intervals (2003, 1990, 1987, 1974, and 1954), a 2×2 km grid was used because the 800 by 800 grid data only covers from 1971 to 2000. The total precipitation estimates for April thru September (summer) and October thru March (winter) in these years were similar (Table 3.4). Over the five intervals, the average summer and winter precipitation ratios were 0.97 and 1.00, respectively. The model estimated a slight increase in precipitation at Mills Lake during the 2002-2003 (October thru March) winter season, with a Mills Lake/Lone Pine Lake precipitation ratio of 1.14 (Table 3.4). The PRISM data suggests that differences in long-term summer, winter, and annual precipitation do not account for all of the differences in historical SOC deposition to the two lakes.

The significant differences in the historical deposition of PBDEs, CUPs, HUPs, PCBs, and PAHs to Mills Lake and Lone Pine Lake were not explained by differences in lake catchment characteristics or precipitation and suggest differences in SOC source regions. This suggests that, similar to atmospheric N deposition in this region, a majority of the SOC deposition to the Mills Lake catchment arrived via upslope winds from the east. This is counter to prevailing westerly winds implying that lake catchment location with respect to the Continental Divide influences SOC deposition in ROMO.

ACKNOWLEDGEMENTS

This work is part of WACAP (Western Airborne Contaminants Assessment Project), a collaborative venture between the National Park Service, the Environmental Protection Agency, the U.S. Geological Survey, Oregon State University, University of Washington, and the U.S.D.A. Forest Service. It was funded primarily through cooperative and interagency agreements with the National Park Service, and also included in-kind contributions from all of the project partners. Further information about WACAP can be found on the WACAP web site at: http://www2.nature.nps.gov/air/Studies/air_toxics/wacap.htm. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

This publication was made possible in part by grant number P30ES00210 from the National Institute of Environmental Health Sciences, NIH. Its contents are solely the responsibility of the authors and do not necessarily represent the official view of the NIEHS, NIH.

The authors would like to thank Marilyn Morrison Erway (Dynamic Corporation) and crew for collecting the sediment samples from ROMO National Park.

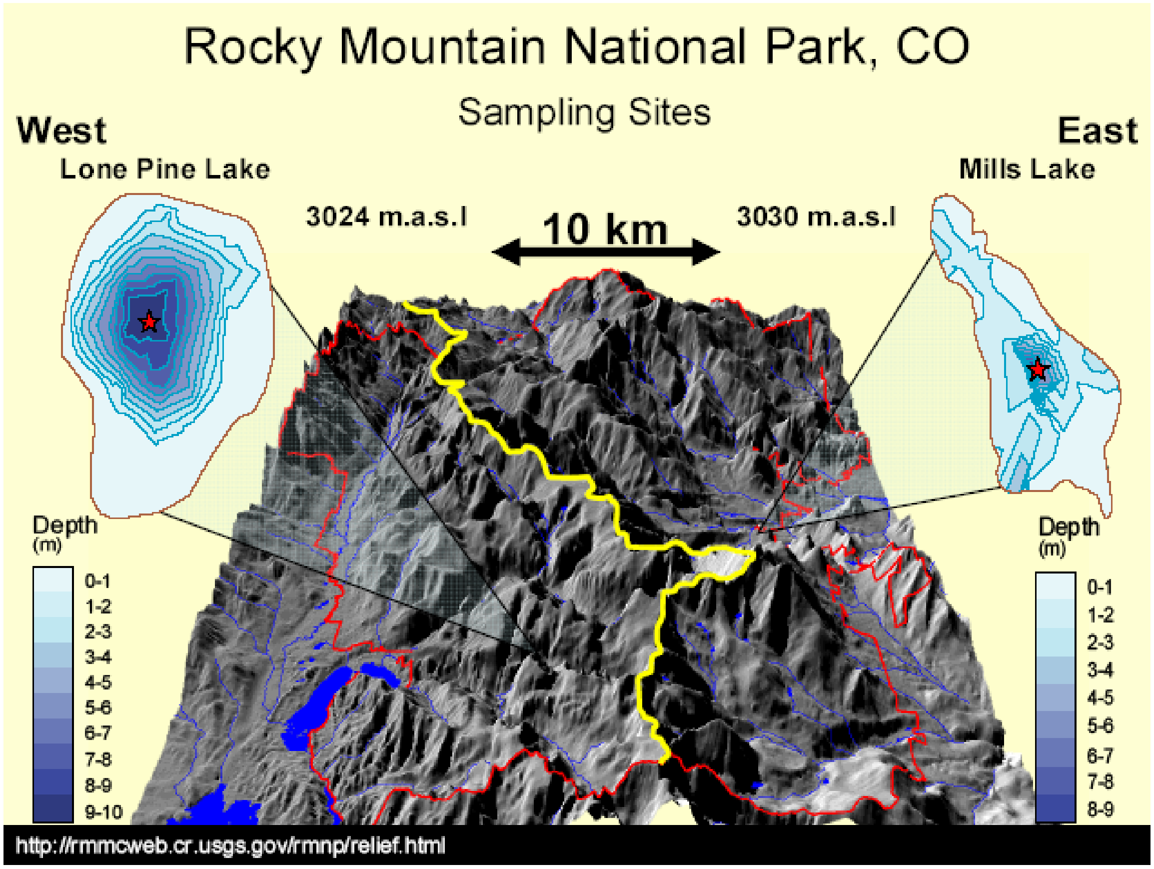


Figure 3.1. Shaded relief map of Rocky Mountain National Park with lake bathymetry maps for Lone Pine Lake and Mills Lake. Red line represents the park boundary and the yellow line represents the Continental Divide ~ 4150 m.a.s.l. Stars indicate coring site location.

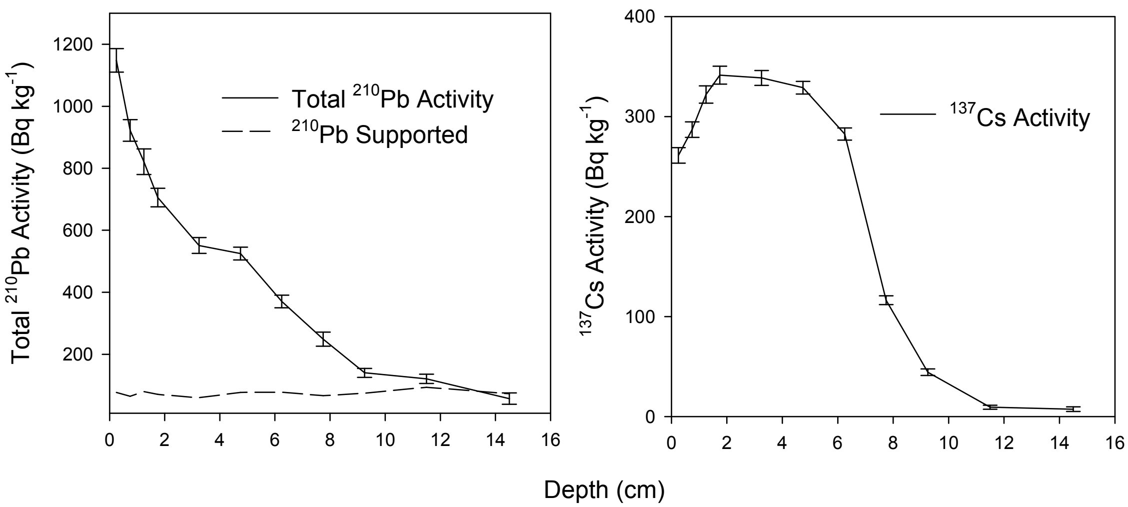


Figure 3.2. Fallout radionuclides in Lone Pine Lake (A) total and supported ^{210}Pb activity, (B) ^{137}Cs concentrations versus depth (*18*).

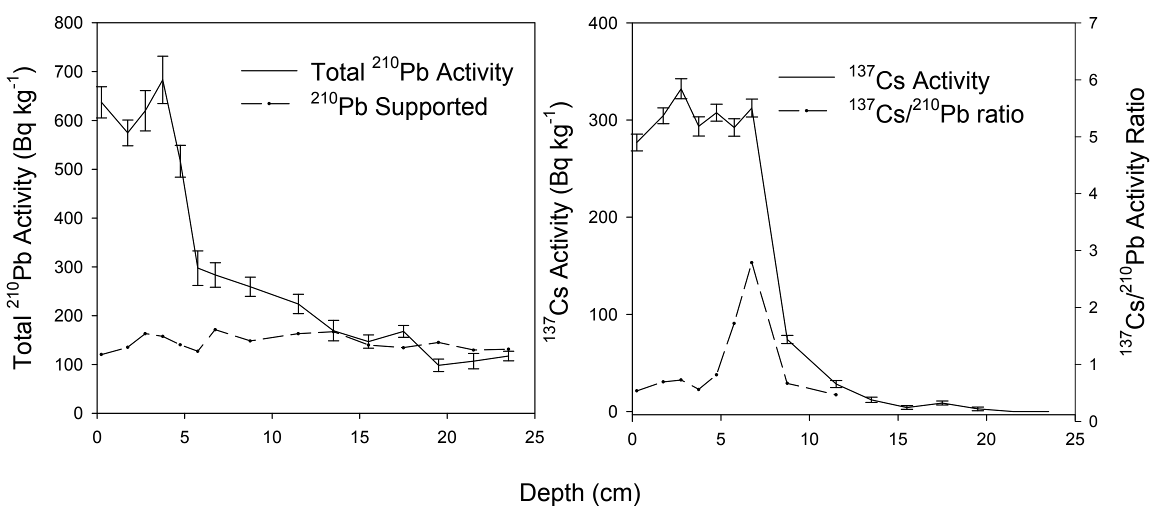


Figure 3.3. Fallout radionuclides in Mills Lake core (A) total and supported ^{210}Pb activity, (B) ^{137}Cs concentrations and ^{137}Cs/^{210}Pb activity ratios versus depth (*18*).

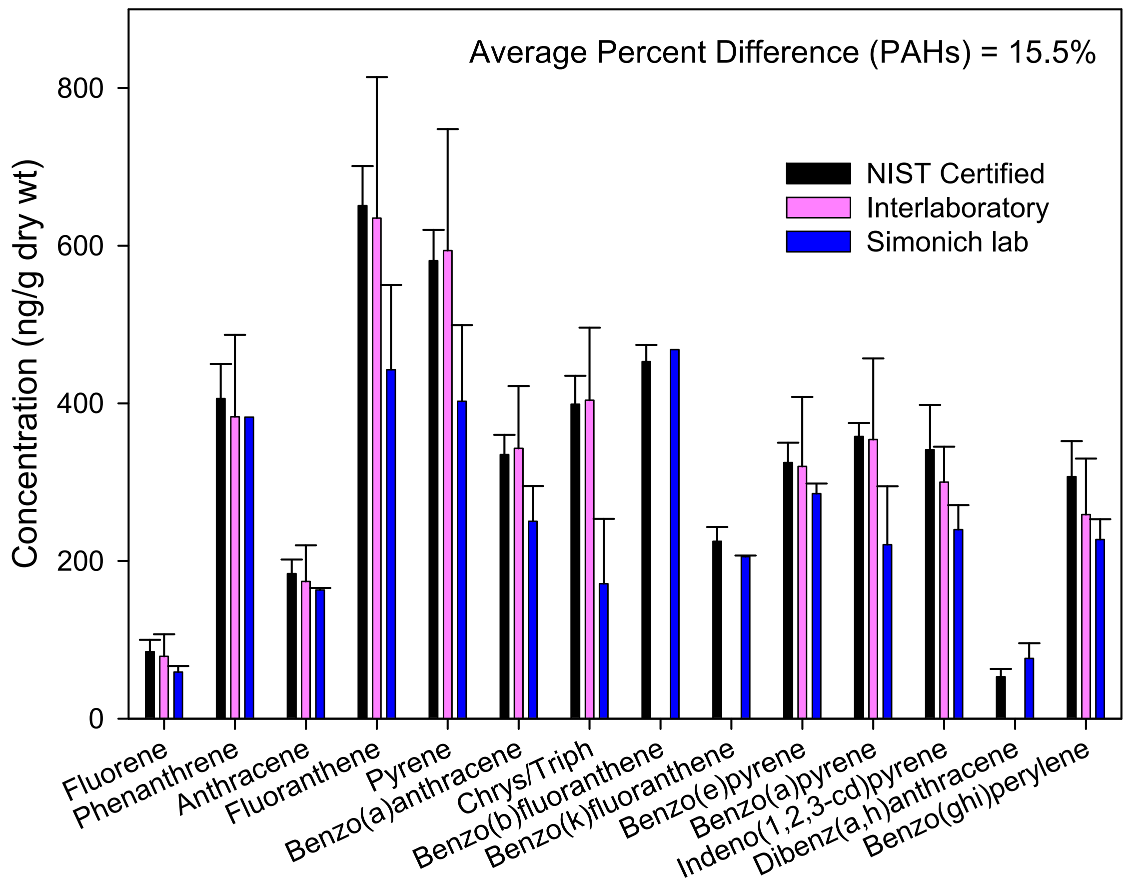


Figure 3.4. Concentrations of PAHs measured in NIST SRM1941b (*26*)

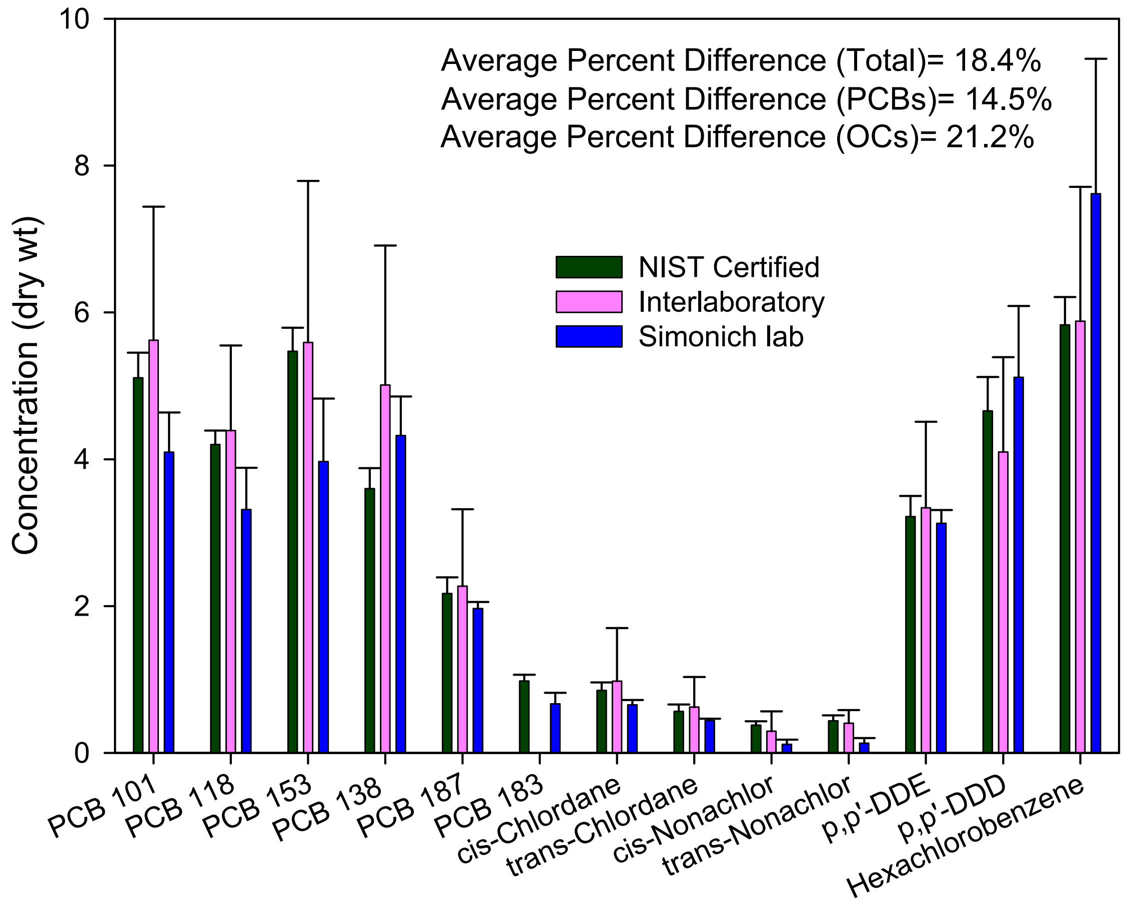


Figure 3.5. Concentrations of SOCs measured in NIST SRM1941b (*26*).

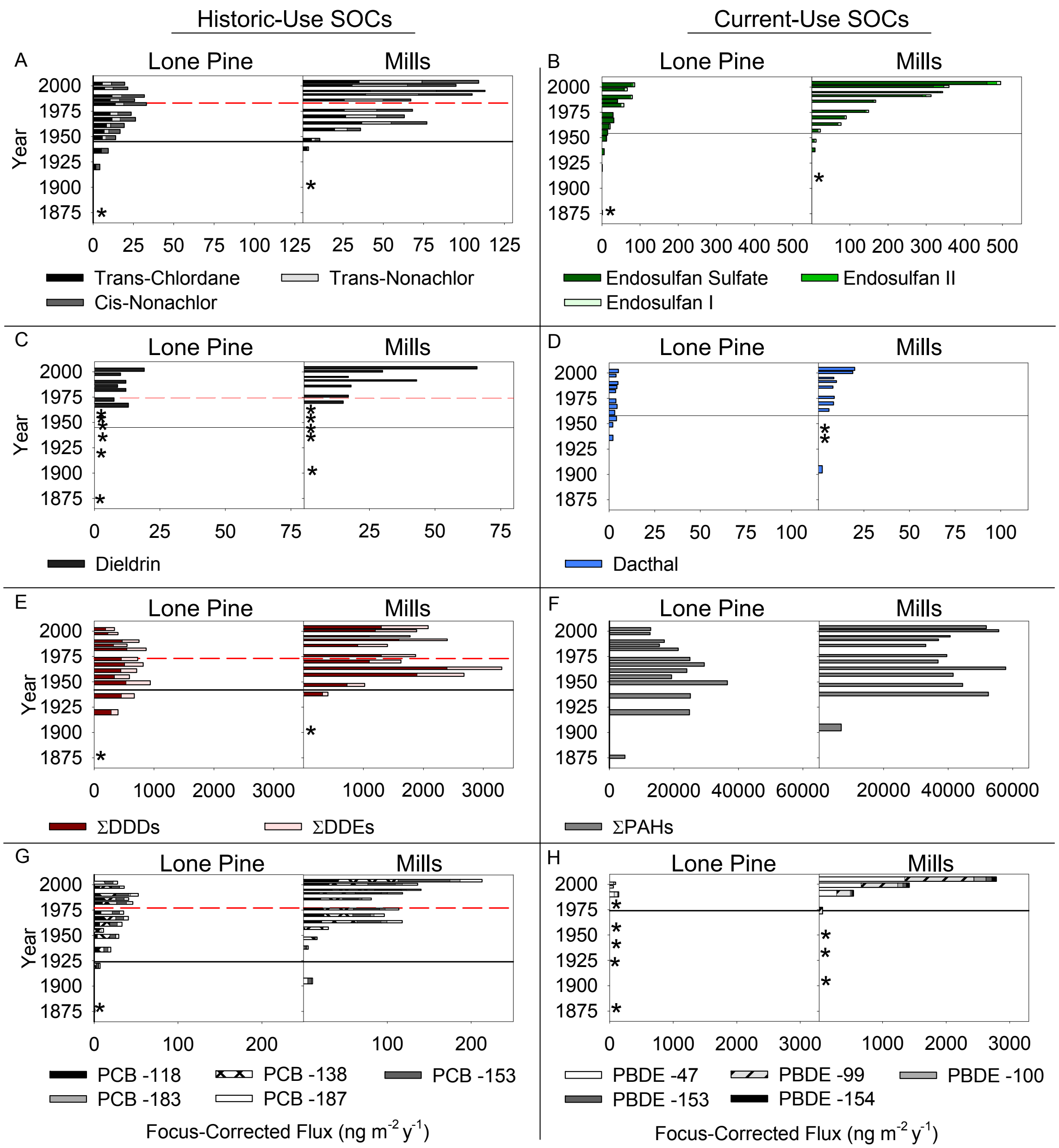


Figure 3.6: Focus-corrected flux (ng m^{-2} y^{-1}) profiles of current and historic-use SOCs in Lone Pine Lake (West) and Mills Lake (East) sediment cores. Solid lines (—) indicate U.S. registered use date, dashed lines (– –) indicate U.S. restriction date, and * indicate below method detection limit.

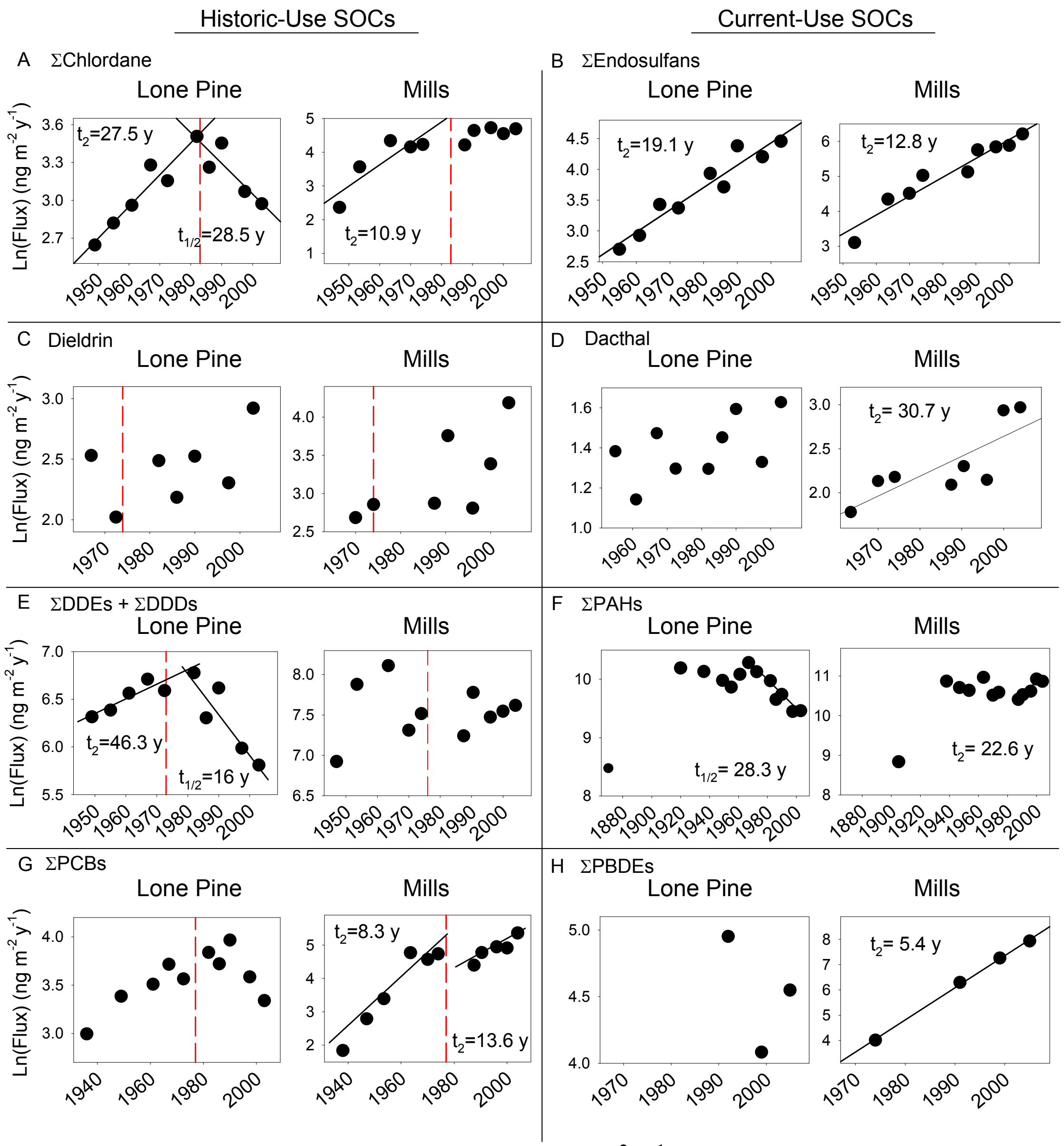


Figure 3.7: Natural log focus-corrected flux (ng m^{-2} y^{-1}) profiles of current and historic-use SOCs in Lone Pine Lake (West) and Mills Lake (East) sediment cores. Doubling times (t_2) and half-lives ($t_{1/2}$) are given where linear regression lines are statistically significant ($p<0.05$). Dashed lines (— —) indicate U.S. restriction date. ΣChlordane represents the sum of TC, TN, and CN. Plots start at U.S. registration. Linear regressions were calculated from the time of U.S. introduction to U.S. restriction and/or U.S. restriction to 2003

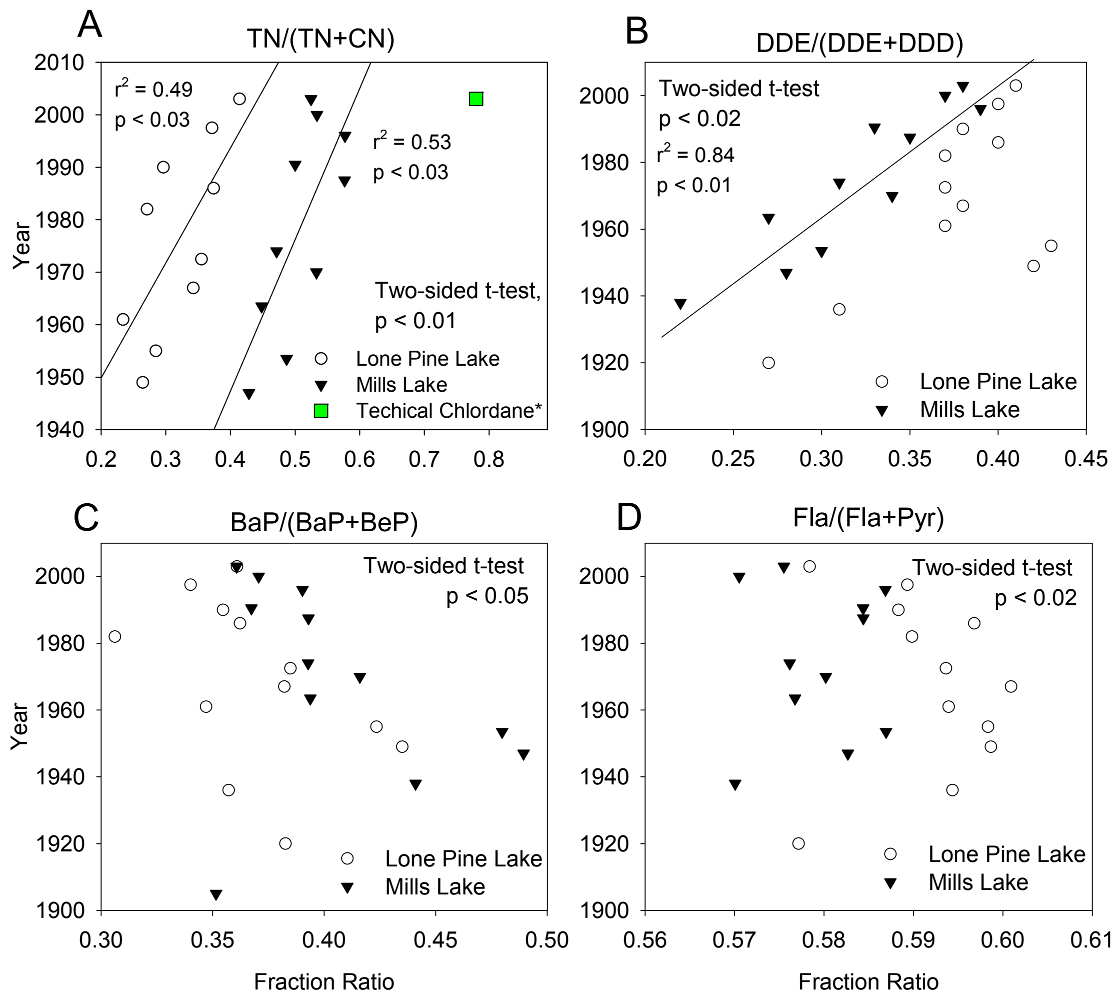


Figure 3.8. The ratio of TN/(TN+CN), ΣDDE/(ΣDDE+ΣDDD), BaP/(BaP+BeP), and Fla/(Fla+Pyr) in sediment from Mills Lake and Lone Pine Lake. All regressions shown are statistically significant. Ratios of contaminants were significantly different.

Table 3.1: Recovery of target SOCs in sediment over the entire analytical method.

	Waldo Lake[a]		EDL[b]	SRM1941b				Waldo Lake[a]		EDL[b]	SRM1941b		
	Avg. % Rec	% RSD	ng/g dw	ng/g dw	PD[c]	% RSD		Avg. %Rec	%RSD	ng/g dw	ng/g dw	PD[c]	% RSD
Amide Pesticides													
Propachlor	49.8	3.3	7.8				Acetochlor	46.1	9.3	9.3			
Alachlor	53.1	12.2	13.3				Metolachlor	58.6	12.2	14.2			
Organochlorine Pesticides and Metabolites													
HCH, gamma[d]	29.6	9.4	117.5				Chlordane, cis	45.7	14.7	18.4	0.7	10.0	29.5
HCH, alpha[d]	50.8	9.0	133.3				p,p'-DDD[f]	60.3	10.2	16.5	5.1	0.0	40.0
HCH, beta[d]	36.2	9.1	175.7				Nonachlor, trans	46.8	17.2	3.7	0.1	53.2	32.8
HCH, delta[d]	51.8	9.4	59.5				o,p'-DDD[f]	55.6	10.8	4.3	1.1		
Methoxychlor	67.4	14.8	18.6	1.0			Chlordane, trans	46.8	15.2	2.0	0.4	5.8	28.2
Heptachlor epoxide	46.8	13.8	89.4				Nonachlor, cis	53.6	13.0	1.5	0.1	55.4	24.2
Endrin aldehyde	51.8	7.9	19.6				Aldrin	29.0	12.5	83.2			
Endrin	70.4	11.5	204.7				o,p'-DDT[g]	44.4	12.0	23.6			
Heptachlor	32.5	12.4	111.9				p,p'-DDE[e]	55.9	12.7	3.4	3.1	0.0	15.8
o,p'-DDE[e]	57.7	11.2	11.3				Mirex	56.3	6.3	41.4			
Chlordane, oxy	43.7	14.8	12.2				p,p'-DDT[g]	54.7	13.5	37.9			
Dieldrin	74.0	13.1	114.8	0.32									
Organochlorine Sulfide Pesticides and Metabolites													
Endosulfan sulfate	61.4	9.6	4.4				Endosulfan II	58.5	10.3	9.0			
Endosulfan I	50.2	13.2	8.1										
Phosphorothioate Pesticides													
Methyl parathion	49.9	5.1	33.0				Parathion	54.0	6.5	15.7			
Malathion	48.3	7.9	65.8				Ethion	60.0	10.4	10.8			
Diazinon	47.9	5.4	5.1				Chlorpyrifos	45.3	9.7	1.2			
Triazine Herbicides and Metabolites													
Simazine	63.2	3.4	58.3				Atrazine	57.6	6.3	9.5			
Cyanazine	136.0	19.3	171.2										
Miscellaneous Pesticides													
Metribuzin	43.6	20.6	30.0				Dacthal	55.5	11.5	6.4			
Etridiazole	21.6	13.9	29.1				Trifluralin	32.9	10.8	1.7			
Triallate	41.1	8.6	24.2				Hexachlorobenzene	33.5	8.0	1.0	7.6	24.1	22.8
Polycyclic Aromatic Hydrocarbons													
Acenaphthylene	20.9	14.7	13.3	138.8			Benzo[a]anthracene	64.5	10.2	11.4	250.4	17.8	17.2
Acenaphthene	33.5	13.5	11.2	51.6			Benzo[k]fluoranthene (BkF)	68.5	10.0	3.3	205.6	0.6	21.6
Fluorene	25.5	12.7	7.2	59.2	12.7	22.3	Benzo[a]pyrene (BaP)	46.7	9.3	2.1	220.7	33.6	23.7
Anthracene	34.8	8.0	24.6	163.3	1.5	13.6	Benzo[b]fluoranthene (BbF)	64.8	9.5	4.0	468.2	0.0	18.7
Phenanthrene	26.0	20.0	13.0	382.6	0.0	18.6	Indeno[1,2,3-cd]pyrene (Ind)	60.1	9.5	29.0	239.9	12.9	17.3
Pyrene (Pyr)	50.6	5.7	1.0	402.8	24.0	22.1	Dibenz[a,h]anthracene	58.2	9.8	23.7	76.4	25.3	22.9
Fluoranthene (Fla)	50.5	5.1	1.1	442.6	24.3	20.8	Benzo[e]pyrene (BeP)	64.6	9.1	6.5	285.5	4.5	22.4
Chrysene/Triphenylene	59.9	9.2	0.8	171.2	48.1	22.3	Benzo[ghi]perylene (BghiP)	55.0	11.1	5.1	227.2	11.3	22.0
Polychlorinated Biphenyls													
PCB 101	70.7	14.2	129.1	4.1	13.2	29.9	PCB 118	74.2	11.6	10.2	3.3	17.2	34.5
PCB 138	74.9	11.7	9.7	4.3	12.3	30.4	PCB 187	76.1	13.1	3.9	2.0	0.0	22.1
PCB 153	73.2	11.8	3.5	4.0	21.6	20.1	PCB 183	76.5	13.1	3.7	0.7	23.0	20.4
Polybrominated Diphenyl Ethers													
BDE 7	58.6	3.0	0.2				BDE 85/155	73.0	2.0	1.8			
BDE 8	77.8	2.2	0.1				BDE 99	75.5	2.4	27.2	0.56		
BDE 10	42.7	6.9	0.2				BDE 100	74.1	2.3	9.4	0.85		
BDE 17	78.1	3.6	0.4				BDE 116	72.8	3.2	1.8			
BDE 25	83.3	3.3	0.8				BDE 118	76.5	4.8	15.1			
BDE 28	70.5	4.7	4.1				BDE 119	75.0	2.9	3.3			
BDE 30	70.6	3.9	0.6				BDE 126	69.2	1.7	2.1			
BDE 32	77.2	1.7	0.7				BDE 138	76.0	1.2	3.3			
BDE 35	82.6	3.2	0.7				BDE 153	76.7	1.3	26.0			
BDE 37	80.3	4.0	1.3				BDE 154	84.8	0.8	0.9			
BDE 49	69.4	5.4	1.3				BDE 155	101.6	0.9	15.6			
BDE 47	71.9	4.5	15.6	1.3			BDE 166	72.4	2.0	2.8			
BDE 66	75.2	5.1	0.6				BDE 181	99.9	2.3	5.8			
BDE 71	67.7	4.8	1.3				BDE 183	73.3	2.3	31.3			
BDE 75	70.0	5.4	4.9				BDE 190	104.4	2.1	5.7			
BDE 77	70.5	6.1	0.8										
Averages, % RSD, and PD[c]													
average	60.3	8.5	23.8	109.3	16.8	23.6	max	136.0	20.6	204.7	468.2	55.4	40.0
							min	20.9	0.8	0.1	0.1	0.0	13.6

[a]Recoveries validated at 26 ng/g wet wt and were corrected for background concentrations of SOCs in sediment. [b]Sample-specific estimated method detection limits. [c]Percent Difference from SRM 1941b certified values n=5. [d]Hexachlorocyclohexane. [e]Dichlorodiphenyldichloroethylene. [f]Dichlorodiphenyldichloroethane. [g]Dichlorodiphenyltrichloroethane.

Table 3.2: Physical and Chemical Limnological Characteristics of Mills Lake and Lone Pine Lake. * indicate data from the parameter-elevation regressions on independent slopes model (average annual total precipitation from 1971-2000, 800×800 m).

	Lone Pine Lake	Mills Lake	Mills Lake/ Lone Pine Lake
Catchment Characteristics			
Latitude (dd)	40.22	40.29	1.00
Longitude (dd)	105.73	105.64	1.00
Elevation (masl)	3024	3030	1.00
Lake Volume (m^3)	128325	78251	0.61
Lake Surface Area (m^2)	49134.9	61148	1.24
Catchment Area (m^2)	21144492	15093297	0.71
Hydraulic Residence Time (d)	4.3	3.3	0.77
*Average Annual Precipitation (cm)	97.6	107.1	1.10
Limnological Characteristics (2003)			
Primary Productivity	Oligotrophic	Oligotrophic	
Dissolved Organic Carbon ($mg \cdot L^{-1}$)	1.73	1.55	0.90
Total Nitrogen ($mg \cdot L^{-1}$)	0.17	0.38	2.24
Total Phosphorus ($\mu g \cdot L^{-1}$)	2.7	2.8	1.04
Chlorophyll a ($\mu g \cdot L^{-1}$)	2.0	2.1	1.05
Turbidity (NTU)	0.3	0.6	2.00
Specific Conductivity ($\mu S \cdot cm^{-1}$)	14.0	11.9	0.85
pH	6.67	6.05	0.91

Table 3.3: Statistically significant ($p<0.05$) doubling times and half-lives of current and historic-use SOCs in Mills Lake and Lone Pine Lake sediment cores. Half-lives and doubling times were calculated from the natural log focus-corrected flux vs. year and the standard deviation was estimated from the slope of the linear regression. Linear regressions were calculated from the time of U.S. introduction to U.S. restriction and/or U.S. restriction to 2003. ns indicates the linear regression was not statistically significant ($p>0.05$). [a] reference (*35*), [b] reference (*34*), and [c] reference (*48*).

	Current-use SOCs				Historic-use SOCs		
	ΣEndosulfans	Dacthal	ΣPAHs	ΣPBDEs	ΣChlordane	ΣDDDs + ΣDDEs	ΣPCBs
Mills Lake							
Doubling Time	12.8 ± 0.005	30.7 ± 0.02	22.6 ± 0.01	5.4 ± 0.001	10.9 ± 0.02	ns	8.3 ± 0.01, 13.6 ± 0.01
Half-life	ns	ns	ns	ns	ns	ns	ns
Lone Pine Lake							
Doubling Time	19.1 ± 0.004	ns	ns	ns	28.7 ± 0.01	46.3 ± 0.01	ns
Half-life	ns	ns	28.3 ± 0.01	ns	28.5 ± 0.01	16.0 ± 0.01	ns
Great Lakes							
Doubling Time				17[a], 11[b], 6.4[b]			
Half-life							
Lakes across the U.S.							
Half-life						14.9[c]	19.7[c]

Table 3.4: Selected SOC ratios (Mills Lake/Lone Pine Lake) in snow (concentrations, flux, and load), lake water (concentrations), and paired sediment intervals (focus-corrected flux). * indicates where a significant difference ($p<0.05$) exists between Lone Pine Lake and Mills Lake, nd indicates a non detect, and nm indicates were not measured in snow. ** indicate data from the parameter-elevation regressions on independent slopes model (1971-2003, 2×2 km).

	Snow			Lake Water	Sediment Ratio				
	2003	2003	2003	2003	2003 ± 1	1990 ± 1	1987 ± 1	1974 ± 1	1954 ± 1
SOCs	Conc.	Flux	Load	Conc.	Flux	Flux	Flux	Flux	Flux
ΣEndosulfan	1.4*	3.2*	2.3*	4.0*	6.4*	4.1*	3.2*	5.2*	1.5*
Dacthal	1.1	2.5*	1.8*	1.5*	3.8*	2.0*	1.9*	2.4*	nd
ΣDDEs + ΣDDDs	nd	nd	nd	nd	6.1*	3.2*	2.5*	2.5*	4.5*
Trans-Chlordane	1.3	3.0*	2.1*	nd	6.0*	3.2*	2.3*	2.4*	2.7*
Dieldrin	1.6*	4.3*	3.1*	nd	3.5*	3.4*	2.0*	2.3*	nd
ΣPAHs	0.95	2.2*	1.6*	nd	4.1*	2.2*	2.1*	1.6*	2.2*
ΣPCBs	nd	nd	nd	nd	6.5*	2.2	2.0	3.2*	2.6*
ΣPBDEs	nm	nm	nm	nm	24.1*	3.1*	nd	nd	nd
Precipitation**									
April-Sept. (Summer)					0.90	1.02	0.97	1.02	0.96
Oct-March (Winter)					1.14	0.97	1.05	0.95	0.91
Annual					1.07	1.01	0.96	0.94	0.92
%TOC					1.1	1.3	1.2	1.1	1.0

LITERATURE CITED:

(1) Blais, J. M.; Schindler, D. W.; Muir, D. C. G.; Kimpe, L. E.; Donald, D. B.; Rosenberg, B. Accumulation of persistent organochlorine compounds in mountains of western Canada. *Nature* **1998**, *395*, 585-588.

(2) Simonich, S. L.; Hites, R. A. Global distribution of persistent organochlorine compounds. *Science* **1995**, *269*, 1851-1854.

(3) Daly, G. L.; Wania, F. Organic Contaminants in Mountains. *Environ. Sci. Technol.* **2005**, *39*, 385-398.

(4) Grimalt, J. O.; Fernandez, P.; Berdie, L.; Vilanova, R. M.; Catalan, J.; Psenner, R.; Hofer, R.; Appleby, P. G.; Rosseland, B. O.; Lien, L.; Massabuau, J. C.; Battarbee, R. W. Selective trapping of organochlorine compounds in mountain lakes of temperate areas. *Environ. Sci. Technol.* **2001**, *35*, 2690-2697.

(5) Wania, F.; Mackay, D. Global fractionation and cold condensation of low volatility organo-chlorine compounds in polar regions. *Ambio* **1993**, *22*, 10-12.

(6) Usenko, S.; Hageman, K. J.; Schmedding, D. W.; Wilson, G. R.; Simonich, S. L. Trace Analysis of Semi-Volatile Organic Compounds in Large Volume Samples of Snow, Lake Water, and Groundwater. *Environ. Sci. Technol.* **2005**, *39*, 6006-6015.

(7) Hageman, K. J.; Simonich, S. L.; Campbell, D. H.; Wilson, G. R.; Landers, D. H. Atmospheric Deposition of Current-Use and Historic-Use Pesticides in Snow at National Parks in the Western United States. *Environ. Sci. Technol.* **2006**, *40*, 3174-3180.

(8) Mast, A.; Foreman, W. T.; Skaates, S. Current-Use Pesticides and Organochlorine Compounds in Precipitation and Lake Sediment from Two High-Elevation National Parks in the Western United States. *Archives of Environmental Contamination and Toxicology* **2006**, In Press.

(9) U.S. Environmental Protection Agency. **(accessed Jan. 2007)**, http://www.epa.gov/pbt/index.htm.

(10) Landers, D. H.; Simonich, S. L.; Campbell, D. H.; Erway, M. M.; Geiser, L.; Jaffe, D.; Kent, M.; Schreck, C.; Blett, T.; Taylor, H. E. Western Airborne Contaminants Assessment Project Research Plan. **2003**, *Western Airborne Contaminants Assessment Project Research Plan. EPA/600/R-03/035. U.S. EPA, ORD, NHEERL, WED, Corvallis, OR(www2.nature.nps.gov/air/Studies/air_toxics/wacap.htm)*.

(11) Burns, D. A. Atmospheric nitrogen deposition in the Rocky Mountains of Colorado and southern Wyoming - a review and new analysis of past study results. *Atmos. Environ.* **2003**, *37*, 921-932.

(12) Heuer, K.; Tonnessen, K. A.; Ingersoll, G. P. Comparison of precipitation chemistry in the Central Rocky Mountains, Colorado, USA. *Atmos. Environ.* **2000**, *34*, 1713-1722.

(13) Fernandez, P.; Vilanova, R. M.; Martinez, C.; Appleby, P.; Grimalt, J. O. The historical record of atmospheric pyrolytic pollution over Europe registered in the sedimentary PAH from remote mountain lakes. *Environ. Sci. Technol.* **2000**, *34*, 1906-1913.

(14) Fernandez, P.; Vilanova, R. M.; Grimalt, J. O. Sediment fluxes of polycyclic aromatic hydrocarbons in European high altitude mountain lakes. *Environ. Sci. Technol.* **1999**, *33*, 3716-3722.

(15) Grimalt, J. O.; van Drooge, B. L.; Ribes, A.; Vilanova, R. M.; Fernandez, P.; Appleby, P. Persistent organochlorine compounds in soils and sediments of European high altitude mountain lakes. *Chemosphere* **2004**, *54*, 1549-1561.

(16) Grimalt, J. O.; Drooge, B. L. V.; Ribes, A.; Fernandez, A. E.; Appleby, P. Polycyclic aromatic hydrocarbon composition in soils and sediments of high altitude lakes. *Environ. Pollut.* **2004**, *131*, 13-24.

(17) Appleby, P. G.; Nolan, P. J.; Gifford, D. W.; Godfrey, M. J.; Oldfield, F.; Anderson, N. J.; Battarbee, R. W. ^{210}Pb Dating by low background gamma counting. *Hydrobiologia* **1986**, *141*, 21-27.

(18) Appleby, P. G. Radiometric dating of sediment cores. WACAPs Project - Year 1 Report. **2003**.

(19) Appleby, P. G. Radiometric dating of sediment cores. WACAPs Project - Year 2 Report. **2004**.

(20) Appleby, P. G. Radiometric dating of additional sediment cores from Matcharak and Wonder Lakes. WACAPs Project - Year 2 Supplementary Report. **2004**.

(21) Appleby, P. G. Radiometric dating of sediment cores. WACAPs Project - Year 3 Report. **2005**.

(22) Ackerman, L. K.; Wilson, G. R.; Simonich, S. L. Quantitative Analysis of 39 Polybrominated Diphenyl Ethers by Isotope Dilution GC/Low-Resolution MS. *Anal. Chem.* **2005**, *77*, 1979-1987.

(23) Method-8280A, E. P. A. The analysis of polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans by high resolution gas chromatography/low resolution mass spectrometry (HRGC/LRMS). http://www.epa.gov/epaoswer/hazwaste/test/pdfs/8280a.pdf.

(24) Daly, C.; Neilson, R. P.; Phillips, D. L. A statistical-topographic model for mapping climatological precipitation over mountainous terrain. *Journal of Applied Meteorology* **1994**, *33*, 140-158.

(25) Certificate of analysis (2004) SRM 1941b, organics in marine sediment. National Institute of Standards and Technology, Gaithersburg, MD.

(26) Wise, S. A.; Poster, D. L.; Schantz, M. M.; Kucklick, J. R.; Sander, L. C.; de Alda, M. L.; Schubert, P.; Parris, R. M.; Porter, B. J. Two new marine sediment

standard reference materials (SRMs) for the determination of organic contaminants. *Anal Bioanal Chem* **2004**, *378*, 1251-1264.

(27) Wong, C. S.; Sanders, G.; Engstrom, D. R.; Long, D. T.; Swackhamer, D. L.; Eisenreich, S. J. Accumulation, Inventory, and Diagenesis of Chlorinated Hydrocarbons in Lake Ontario Sediment. *Environ. Sci. Technol.* **1995**, *29*, 2661-2672.

(28) Dearth, M. A.; Hites, R. A. Complete Analysis of Technical Chlordane Using Negative Ionization Mass Spectrometry. *Environ. Sci. Technol.* **1991**, *25*, 245-254.

(29) Bidleman, T.; Jantunen, L. M.; Helm, P. A.; Lunden, E. B.; Juntto, S. Chlordane Enantiomers and Temporal Trends of Chlordane Isomers in Arctic Air. *Environ. Sci. Technol.* **2002**, *36*, 539-544.

(30) Sethajintanin, D.; Anderson, K. A. Temporal bioavailability of organochlorine pesticides and PCBs. *Environ. Sci. Technol.* **2006**, *40*, 3689-3695.

(31) John F. Quensen III; Sherry A. Mueller; Mahendra K. Jain; Tiedje, J. M. Reductive Dechlorination of DDE to DDMU in Marine Sediment Microcosms. *Science* **1998**, *280*, 722 - 724.

(32) Blais, J. M.; Muir, D. C. G. In *Tracking Environmental Change Using Lake Sediments*; Last, W. M., Smol, J. P., Eds.; Kluwer Academic Publishers, 2001; Vol. 2, pp 271-298.

(33) Strandberg, B.; Dodder, N. G.; Basu, I.; Hites, R. A. Concentrations and spatial variations of polybrominated diphenyl ethers and other organohalogen compounds in Great Lakes air. *Environ. Sci. Technol.* **2001**, *35*, 1078-1083.

(34) Zhu, L. Y.; Hites, R. A. Brominated Flame Retardants in Sediment Cores from Lake Michigan and Erie. *Environ. Sci. Technol.* **2005**, *39*, 3488-3494.

(35) Li, A.; Rockne, K. J.; Sturchio, N.; Song, W. L.; Ford, J. C.; Buckley, D. R.; Mills, W. J. Polybrominated diphenyl ethers in the sediments of the Great Lakes. 4. Influencing factors, trends, and implications. *Environ. Sci. Technol.* **2006**, *40*, 7528-7534.

(36) Landers, D. H.; Simonich, S. L.; Jaffe, D. A.; Geiser, L.; Campbell, D. H.; Schwindt, A.; Schreck, C.; Kent, M.; Hafner, W. D.; Taylor, G. E.; Hageman, K. J.; Blett, T.; Erway, M. M.; Pierson, S.; Christie, S. An Assessment of Airborne Contaminants in National Parks of the Western United States. **2007**.

(37) Larsson, P.; Collivin, L.; Okla, L.; Meyer, G. Lake Productivity and Water Chemistry as Governors of the Uptake of Persistent Pollutants in Fish. *Environ. Sci. Technol.* **1992**, *26*, 346-352.

(38) Ramankutty, N.; Foley, J. A. Estimating historical changes in land cover: North American croplands from 1850 to 1992. *Global Ecol Biogeogr* **1999**, *8*, 381-396.

(39) United States Census Bureau. **2000**, *http://quickfacts.census.gov/qfd/states/*.

(40) Hafner, W. D.; Carlson, D. L.; Hites, R. A. Influence of local human population on atmospheric polycyclic aromatic hydrocarbon concentrations. *Environ. Sci. Technol.* **2005**, *39*, 7374-7379.

(41) Garban, B.; Blanchoud, H.; Motelay-Massei, A.; Chevreuil, M.; Ollivon, D. Atmospheric bulk deposition of PAHs onto France: trends from urban to remote sites. *Atmos. Environ.* **2002**, *36*, 5395-5403.

(42) Baron, J. S.; Rueth, H. M.; Wolfe, A. M.; Nydick, K. R.; Allstott, E. J.; Minear, J. T.; Moraska, B. Ecosystem responses to nitrogen deposition in the Colorado Front Range. *Ecosystems* **2000**, *3*, 352-368.

(43) U.S. Department of Agriculture -- National Agriculture Statistics Service,. **2002**, *http://151.121.3.33:8080/Census/Create_Census_US_CNTY.jsp#top*.

(44) U.S. Geological Survey; Pesticide National Synthesis Project Annual Use Maps. *http://ca.water.usgs.gov/pnsp/use92/* **1997**.

(45) Franz, T. P.; Eisenreich, S. J. Snow scavenging of polychlorinated biphenyls and polycyclic aromatic hydrocarbons in Minnesota. *Environ. Sci. Technol.* **1998**, *32*, 1771-1778.

(46) Wania, F.; Mackay, D.; Hoff, J. T. The importance of snow scavenging of polychlorinated biphenyl and polycyclic aromatic hydrocarbon vapors. *Environ. Sci. Technol.* **1999**, *33*, 195-197.

(47) Daly, G. L.; Wania, F. Simulating the influence of snow on the fate of organic compounds. *Environ. Sci. Technol.* **2004**, *38*, 4176-4186.

(48) Van Metre, P. C.; Mahler, B. J. Trends in Hydrophobic Organic Contaminants in Urban and Reference Lake Sediments across the United States, 1970-2001. *Environ. Sci. Technol.* **2005**, *39*, 5567-5574.

CHAPTER 4. SPATIAL AND TEMPORAL TRENDS OF SEMI-VOLATILE ORGANIC POLLUTANTS IN REMOTE WESTERM U.S. LAKE SYSTEMS

SASCHA USENKO[†], DIXON H. LANDERS[§], PETER G. APPLEBY[⊥], AND STACI L. SIMONICH[†,‡]

[†]Department of Chemistry, [‡]Department of Environmental & Molecular Toxicology, Oregon State University, Corvallis, Oregon 97331

[§]United States Environmental Protection Agency-Western Ecology Division, Corvallis, OR 97333, USA

[⊥]Environmental Radioactivity Research Centre, University of Liverpool, Liverpool L69 3BX, UK

ABSTRACT

Sediment cores from fourteen remote lakes were collected from western U.S. National Parks in 2003-2005 and analyzed for 98 semi-volatile organic (SOCs) compounds from 2003-2005. Sediment intervals were dated using ^{210}Pb and ^{137}Cs, and analyzed for current and historic-use pesticide (CUPs and HUPs) and their degradation products, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and polybrominated diphenyl ethers (PBDEs). The most frequently detected CUPs were dacthal and endosulfan I, II, and sulfate. The most frequently detected HUPs were trans-chlordane, trans-nonachlor, cis-nonachlor, DDDs, DDEs, and dieldrin. Spatial and temporal trends were explored across parks for CUPs, HUPs, PCBs, PAHs, and PBDEs. In general, the current use SOCs flux increased from the time of U.S. registration to present day (surficial sediment) with a doubling time of 9.8 to 30.7 years. In general, the historic use SOCs flux increased from the time of U.S. registration until the time of U.S. restriction with a doubling time of 8.8 to 46.3 years. Following the time of U.S. restriction, HUP fluxes decreased with a half-live of 10.5 to 70.9 years but were detectable in surficial sediment, indicating that these compounds continued to be deposited to remote lake systems in western U.S. In the surficial sediment, the flux of many SOC showed a strong correlation with the 2003 seasonal snowpack SOC fluxes (r^2 ranged from 0.35 to 0.91, $p<0.05$). These significant regressions stress the importance of winter time SOC deposition in western National Parks.

INTRODUCTION

Semi-volatile organic compounds (SOCs) have vapor pressures in the range 10^{-4} to 10^{-11} atm (*1*). Many anthropogenic SOCs pose risks to human and ecosystem health because of their persistent, bioaccumulative, and toxic properties in the environment (*2*). Some SOCs are capable, due to their persistent in the environment and volatility, of undergoing atmospheric transport for thousands of kilometers in the gas phase and/or on aerosols (*3-5*). SOCs are deposit to the earth's surface by air-surface exchange, dry deposition and/or wet deposition in the form of snow and rain (*6,7*). SOCs deposited in colder regions, such as polar or orographic regions, have a lower chemical potential, which decreases degradation in the ecosystem and revolatilization into the atmosphere (*3,5,6,8*). This combination of the lower volatility and increased persistence results in some SOCs accumulating in areas with low average temperatures, such as polar or orographic regions (*3,5,6,8-10*). These processes are described by the global fractionation model and the theory of cold condensation (*3,10*). The global fractionation model and the cold condensation theory predicts that, due to the latitudinal temperature gradients and regional altitudinal temperature gradients, organic contaminants will condense out of the atmosphere at different latitudes and/or different altitudes depending upon their vapor pressure (*3,10*). Vast improvements in our understanding of the fate and transport of many SOCs have been accomplished with studies in eastern North America, Europe, and parts of the arctic and Antarctica (*3,7,11-24*). Advancements in our understanding of the fate and transport of SOCs in western U.S are hindered by the small number and limited scope of previous studies (*25-29*).

Lake sediment cores are unique because they are one of the few environmental matrices that can provide the historical deposition profiles and flux of contaminants to high-altitude and/or high-latitude lake ecosystem. The historical deposition of SOCs is recorded naturally in lake sediment and can be reconstructed by analyzing SOCs in dated sediment cores. In all lake sediment, organic contaminants such as SOCs can undergo degradation and molecular diffusion (*30*). However, the study of reconstructed historical SOC profiles, SOC fluxes, and SOC temporal trends with these profiles has been well documented and used to improve the understanding of the fate and transport of SOCs on local, regional, and global scales (*6,13,15,19,20,31*).

There are few publications on the historical deposition of SOCs to sediment from high-altitude and/or high-latitude remote lakes in the western U.S. (*9,26-28,32*). To improve our understanding of the fate and transport of SOCs in remote western U.S. lake systems, we evaluated the spatial and temporal SOC flux patterns and trends within, and between, remote lake sediments cores. In previous studies, spatial and temporal sediment measurements have been used to identify regional temporal changes in PAH sources by utilizing different source apportionment models (*33*). Differences in individual PAH sediment profiles, and PAH composition within the profile, were used to determine the PAH contributions from regional and local sources, as well as to identify changes in PAH sources overtime (*33*). Global and regional studies have used spatial and temporal sediment measurements to validate the global fractionation model and the theory of cold condensation (*34*). Difference in SOCs atmospheric transport and deposition, east versus west of the Continental Divide, was identified in Rocky Mountain National Park (Chapter 3). The purpose of this research was to examine the spatial and temporal trends of CUP, HUP, PCB, PAH, and PBDE fluxes in sediment cores collected from remote lake systems in the western U.S.

EXPERIMENTAL SECTION

Lacustrine Catchment Sites. Sediment cores were collected from oligotrophic lakes in Sequoia National Park (SEKI), CA, Rocky Mountain National Park (ROMO), CO, Olympic National Park (OLYM), WA, Mt. Rainier National Park (MORA), WA, Glacier National Park (GLAC), MT, Denali National Park (DENA), AK, Gates of the Arctic National Park and Preserve (GAAR), AK, and Noatak National Preserve (NOAT), WA (Figure 4.1). Two lakes were sampled in each national park, however only one lake was sampled in GAAR and NOAT, for a total of fourteen lakes (Figure 4.1 and Table 4.1). Emerald Lake (SEKI) is a high-altitude cirque lake (2800 m a.s.l.) with a predominantly granite catchment orientated northwest. Pear Lake (SEKI) is also a high-altitude cirque lake (2904 m a.s.l.) located 0.5 km from Emerald Lake (SEKI); its granite catchment is orientated north. Mills Lake (ROMO) is a high-altitude cirque lake (~3030 m a.s.l.) located east of the Continental Divide. Lone Pine Lake (ROMO) (~3024 m a.s.l.) is located approximately 10 km from Mills Lake (ROMO) west of the Continental Divide. Hoh Lake (OLYM) is a hanging cirque lake (1384 m a.s.l.) orientated on the north side of

Mt. Olympus. PJ Lake (OLYM) is a hanging cirque lake (1433 m a.s.l.) orientated on the northeast side of Mt. Olympus, approximately 27 km from PJ Lake (OLYM). Golden Lake (MORA) is high-altitude perched lake orientated on the west side of Mt Rainier. LP19 (MORA) is an unnamed high-altitude perched lake also orientated on the west side of Mt Rainier, approximately 7.5 km south of Golden Lake (MORA). Snyder Lake (GLAC) is a perched cirque lake (1600 m a.s.l.) located east of the Continental Divide. Oldman Lake (GLAC) cirque lake (2026 m a.s.l.) is located approximately 30 km from Snyder Lake (GLAC) west of the Continental Divide. Wonder Lake (DENA) and McLeod Lake (DENA) are a piedmont lakes located approximately 55 km north of Mt. McKinley. Lake Matcharak (GAAR) is located in the arctic tundra along the Noatak River south of the central Brooks Range. Burial Lake (NOAT) is located in the arctic sets in the Foothills of the north Brooks Range approximately 144 km west of Lake Matcharak. The lake bathymetry and sampling site location for each lake is provided in Appendix A. In this study, GAAR and NOAT where treated as one national park because they are immediately adjacent to each other. The lake's physical and limnological characteristics, as well as the ratio of these characteristics within a national park, are provided in Table 4.1.

Sediment Sampling Methodology. Sampling was conducted as described previously (Chapter 3). Briefly, sediment cores were collected from the deepest area of the lake using an Uwitec gravimetric corer and 78 mm polycarbonate core tube. Sediment cores were extruded vertically and sectioned in the field, 0.5 cm intervals for first 10 cm and 1 cm intervals thereafter. Intervals were stored separately in pre-cleaned glass jars. Sediment samples were kept on blue ice and shipped overnight to the laboratory.

^{210}Pb Dating, Percent Moisture, and TOC. An aliquot from each interval was analyzed for percent moisture, total organic carbon (TOC), and ^{210}Pb activity. Radiometric dating was performed by Peter G. Appleby of the University of Liverpool. Complete details of these analyses are provided elsewhere (Chapter 3). The constant rate of supply model along with measured ^{210}Pb activity was used to determine the sedimentation rate and average date of each interval (*35-41*). The total and supported ^{210}Pb activity for each core along with the sedimentation rate versus age plots are provided in Appendix B.

PRISM. The Parameter-elevation Regressions on Independent Slopes Model (PRISM) was designed to estimate the orographic climate parameters (*42*). PRISM provides the average precipitation for a month from 1971-2000 with 800×800 m resolution.

Analytical Methodology. A minimum of eight intervals per sediment core were analyzed for 98 SOCs including CUPs, HUPs, PCBs, PAHs, and PBDEs, as previously described in Chapter 3. Sediment intervals were selected for extraction based on known U.S. restriction and registration dates. In addition, the surficial sediment intervals were selected as well as were possible one interval was selected to represent pre-industrialization expansion into the western U.S. (1875-1910). The extraction, isolation, and quantification of SOCs were also described in Chapter 3. In brief, wet sediment samples (10-40 g ww) were dried with sodium sulfate and extracted using pressurized liquid extraction. Prior to extraction, samples were spiked with an isotopically labeled surrogate-EA solution to correct for target analyte loss over the analytical method. SOCs were isolated and matrix interferences were removed using gel permeation chromatography, followed by silica gel chromatography. Extracts were concentrated (~200 μL) and spiked with an isotopically labeled internal standard-EA solution. Gas chromatographic mass spectrometry with electron impact and electron capture negative ionization was used for the SOC separation and detection.

Focusing Factor Correction. Focusing factors (FF) were calculated for each sediment core in order to correct for sediment focusing (Table 4.1). Sediment focusing describes the redistribution of particulate matter throughout the lake (*43*).

$$\mathrm{FF} = \frac{^{210}\mathrm{Pb\ Inventory}}{^{210}\mathrm{Pb\ Fallout}} \qquad (4\text{-}1)$$

In equation 4-1, ^{210}Pb inventory is derived by plotting unsupported ^{210}Pb against the mass sedimentation accumulation rate (*44*). The ^{210}Pb atmospheric fallout was modeled from ice cores, soil samples, and atmospheric collectors near sampling sites (*45-49*). ^{210}Pb atmospheric fallout may vary over short time periods, however over the time frame of these sediment cores (<150 years), the ^{210}Pb atmospheric fallout is considered to be fairly constants (*35,36*). In areas of a lake where the particulate matter is accumulating are described by a FF greater than one. Areas of a lake with particulate matter erosion are described by a FF less than one. Correcting for the redistribution of particulate matter in lake sediment is important because hydrophobic SOCs sorb to particulate matter. The erosion and accumulation of particulate matter may also result in the erosion and accumulation of SOCs from one area of the lake to another. The FFs of the lake sediment cores ranged from 0.78 to 4.55 (Table 4.1).

In order to examine the spatial and temporal trends of SOCs in multiple cores all SOC sediment concentrations were multiplied by the lake sedimentation rate and normalized to the FF. This converted all SOC concentrations (ng g^{-1} dry wt) to focus-corrected SOC fluxes (ng m^{-2} y^{-1}).

RESULTS AND DISCUSSION

Spatial Distributions. The surficial sediment was used to identify the current spatial distribution of CUPs, HUPs, PCBs, PAHs, and PBDEs (Figure 4.2-4.4). ΣEndosulfans (Endosulfan I, II, and sulfate) and dacthal were measured in surficial sediment throughout western U.S. lakes. This is evidence that these CUPs undergo atmospheric transport and deposition from source regions (agricultural areas) to high-altitude and high-latitude ecosystems. ΣEndosulfans was the most commonly measured CUPs in surficial sediment, followed by Dacthal. Endosulfan Sulfate, the degradation product of endosulfan I and II, comprised 80 to 95% of the ΣEndosulfans. ΣEndosulfans surficial sediment fluxes ranged approximately four orders of magnitude. Emerald Lake (SEKI) and Mills Lake (ROMO) had the greatest surficial sediment flux of ΣEndosulfans at ~500 ng m^{-2} y^{-1}, while Burial Lake (NOAT) had a surficial sediment flux of 0.03 ng m^{-2} y^{-1} (Figure 4.2). Dacthal surficial sediment fluxes ranged approximately four orders of magnitude. Pear Lake (SEKI) had the greater surficial sediment flux of dacthal (53 ng m^{-2} y^{-1}). Dacthal was measured in both lakes from ROMO, SEKI, and GLAC. However, dacthal was not detected in the surficial sediment of LP19 (MORA) or Golden Lake (MORA) (Figure 4.2).

HUPs were also measured in surficial sediment throughout western U.S. lakes (Figure 4.3). This suggests that, even decades after U.S. restriction, HUPs continue to volatilize from historical contaminated soils and accumulate in high-altitude and high-latitude ecosystems (*32*). ΣChlordanes (trans-chlordane, trans- and cis-nonachlor) were measured in the surficial sediment of every core examined and was the most commonly measured HUP (Figure 4.3). The highest ΣChlordane flux was measured in SEKI (Emerald), while the lowest flux was measured in Burial Lake (NOAT) (Figure 4.3). Similar to CUPs, the fluxes of HUPs in surficial sediment range approximately four orders of magnitude. Dieldrin was only detected in SEKI and ROMO. ΣDDTs (o,p-DDT and p,p-DDT) were not measured in the surficial sediment of any park. However, the major degradation products of ΣDDTs, ΣDDDs (o,p-DDD + p,p-DDD) and DDEs (o,p-DDE + p,p-DDE), (*50,51*) were measured in the surficial sediment from lakes in ROMO, SEKI, and GLAC, as well as MORA (LP19) (Figure 4.3). ΣDDDs and ΣDDEs surficial sediment fluxes ranged from 2100 ng m^{-2} y^{-1} in Mills Lake to 300 ng m^{-2} y^{-1} in LP19. ΣDDDs and ΣDDEs were not detected in the Alaskan or OYLM lake surficial sediment.

ΣPAHs and ΣPCBs were also detected in surficial sediment throughout western North America's National Parks (Figure 4.4). The specific of ΣPAHs, ΣPCBs, and ΣPBDEs measured are shown in Chapter 3. ΣPCBs were measured in the surficial sediment of each lake and fluxes ranged four orders of magnitude. The PCB congener profile in the surficial sediment was fairly uniform throughout the western U.S., including the Alaskan sites. ΣPAH fluxes in surficial sediment also ranged four orders of magnitude; however the ΣPAHs were not detected in the surficial sediment of McLeod Lake (DENA). The highest ΣPAH flux was measured at Snyder Lake (GLAC) (185,000 ng m^{-2} y^{-1}), Oldman Lake (GLAC) (35,000 ng m^{-2} y^{-1}), and Mills Lake (ROMO) (52,000 ng m^{-2} y^{-1}). Snyder Lake (GLAC) received approximately five times the ΣPAH flux as Golden Lake (MORA). ΣPBDEs were only detected in the surficial sediment from Emerald Lake (SEKI), Mills Lake (ROMO), and Lone Pine Lake (ROMO) (Figure 4.4). ΣPBDEs were not measured in Pear Lake (SEKI).

Lake to lake variations in SOC surficial sediment flux were also observed. These variations can result from physical and limnological characteristics differences between the two lakes. Difference in hydraulic residence time, productivity, topographic barriers, and climatic condition include winder patterns can influence the deposition of SOCs into high-altitude and/or high-latitude lake catchments.

Temporal Distributions. The SOCs detected in surficial sediment were also detected throughout the sediment core of the lake. Many SOCs profiles were consistent with U.S. registration and U.S. restrictions dates (Figure 4.5-4.18). This is illustrated by the ΣChlordanes profiles reconstructed from Pear Lake (SEKI). ΣChlordanes began depositing in Pear Lake (SEKI) sediments around the time of U.S. registration of technical chlordane in (1948) (Figure 4.5A) (*12*). The ΣChlordane flux in Pear Lake (SEKI) increased from U.S. introduction in 1948, with a doubling time of 8.8 ± 0.02 yrs (r^2=0.97, p<0.005) until U.S. restriction in 1988 (Figure 4.12A and Table 4.2) (*12*). After U.S. restriction, the ΣChlordane flux decreased with a half-life of 11.7 ± 0.02 yrs (r^2=0.91, p<0.005) (Figure 4.12A and Table 4.2). As of 2003, the ΣChlordane were still being deposited to Pear Lake (SEKI) sediment even after U.S. restriction, suggesting that components of technical chlordane continue to volatilize from historically contaminated agricultural soils and undergo atmospheric transport and deposition to the Pear Lake (SEKI) catchment. This is likely from regional sources because of how well the ΣChlordane flux profile in Pear Lake closely follows U.S. registration and restriction dates.

The ΣDDDs and ΣDDEs were measured in ~70% of the sediment cores. ΣDDDs and ΣDDEs were only measured in one interval from PJ Lake (OLYM) and Hoh Lake (OLYM), which were dated at 1963 (210 ng m^{-2} y^{-1}) and 1953 (30 ng m^{-2} y^{-1}), respectively (Figure 4.8E). The ΣDDDs and ΣDDEs were not detected in the Alaskan lakes (Figures 4.10E and 4.11E). In Golden Lake (MORA), the ΣDDD and ΣDDE flux increased after U.S. registration of technical DDT in 1942 and decreased sharply after U.S. restrictions of technical DDT in 1972. ΣDDDs and ΣDDEs were not measured in the surficial sediment of Golden Lake (MORA) (Figure 4.7E). This suggests that atmospheric transport and deposition of ΣDDDs and ΣDDEs from historical agricultural sources into Golden Lake (GLAC) catchment are continuing to decrease.

The ΣDDD and ΣDDE flux measured in Pear Lake (SEKI) decreased from 1961 (24,000 ng m^{-2} y^{-1}) to 2003 (710 ng m^{-2} y^{-1}), with a half-life of 10.5 ± 0.01 yrs (r^2=0.93, p<0.001) (Figures 4.5E, Figure 4.12E, and Table 4.2). ΣDDT was not detected in the Pear Lake (SEKI) sediment core. This suggests that DDT under went reductive dechlorination to DDD under anoxic conditions and dehydrochlorination to ΣDDE under oxic conditions in the lake water and sediment (*50,51*). ΣDDD and ΣDDE were also measured in Emerald Lake (SEKI) and decreased from 1961 (7600 ng m^{-2} y^{-1}) to 1997 (2000 ng m^{-2} y^{-1}), with a half-life of 18.7 ± 0.01 yrs (r^2=0.93, p<0.001) (Figures 4.5E, Figure 4.12E, and Table 4.2). In 2003, the ΣDDD and ΣDDE flux in Emerald Lake increased to (3000 ng m^{-2} y^{-1}).

The ΣDDE/(ΣDDE+ΣDDD) ratio in Pear Lake (SEKI) changed throughout the depth of the sediment core. In the interval dated as 1957, DDD was the dominate DDT degradation product and the ΣDDE/(ΣDDE+ΣDDD) ratio was 0.29 (Figure 4.19). However, over time and with U.S. restriction of technical DDT in 1972, the fraction ratio of ΣDDE/(ΣDDE+ΣDDD) in 1980 and 2003 was 0.49 and 1.0, respectively (Figure 4.19). Pear Lake (SEKI) is highly stratified in the summer and winter months and, during these months, water in Pear Lake's (SEKI) hypolimnion becomes anoxic (*52*). Because, the dehydrochlorination of DDT to DDE requires oxic conditions; this may suggest that the degradation of DDT to DDE occurred in agriculture soils and not in Pear Lake (SEKI) sediment. The ΣDDE/(ΣDDE+ΣDDD) ratio in Emerald Lake (SEKI) also increase overtime (Figure 4.19).

ΣEndosulfans, a CUP, began depositing to these lakes around the time of U.S. registration of technical endosulfan (1954) (*2*), with doubling times ranging from 5.7 to 32.4 years (Figures 4.12-4.18B and Table 4.2). ΣEndosulfan fluxes were consistent with U.S. use dates in ~70% of the sediment cores examined by this study (Figure 4.5-4.11B). The ΣEndosulfan flux has increased in LP19 (MORA) and Golden Lake (MORA), with doubling times of 10.8 ± 0.02 yrs (r^2=0.81, p<0.01) and 9.8 ± 0.01 yrs (r^2=0.94, p<0.001), respectively (Figure 4.14B and Table 4.2). These ΣEndosulfan doubling times, as well as the doubling times measured in Pear Lake (SEKI), Mills Lake (ROMO), Oldman Lake (GLAC) and PJ Lake (OLYM), were all less than 13.5 yrs and correlated well with regional endosulfan use patterns (r^2=0.50, p<0.05) (*53,54*) (Figure 4.20). However, the ΣEndosulfan doubling time was excluding from the regression because of its slow doubling time of 34.2 ± 0.02 yrs (r^2=0.72, p<0.03). This statistical significant regression demonstrates the importance of regional endosulfan use within 150 km of a National Park in the western U.S.

ΣEndosulfan flux measured in Lone Pine Lake (ROMO) and Snyder Lake (GLAC) had doubling times of 19.1 ± 0.004 (r^2=0.92, p<0.001) and 19.7 ± 0.01 yrs (r^2=0.88, p<0.001), respectively (Figure 4.13B, Figure 4.16B, and Table 4.2). Lone Pine Lake (ROMO) and Mills Lake (ROMO) are both <20 km from Endosulfan use areas (Figure 4.21 and 4.22) (Chapter 3, *32*). In addition, Snyder Lake (GLAC) and Oldman Lake (GLAC) are both <40 km from Endosulfan use areas (Figure 4.21 and 4.22). Lone Pine Lake (ROMO) and Snyder Lake (GLAC) reside on the west side of the Continental Divide and the major regional endosulfan use resides on the east side of the Continental Divide in these regions. In both Lone Pine Lake (ROMO) and Snyder Lake (GLAC), the Continental Divide appears to buffer the atmospheric transport of ΣEndosulfan to these lake catchments. This results in slower ΣEndosulfan doubling times for Lone Pine Lake (ROMO) and Snyder Lake (GLAC) compared to Mills Lake (ROMO) and Oldman Lake (GLAC), respectively.

McLeod Lake (DENA) had one of the slowest ΣEndosulfan flux doubling time of 29.6 ± 0.01 yrs (r^2=0.73, p<0.05) (Figure 4.17B and Table 4.2). Because there was no regional endosulfan use in Alaska around McLeod Lake (DENA) (*53,54*), this suggests that ΣEndosulfan underwent long-range atmospheric transport (LRAT) to McLeod Lake (DENA). Doubling times calculated from ΣEndosulfan fluxes were significantly correlated with endosulfan use within a 150 km radius, (r^2=0.50, p<0.05) (Figure 4.20).

Dacthal, a current-use pesticide, was measured in ~57% of the sediment cores and began depositing to lakes around the time of U.S. registration in 1955 (*2*) and was consistent with dacthal use patterns in the U.S. (Figure 4.23 and 4.24) (*54*) . Dacthal was not measured in Wonder Lake (DENA), Matcharak Lake (GAAR), Burial Lake (NOAT) (Figures 4.10D and 4.11D). This suggests that dacthal does not undergo LRAT transport to the arctic, despite it's long estimate atmospheric half-life of 12 to 120 days, which is approximately 15 times greater than endosulfan I (*55*). Dacthal was also not measured in LP19 (MORA), Golden Lake (MORA) and Hoh Lake (OLYM), however it was measured in Snyder Lake (GLAC) and Oldman Lake (GLAC). The dacthal flux measured in Snyder Lake (GLAC) and Oldman Lake (GLAC) had doubling times of 29.4

± 0.01 (r^2=0.60, p<0.05) and 25.7 ± 0.01 yrs (r^2=0.80, p<0.005), respectively (Figure 4.16D and Table 4.2). From 1990-1993 and 1995-1998, dacthal use in Montana was estimated to be zero (Figure 4.23 and 4.24) (*54,56*). In 2003, dacthal use in the Alberta Canadian prairies (north of GLAC) was also estimated to be zero (*57*). LP19 (MORA) and Golden Lake (MORA) reside on the west side of MORA, while greater than 90% of the 1990-1993 and 1995-1998 dacthal use occurred east of MORA (Figure 4.23 and 4.24) (*54,56*). This suggests that dacthal undergoes LRAT from use areas in Washington, Idaho, and Oregon via westerly winds, to Montana before being deposited in GLAC.

PCBs began depositing to the lakes around the time of U.S. introduction in 1929 (Figures 4.5G-4.11G). Approximately 43% of the lakes had a statistically significant ΣPCB flux doubling time (10.2 to 42.0 yrs), while 21% of the had statistically significant ΣPCB flux half-lives (20.3 to 40.3 yrs) (Figure 4.12G-4.18G and Table 4.2). The PCB congener profile measured throughout the surficial sediment was fairly uniform over western North America. The PCB congener profile was also very constant throughout the sediment cores. Of the PCB congeners measured in sediment, PCB-138 was the major congener. The ΣPCB fluxes in the Alaskan lakes reached a maximum, in the intervals analyzed after U.S. restriction in 1977 (Figures 4.10G and 4.11G). In McLeod Lake (DENA) and Matcharak Lake (GAAR) the maximum ΣPCB flux was in the surficial sediment. This was also observed in other studies of the North American High Arctic (*34*). This delay in maximum PCB flux, compared to mid-latitude sites, may be evidence of global fractionation (*34*).

PBDEs were detected in all most lakes at or below the quantitation limit. PBDE deposition began around the time of U.S. introduction in 1970s. The most commonly detected congeners were PBDE-47, PBDE-99, and PBDE-100. Mills Lake (ROMO) was the only site where a statistically significant doubling time for ΣPBDE flux could be calculated (Chapter 3). The doubling time of ΣPBDE flux in Mills Lake (ROMO) was 5.4 ± 0.001 yrs (r^2=0.99, p<0.001) (Figure 4.13H and Table 4.2). This is most likely due to the major metropolitan areas <150 km east of ROMO (Denver, Boulder, and Fort Collins). The ΣPBDE flux to Mills Lake (ROMO) in 2003 was 24 times greater than that of Lone Pine Lake (ROMO) (Chapter 3). No statistically significant PBDE trends were present in the Lone Pine Lake (ROMO) sediment core (Figure 4.13H and Table 4.2).

The difference in the PBDE flux and depositional trends between Mills Lake (ROMO) and Lone Pine Lake (ROMO) is most likely do to the Continental Divide's influence on atmospheric transport of SOCs.

ΣPAHs were detected in every lake sediment core examined. Over 50% of the sites demonstrated statistically significant temporal trends with ΣPAH flux. Half-lives and doubling times for ΣPAHs in sediment cores from these lakes ranged from 15.3 to 28.3 yrs and 10.5 to 112.6 yrs, respectively (Figure 4.12F-4.18F and Table 4.2).

Snyder Lake (GLAC), located on the west side of the Continental Divide, has received the greatest ΣPAH deposition of any other lake examined consistently over the past ~50 years. This is surprising because of the low population density in the surrounding areas (208,000 individuals within 150 km) and the significant positive correlation previously demonstrated between atmospheric PAH concentrations and population (*58,59*).

The Snyder Lake (GLAC) surficial sediment ΣPAH flux (185,000 ng m^{-2} y^{-1}) was approximately 5.3 times greater than Oldman Lake (GLAC) (35,000 ng m^{-2} y^{-1}) and approximately 3.5 times greater than Mills Lake (ROMO) (52,000 ng m^{-2} y^{-1}). The ΣPAH flux measured in Snyder Lake (GLAC) decreased with a half-life of 46.8 ± 0.01 yrs (r^2=0.87, p<0.01) (Figure 4.16F and Table 4.2) (Figure 4.14 and Table 4.2). However, the ΣPAH flux measured in Oldman Lake (GLAC) increased with a doubling time of 48.9 ± 0.01 yrs (r^2=0.90, p<0.001) (Figure 4.16F and Table 4.2). The deposition of ΣPAH to Mills Lake increased with a doubling time of 22.6 ± 0.01 yrs (r^2=0.88, p<0.01) from 1987 to 2003 (Figure 4.13F and Table 4.2). This increase in ΣPAH deposition to Mills Lake may correspond with population growth in this region over the past decade (*60*). 3,050,000 individuals live within a 150 km radius of ROMO (*60*). This may suggest that the increased of ΣPAH flux into Snyder Lake over other sites was not due to urban sources.

Snow Park Flux and Surficial Sediment Flux Correlation

In 2003, seasonal snowpack samples were collected from each of these lake catchments, except for PJ Lake and Hoh Lake in OLYM because of insufficient snowpack (*32*). Many SOCs measured in snow were also measured in surficial sediment including ΣEndosulfans, dacthal, ΣChlordanes, ΣHCH (γ-HCH + α-HCH), ΣPCBs, and ΣPAH. Linear regression analysis indicated that the natural log of surficial sediment fluxes of ΣEndosulfans, ΣChlordanes, ΣHCH (γ-HCH + α-HCH), ΣPCBs, and ΣPAHs were significantly correlated ($p<0.05$) with the natural log of snow fluxes for these same SOCs, r^2 equaled 0.76, 0.34, 0.91, 0.64, and 0.60, respectively (Figure 4.25 and 4.26). These significant regressions stress the importance of winter time SOC deposition in western National Parks. Dacthal surficial sediment fluxes were not significantly correlated with the 2003 snow fluxes. This is most likely due to dacthal being hydrolyzed to tetrachloroterephthalic acid in water column prior to accumulating in sediment (*61,62*). Slopes of significant regression ranged from 0.80 to 2.0 suggesting that any increase in snow flux would result in a similar increase in surficial sediment flux (Figure 4.25 and 4.26).

PAHs in Glacier National Park. In 1955, an aluminum smelter, (Columbia Falls Aluminum Co. (CFAC)) using stud Soderberg aluminum smelting technology, became operational in Columbia Falls, MT (*63*). The CFAC resides on the Flathead River, ~10 km southwest of GLAC (*64*) and ~45 km southwest of Snyder Lake (GLAC) (Figure 4.27). Outflow from Snyder Lake (GLAC) forms a tributary of the Flathead River. Aluminum smelters with Soderberg technology are known sources of fluoride and PAHs to the environment (*65*) and CFAC has been releasing hydrogen fluoride and ΣPAHs to the atmosphere (~4 tons/year) (*2*). In 1970, atmospheric fluoride was measured in the southwestern region of GLAC (*64,66*) and in radial transects from CFAC in foliage (*66*) (Figure 4.27). These fluoride concentrations were used to produce fluoride concentration isolines that extended up the valley (~40 km) toward Snyder Lake (GLAC) (*66*) (Figure 4.27). This study suggests that fluoride emitted into the atmosphere from CFAC may undergo atmospheric transportation and deposition to Snyder Lake (GLAC). These upslope winds may also transport and deposit PAHs released from the CFAC to Snyder Lake (GLAC).

PAH source apportionment models are often used to identify PAH sources (*67,68*). PAH sources can be distinguished from one another using specific rations of individual PAHs. Aluminum smelters that use stud Soderberg aluminum smelting technology have been shown to emit a Ind/(Ind+BeP) fraction ratio and a

Ind/(Ind+BghiP) fraction ratio of 0.39 and 0.42, respectively (*69*) (Table 4.3). In 1893, prior to CFAC coming on-line, the fraction ratio of Ind/(Ind+BeP) and Ind/(Ind+BghiP) in the Snyder Lake (GLAC) sediment core was 0.49 and 0.55, respectively. From 1955 to 2005, after CFAC came on-line, the Ind/(Ind+BeP) ratio has been fairly constant, with an average ratio ± standard deviation of 0.35 ± 0.05 (Table 4.3). The average Ind/(Ind+BghiP) ratio in Snyder Lake from 1955 to 2003 was 0.48 ± 0.05 (Table 4.3). In Oldman Lake (GLAC), Ind was only detected in the 2005 (surficial sediment) and 1906 intervals. In 1906, the fraction ratio of Ind/(Ind+BeP) and Ind/(Ind+BghiP) in the Oldman Lake (GLAC) sediment core was 0.66 and 0.50, respectively, while in the surficial sediment of Oldman Lake (GLAC) the Ind/(Ind+BeP) and Ind/(Ind+BghiP) ratio was 0.45 and 0.51, respectively (Table 4.3). The Ind/(Ind+BghiP) ratio from the combustion of wood is 0.64 ± 0.07 (*67*). The ratio of Ind/(Ind+BeP) and Ind/(Ind+BghiP) from the combustion of pine in a fireplace is 0.53 and 0.54, respectively (*70*) (Table 4.3). Retene, a biogenic PAH that is a molecular marker of biomass combustion, was also measured in the Snyder Lake sediment core. The retene flux was not significantly correlated with ΣPAH, BeP, Ind, or BghiP flux in Snyder Lake ($p>0.5$), which suggests biomass combustion was not the major source PAHs in the Snyder Lake catchment. The Ind/(Ind+BeP) and Ind/(Ind+BghiP) ratio should remain fairly constant from emission sources to the Snyder Lake sediment core because they PAHs are in the particulate phase and have similar physical and chemical properties.

Snyder Lake (GLAC) Ind/(Ind+BeP) and Ind/(Ind+BghiP) ratios are significantly different ($p<0.005$) from the Mills Lake (ROMO) sediment core which is influenced by a strong urban source (Chapter 3), with an average ratio from 1953 to 2003 of Ind/(Ind+BeP) and Ind/(Ind+BghiP) of 0.66 ± 0.02 and 0.61 ± 0.08, respectively (Table 4.3). The Ind/(Ind+BeP) ratio from gasoline combustion in motor vehicles is 0.74 (*68*) (Table 4.3). LP19 (MORA) is also influenced by a strong urban source area (3,670,000 individuals within 150 km radius). In LP19 (MORA), benzo(ghi)pyrene was not detected and it was not possible to calculate a Ind/(Ind+BghiP) ratio. However, the average Ind/(Ind+BeP) ratio for LP19 (MORA) was 0.61 ± 0.02, from 1956 to 2003. The Snyder Lake (GLAC) Ind/(Ind+BeP) ratio was also significantly different from LP19 (MORA)

($p<0.005$) (Table 4.3). This suggests that a majority of Snyder Lake's (GLAC) PAH load maybe from CFAC and not from local urban sources or biomass combustion.

In 2003, seasonal snowpack was collected from all lake catchments (expect OLYM), including Snyder Lake and Oldman Lake (*32*). The natural log of the ΣPAH snow flux in 2003, from all lake catchments, was significantly correlated with natural log of the surficial sediment ΣPAH flux, from all lake cores ($r^2=0.60$, $p<0.005$) (Figure 4.25). The ΣPAH snow flux measured in 2003 from the Snyder Lake catchment (310,000 ng m^{-2} y^{-1}) was the highest measured ΣPAH snow flux and approximately three times higher than the ΣPAH snow flux measured at Oldman Lake catchment (107,000 ng m^{-2} y^{-1}). The Ind/(Ind+BeP) ratios measured in the 2003 seasonal snowpack from Snyder Lake and Oldman Lake were 0.40 and 0.49, respectively (Table 4.3). The Ind/(Ind+BghiP) ratios in the 2003 snowpack from Snyder Lake and Oldman Lake were 0.43 and 0.54, respectively. The PAH ratios calculated from the 2003 Snyder Lake (GLAC) snowpack closely match the fraction ratios calculated from the Soderberg aluminum smelter emissions. The Ind/(Ind+BeP) ratio in snowpack from Mills Lake and Lone Pine Lake were 0.55 and 0.50, respectively. The Ind/(Ind+BghiP) ratio in snowpack from Mills Lake and Lone Pine Lake were 0.57 and 0.54, respectively (Table 4.3). PAH source apportionment for GLAC, using individual PAH ratios in sediment and snow supports that a majority PAHs being deposited into Snyder Lake (GLAC) are from CFAC and not from biomass combustion or local urban sources, including seasonal summertime automobile traffic through GLAC.

CONCLUSION

Evaluating the spatial and temporal trends of CUPs, HUPs, PCBs, PAHs, and PBDEs in sediment from remote lake systems in western U.S. National Parks suggested that many SOCs are undergoing LRAT and deposition to high-altitude and/or high-latitude ecosystems in the western U.S. Dacthal measurements in MORA and GLAC sediment, combined with regional dacthal use, suggest that dacthal is undergoing atmospheric transport via the predominant westerly winds and deposition. Doubling times calculated from the ΣEndosulfan fluxes were significantly correlated with endosulfan use (Figure 4.26). ΣEndosulfan and ΣPAH fluxes, profiles, and trends within sediment from GLAC and ROMO illustrate that the Continental Divide does impact the atmospheric transport of SOCs. Spatial and temporal PAH trends identified a hot spot of PAH deposition in and around Snyder Lake (GLAC) with respect to other lake catchments. PAH source apportionment models were used to eliminate biomass combustion and urban sources as major PAH emission sources to Snyder Lake (GLAC) and suggests that the major PAH emission source to the Snyder Lake catchment (GLAC) is likely a local aluminum smelter. The natural log of many SOC sediment fluxes showed a significant correlation with the national log of snow flux which demonstrates the importance of winter time deposition. Lake to Lake variability within parks was most likely due to location with respect to SOC sources, position relative to topographic barriers, and differences in lake physical and limnological characteristics.

ACKNOWLEDGEMENTS

This work is part of WACAP (Western Airborne Contaminants Assessment Project), a collaborative venture between the National Park Service, the Environmental Protection Agency, the U.S. Geological Survey, Oregon State University, University of Washington, and the U.S.D.A. Forest Service. It was funded primarily through cooperative and interagency agreements with the National Park Service, and also included in-kind contributions from all of the project partners. Further information about WACAP can be found on the WACAP web site at: http://www2.nature.nps.gov/air/Studies/air_toxics/wacap.htm. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

This publication was made possible in part by grant number P30ES00210 from the National Institute of Environmental Health Sciences, NIH. Its contents are solely the responsibility of the authors and do not necessarily represent the official view of the NIEHS, NIH.

The authors would like to thank Marilyn Morrison Erway (Dynamic Corporation) and crew for collecting the sediment samples from ROMO.

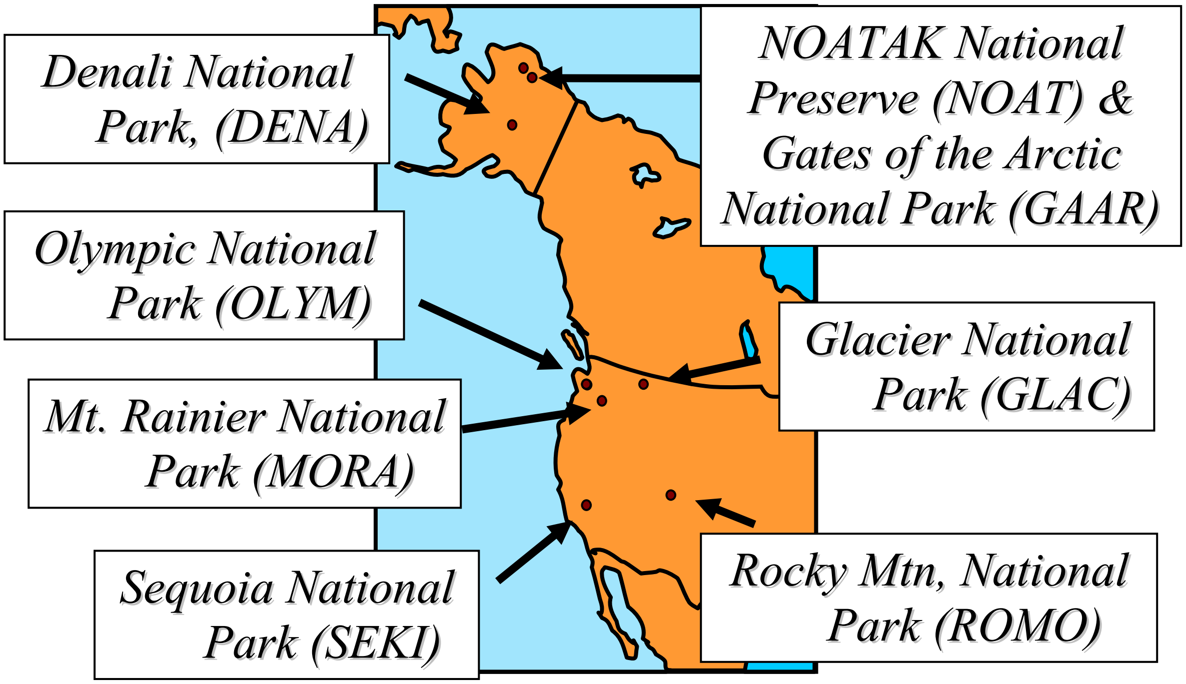
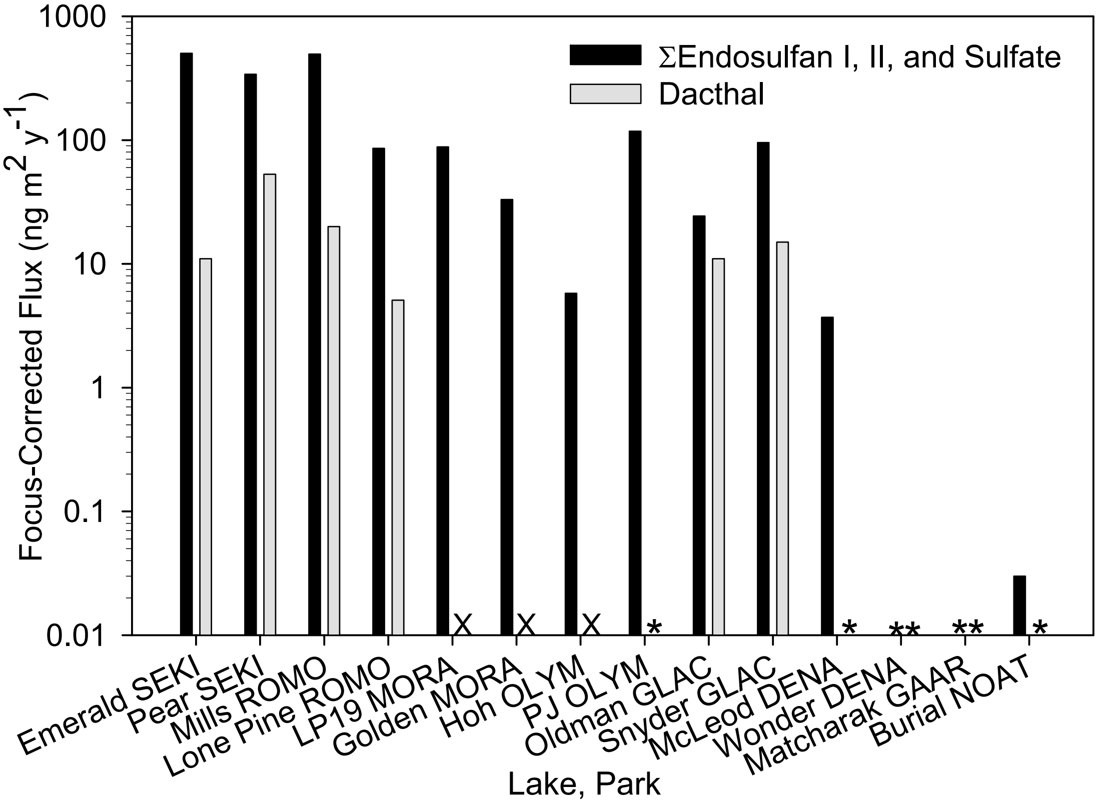
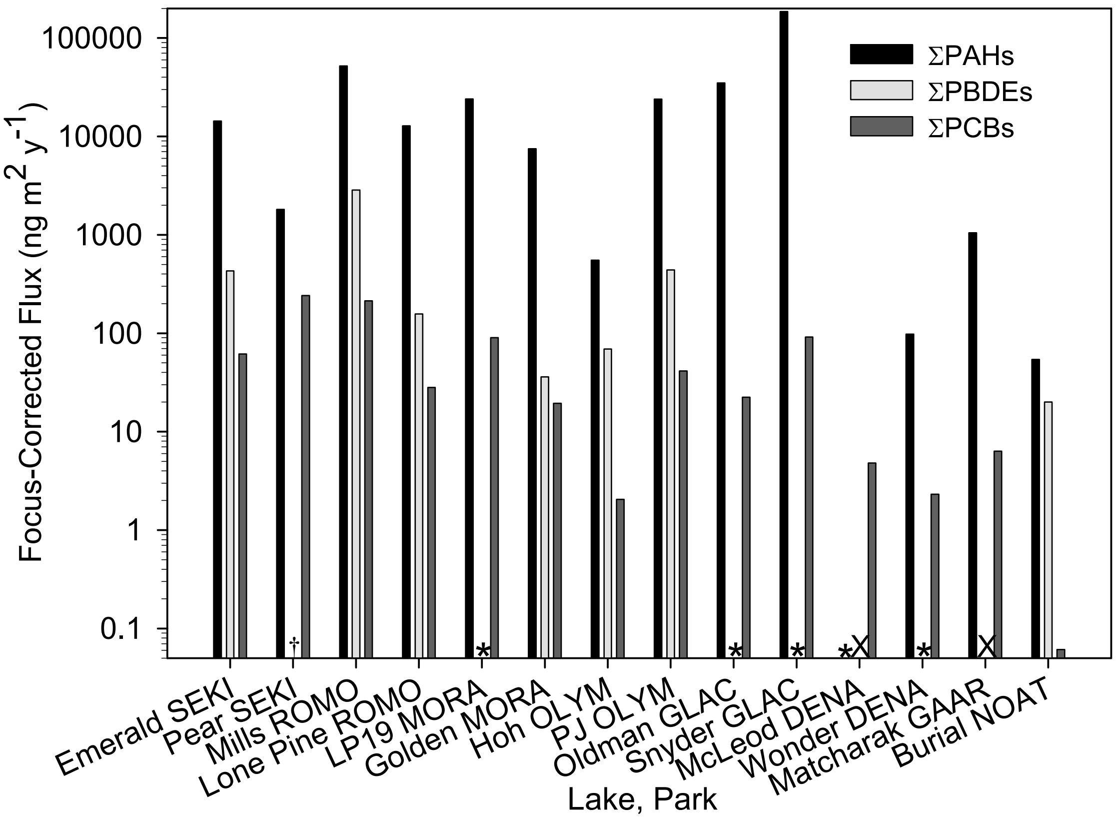


Figure 4.1. U.S. National Park locations.



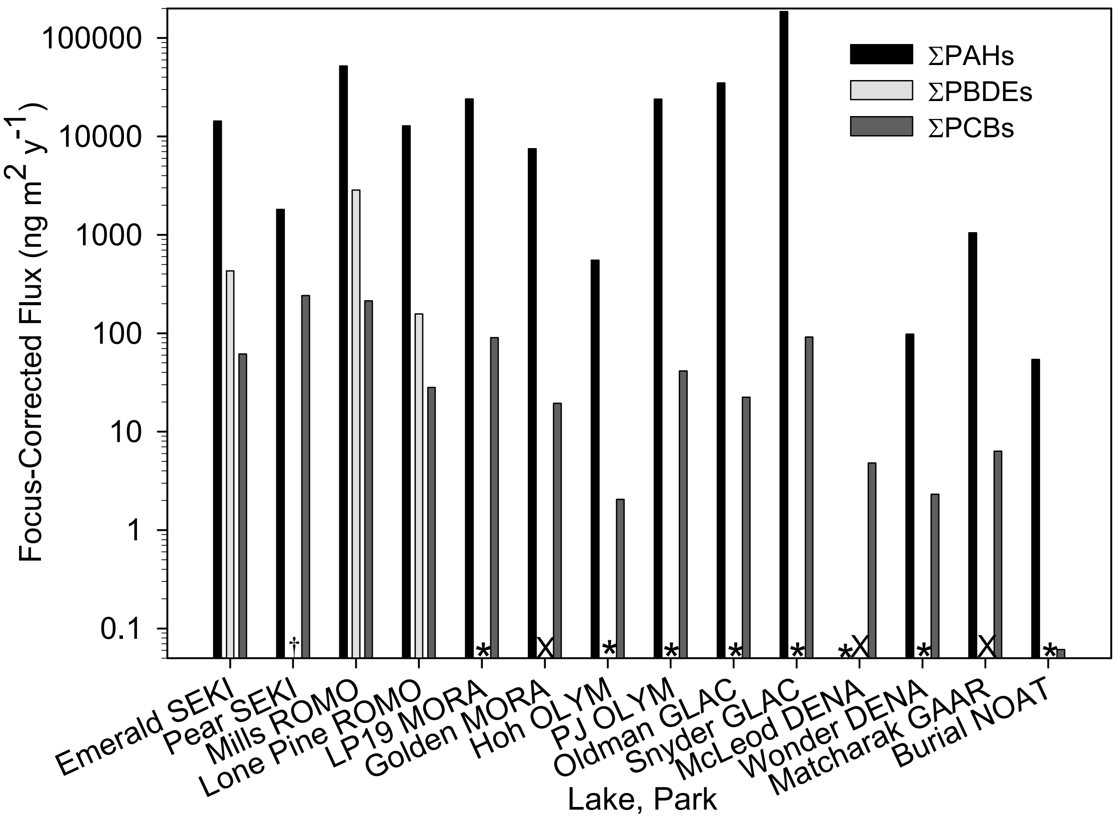
* <EDL, X Laboratory Blank > 33% of Measured Concentration

Figure 4.2: Current-use Pesticides in Western National Park Surficial Sediment



†Not Measured, * <EDL, X Laboratory Blank > 33% of Measured Concentration

Figure 4.3: Historic-use Pesticides in Western National Park Surficial Sediment



†Not Measured, * <EDL, X Laboratory Blank > 33% of Measured Concentration

Figure 4.4: ΣPAHs, ΣPBDEs, and ΣPCBs in Western National Park Surficial Sediment

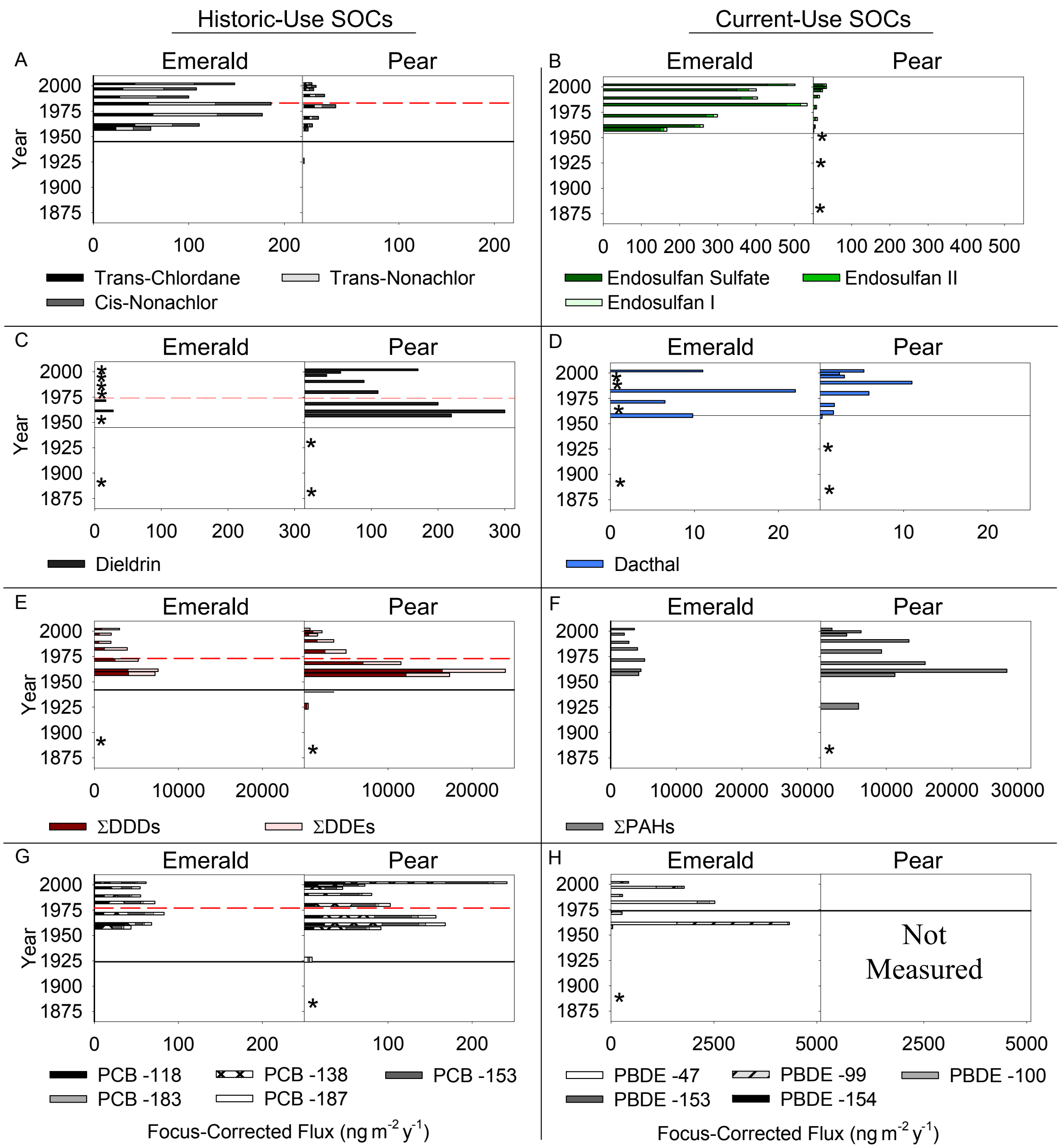


Figure 4.5: Focus-corrected flux (ng m^{-2} y^{-1}) profiles of current and historic-use SOCs in Emerald Lake (SEKI) and Pear Lake (SEKI) sediment cores. Solid lines (—) indicate U.S. registered use date, dashed lines (– –) indicate U.S. restriction date, and * indicate below method detection limit.

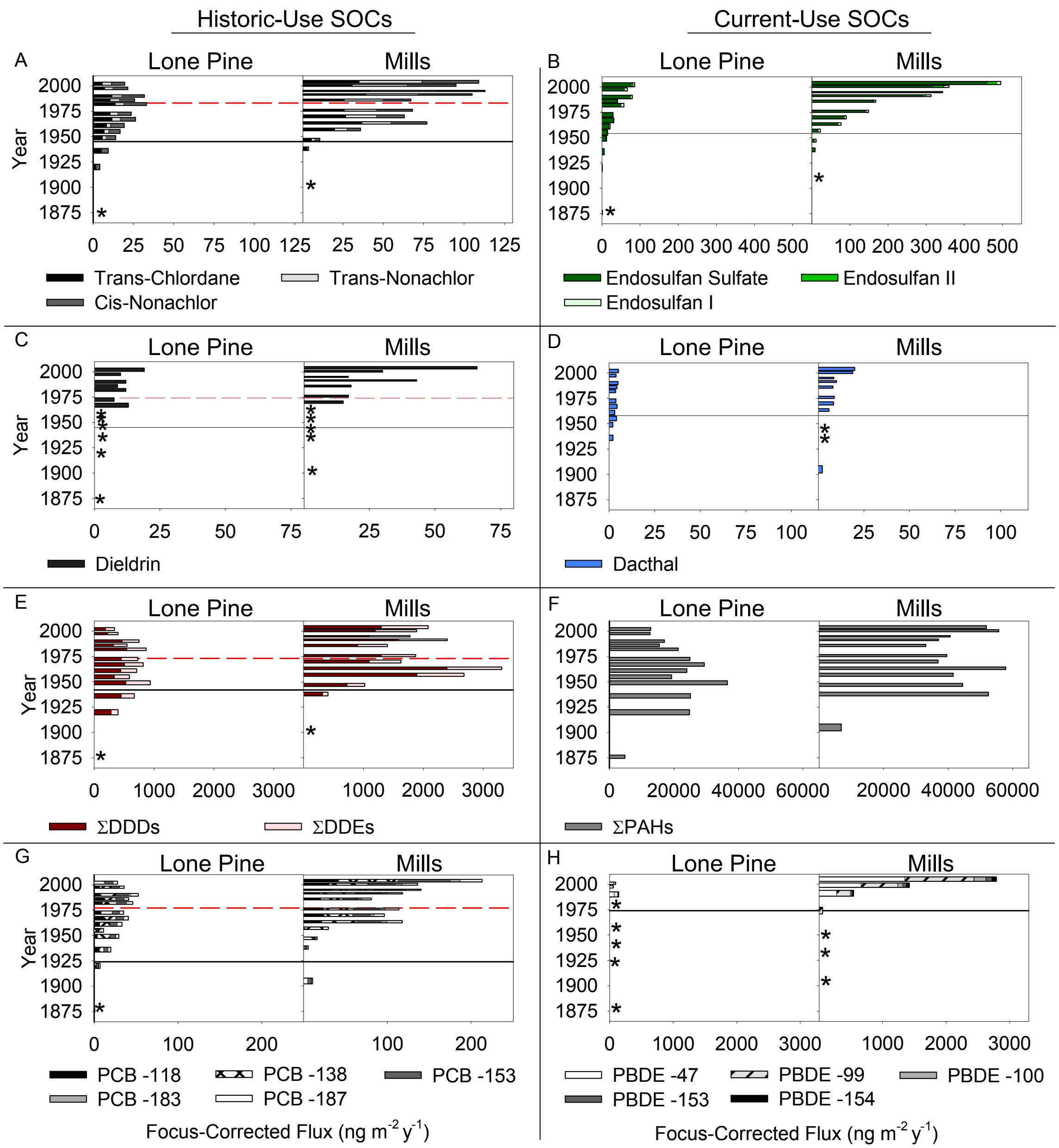


Figure 4.6: Focus-corrected flux (ng m^{-2} y^{-1}) profiles of current and historic-use SOCs in Lone Pine Lake (west, ROMO) and Mills Lake (east, ROMO) sediment cores. Solid lines (—) indicate U.S. registered use date, dashed lines (– –) indicate U.S. restriction date, and * indicate below method detection limit.

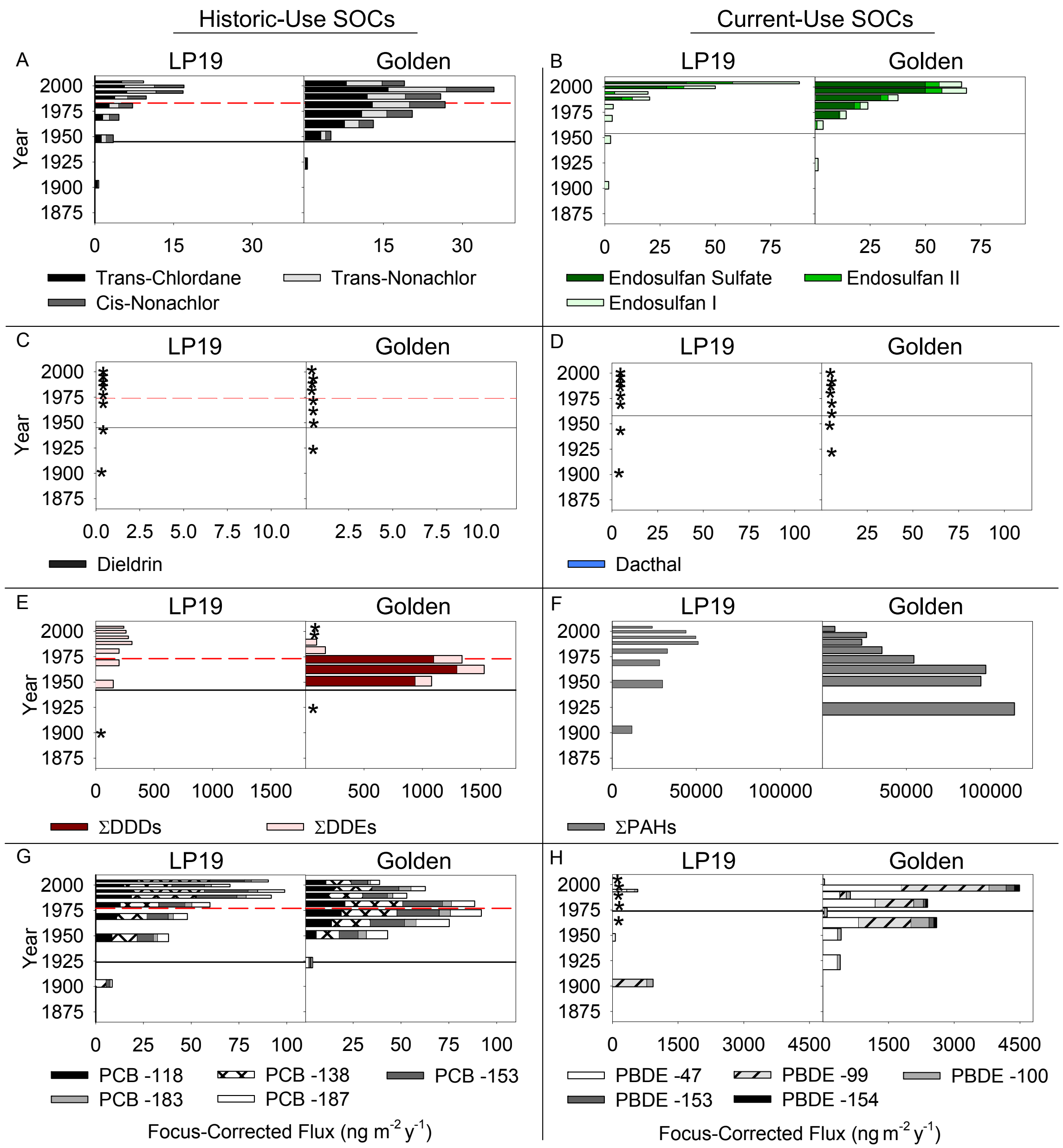


Figure 4.7: Focus-corrected flux (ng m^{-2} y^{-1}) profiles of current and historic-use SOCs in LP19 (MORA) and Golden Lake (MORA) sediment cores. Solid lines (—) indicate U.S. registered use date, dashed lines (– –) indicate U.S. restriction date, and * indicate below method detection limit.

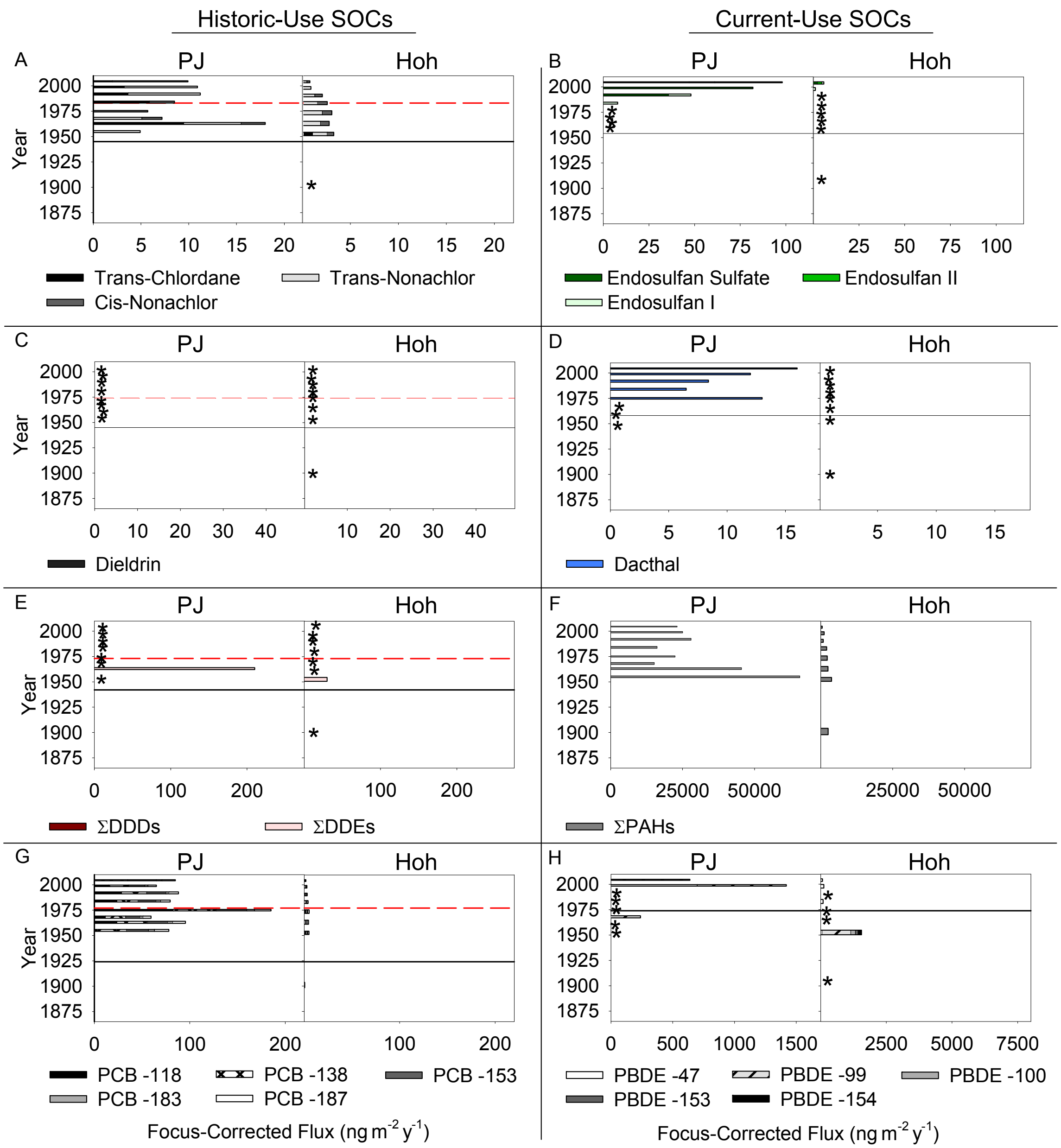


Figure 4.8: Focus-corrected flux (ng m^{-2} y^{-1}) profiles of current and historic-use SOCs in PJ Lake (OLYM) and Hoh Lake (OLYM) sediment cores. Solid lines (—) indicate U.S. registered use date, dashed lines (– –) indicate U.S. restriction date, and * indicate below method detection limit.

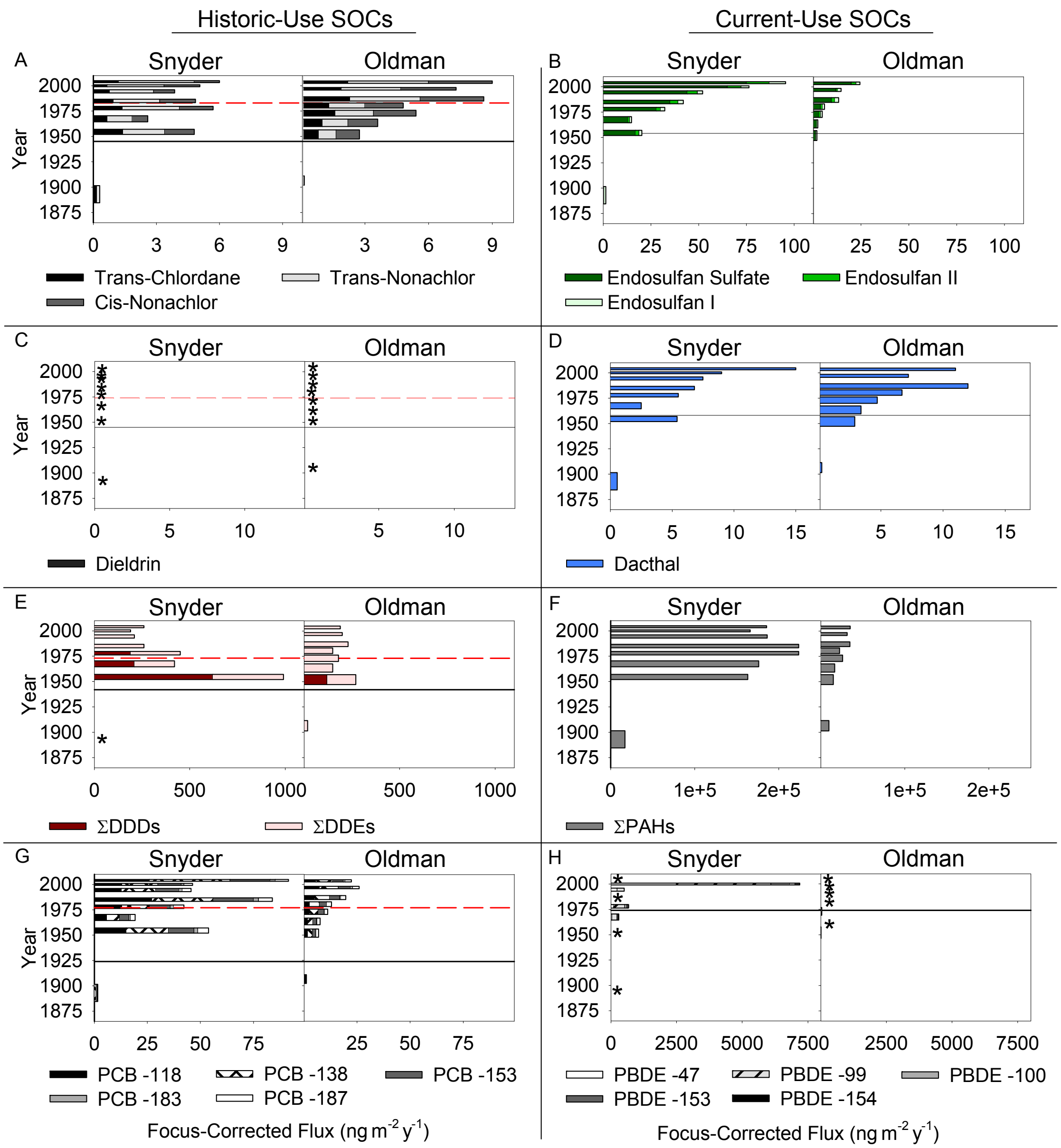


Figure 4.9: Focus-corrected flux (ng m^{-2} y^{-1}) profiles of current and historic-use SOCs in Snyder Lake (west, GLAC) and Oldman Lake (east, GLAC) sediment cores. Solid lines (—) indicate U.S. registered use date, dashed lines (– –) indicate U.S. restriction date, and * indicate below method detection limit.

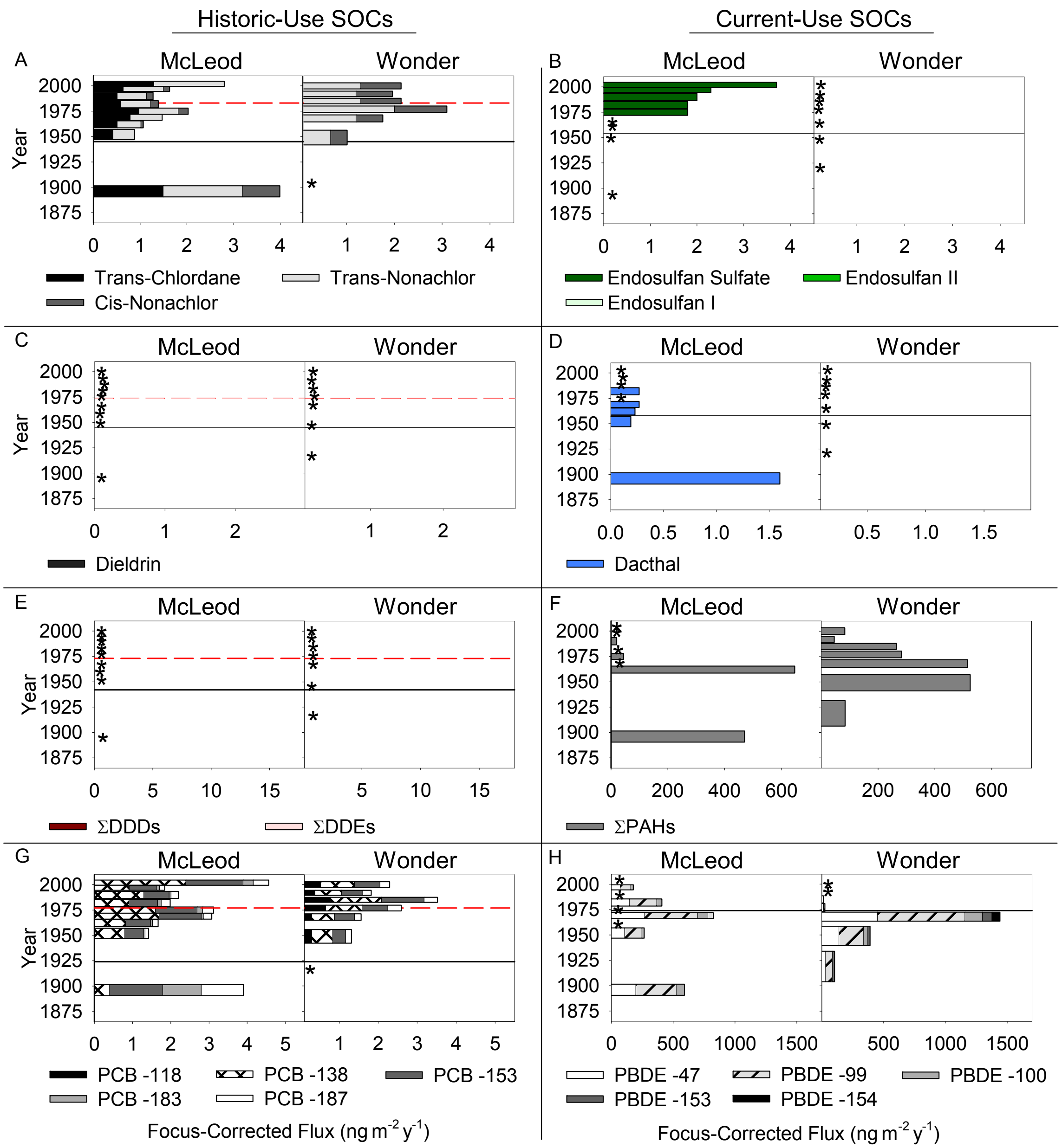


Figure 4.10: Focus-corrected flux (ng m^{-2} y^{-1}) profiles of current and historic-use SOCs in Wonder Lake (DENA) and McLeod Lake (DENA) sediment cores. Solid lines (—) indicate U.S. registered use date, dashed lines (– –) indicate U.S. restriction date, and * indicate below method detection limit.

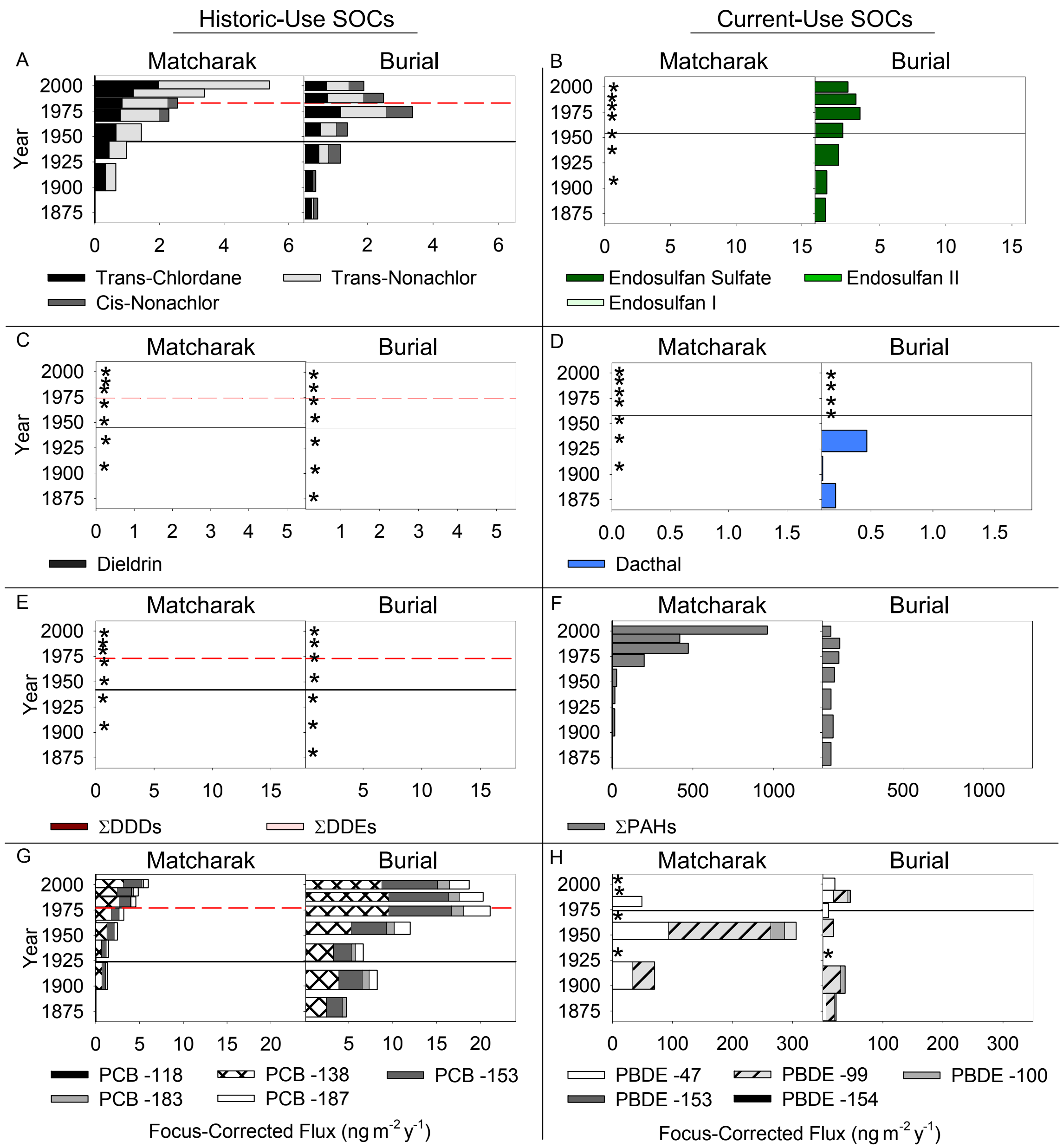


Figure 4.11: Focus-corrected flux (ng m^{-2} y^{-1}) profiles of current and historic-use SOCs in Burial Lake (NOAT) and Lake Matcharak (GAAR) sediment cores. Solid lines (—) indicate U.S. registered use date, dashed lines (– –) indicate U.S. restriction date, and * indicate below method detection limit.

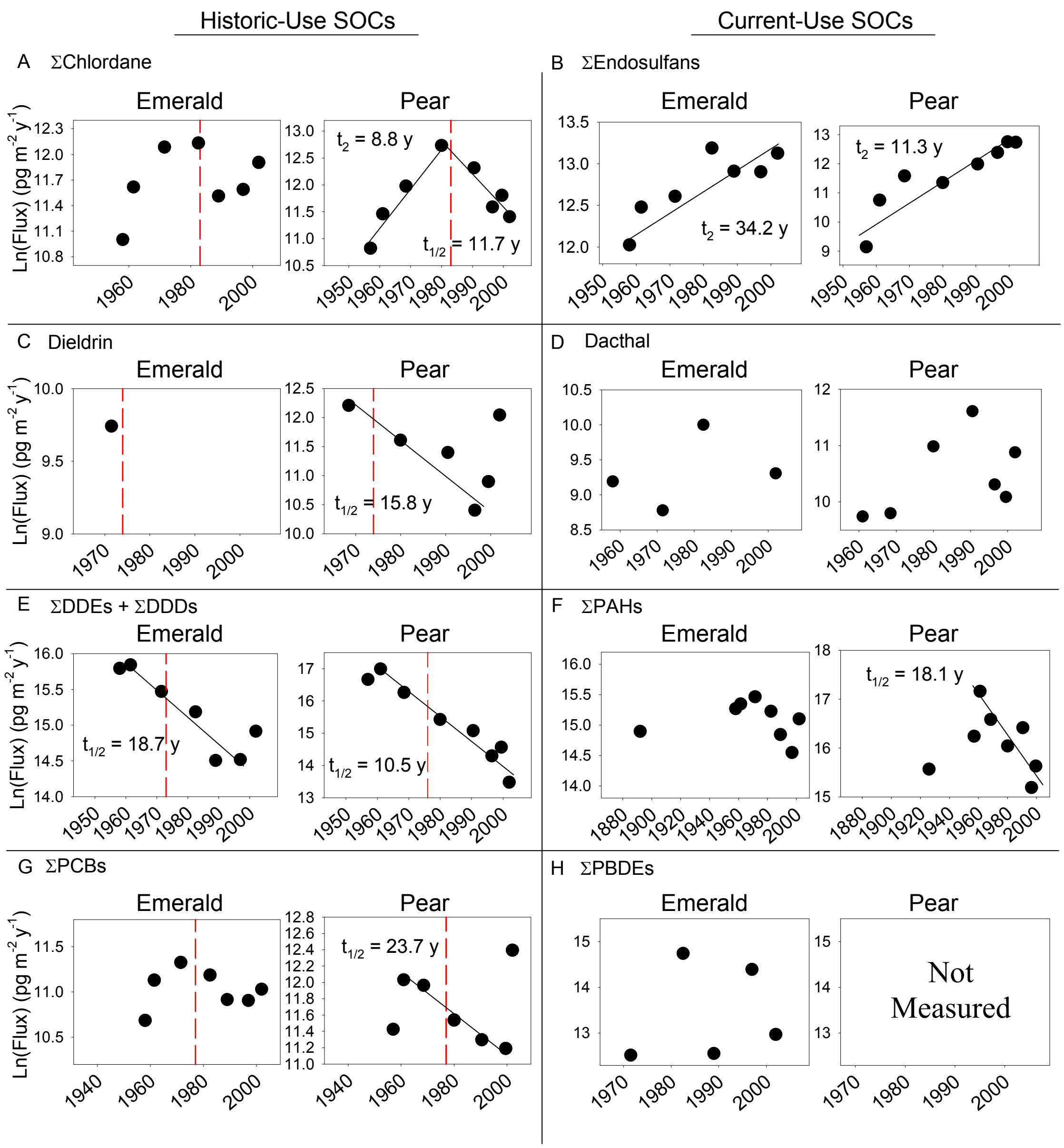


Figure 4.12: Natural log focus-corrected flux (ng m^{-2} y^{-1}) profiles of current and historic-use SOCs in Emerald Lake (SEKI) and Pear Lake (SEKI) sediment cores. Doubling times (t_2) and half-lives ($t_{1/2}$) are given where linear regression lines are statistically significant ($p<0.05$). Dashed lines (——) indicate U.S. restriction date. ΣChlordane represents the sum of TC, TN, and CN. Plots start at U.S. registration.

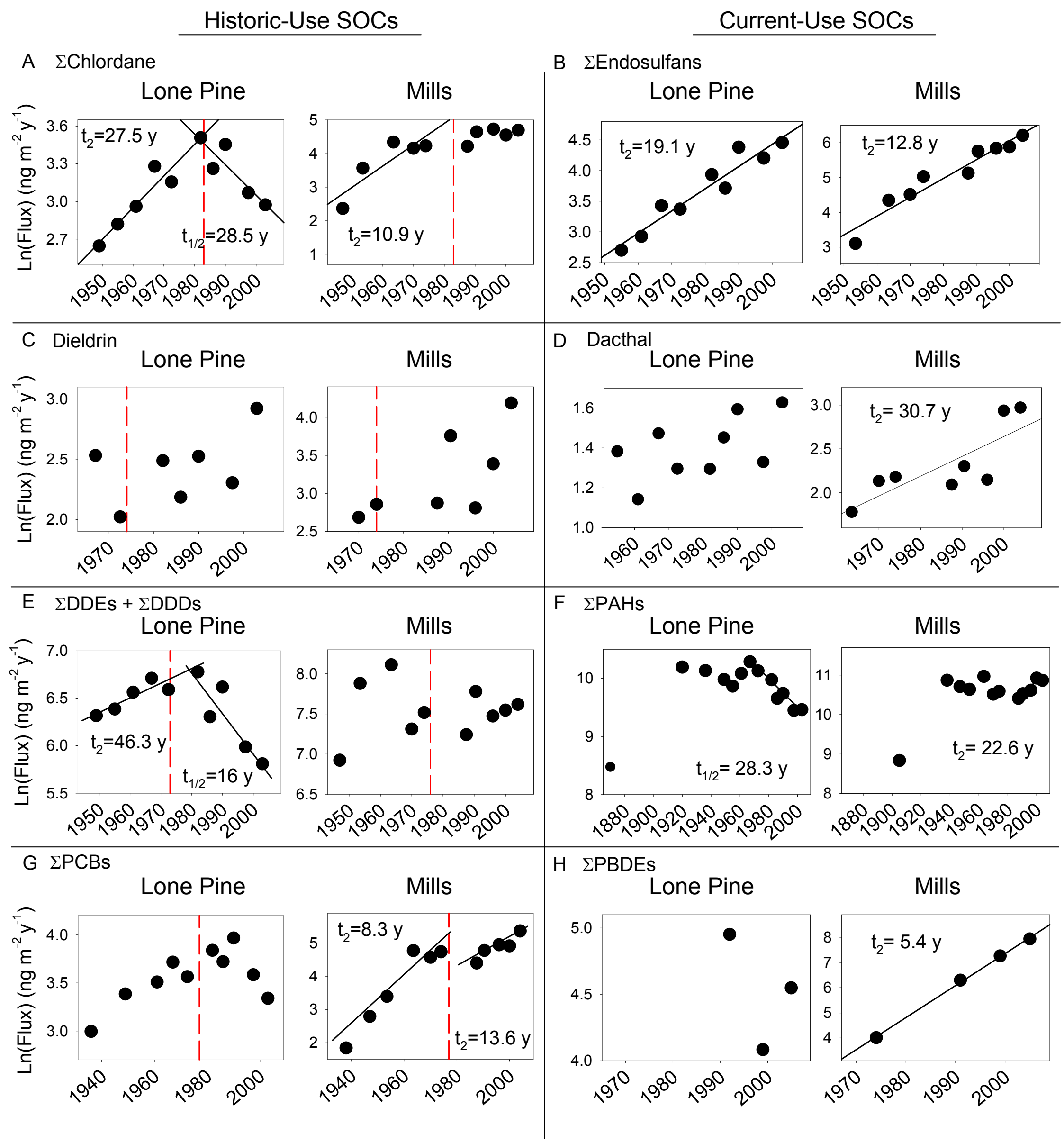


Figure 4.13: Natural log focus-corrected flux (ng m^{-2} y^{-1}) profiles of current and historic-use SOCs in Lone Pine Lake (west, ROMO) and Mills Lake (east, ROMO) sediment cores. Doubling times (t_2) and half-lives ($t_{1/2}$) are given where linear regression lines are statistically significant ($p<0.05$). Dashed lines (−−) indicate U.S. restriction date. ΣChlordane represents the sum of TC, TN, and CN. Plots start at U.S. registration. Linear regressions were calculated from the time of U.S. introduction to U.S. restriction and/or U.S. restriction to 2003

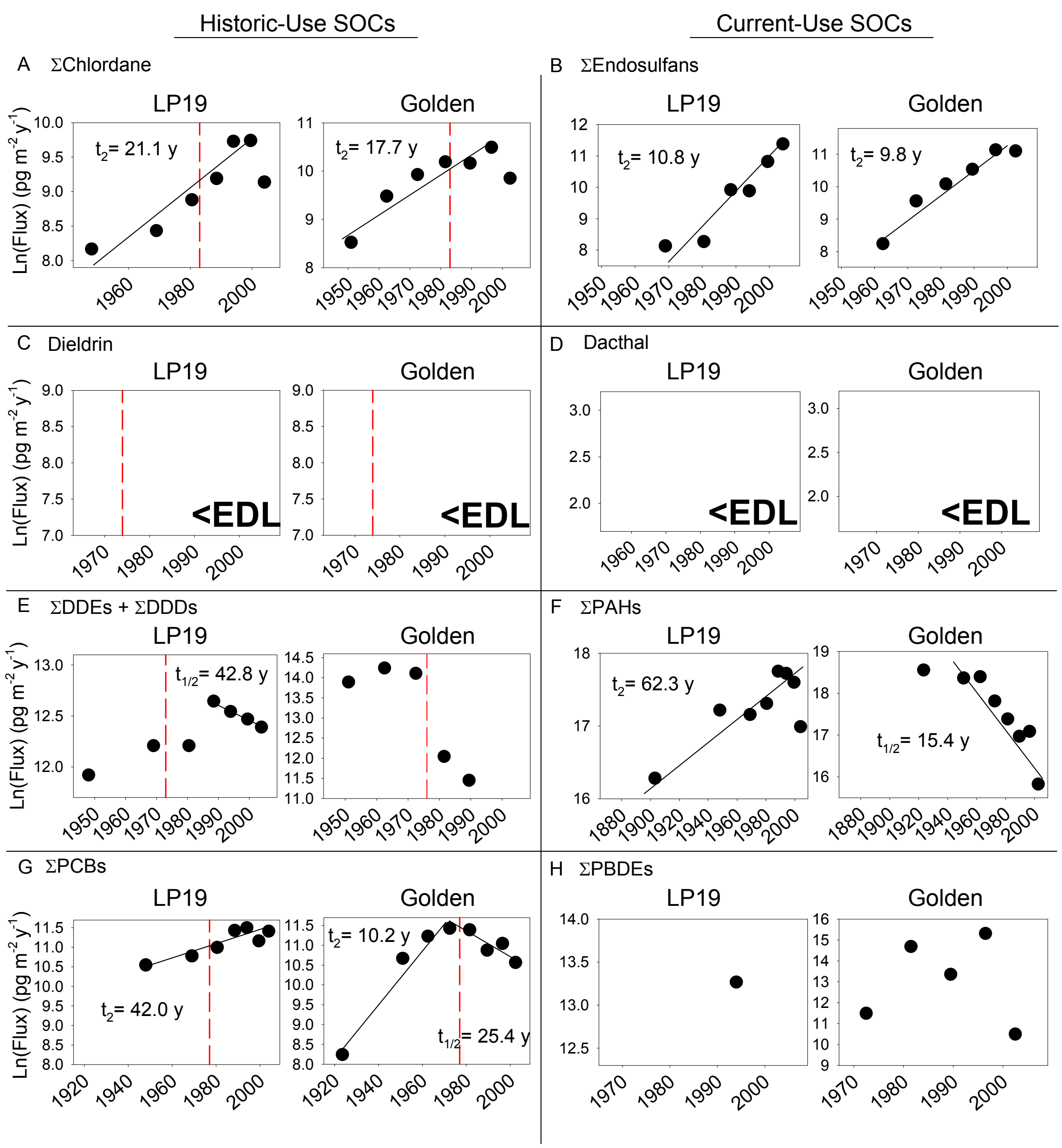


Figure 4.14: Natural log focus-corrected flux (ng m^{-2} y^{-1}) profiles of current and historic-use SOCs in LP19 (MORA) and Golden Lake (MORA) sediment cores. Doubling times (t_2) and half-lives ($t_{1/2}$) are given where linear regression lines are statistically significant ($p<0.05$). Dashed lines (——) indicate U.S. restriction date. ΣChlordane represents the sum of TC, TN, and CN. Plots start at U.S. registration.

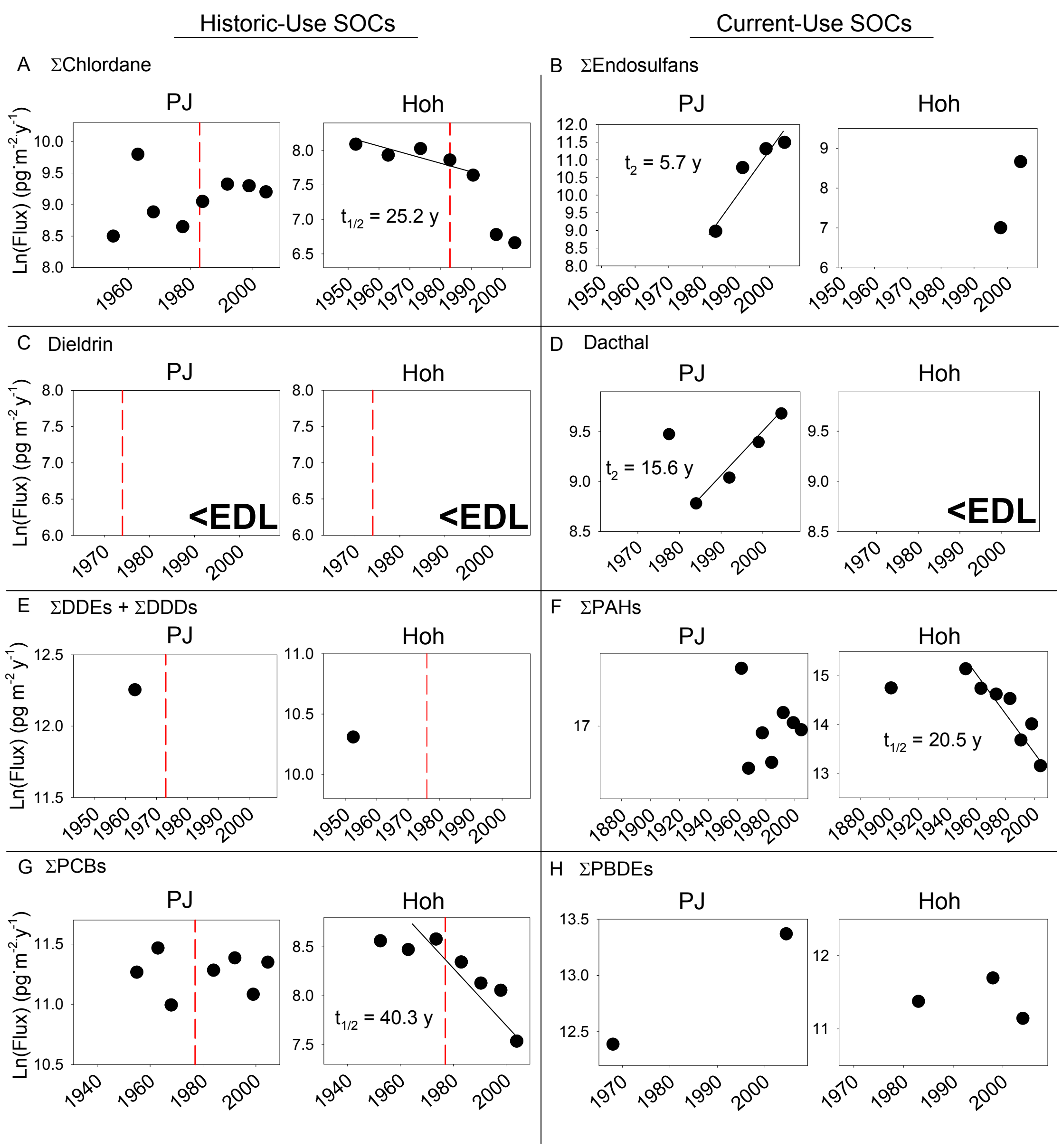


Figure 4.15: Natural log focus-corrected flux (ng m^{-2} y^{-1}) profiles of current and historic-use SOCs in PJ Lake (OLYM) and Hoh Lake (OLYM) sediment cores. Doubling times (t_2) and half-lives ($t_{1/2}$) are given where linear regression lines are statistically significant ($p<0.05$). Dashed lines (−−) indicate U.S. restriction date. ΣChlordane represents the sum of TC, TN, and CN. Plots start at U.S. registration.

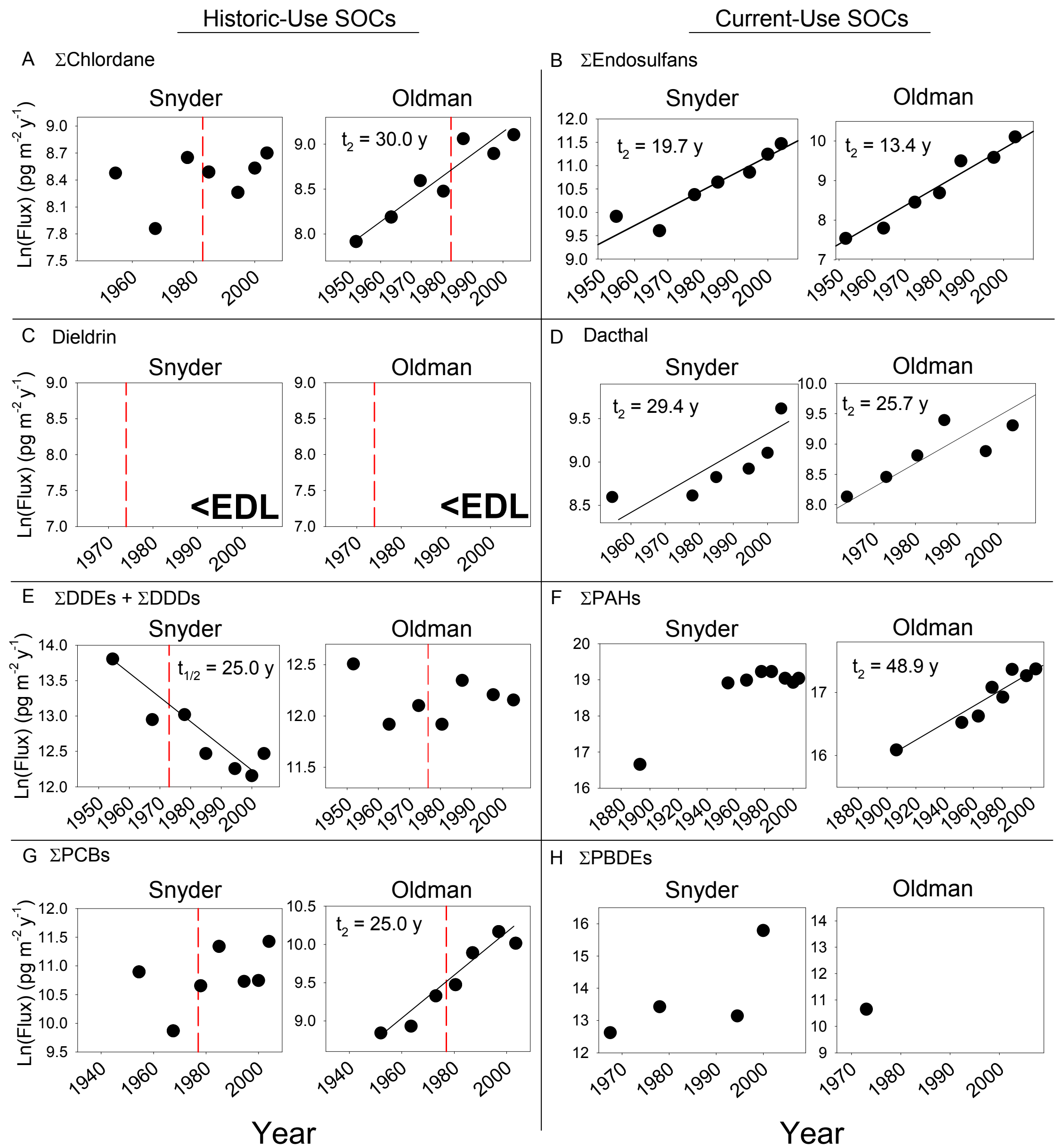


Figure 4.16: Natural log focus-corrected flux (ng m^{-2} y^{-1}) profiles of current and historic-use SOCs in Snyder Lake (west, GLAC) and Oldman Lake (east, GLAC) sediment cores. Doubling times (t_2) and half-lives ($t_{1/2}$) are given where linear regression lines are statistically significant ($p<0.05$). Dashed lines (— —) indicate U.S. restriction date. ΣChlordane represents the sum of TC, TN, and CN. Plots start at U.S. registration.

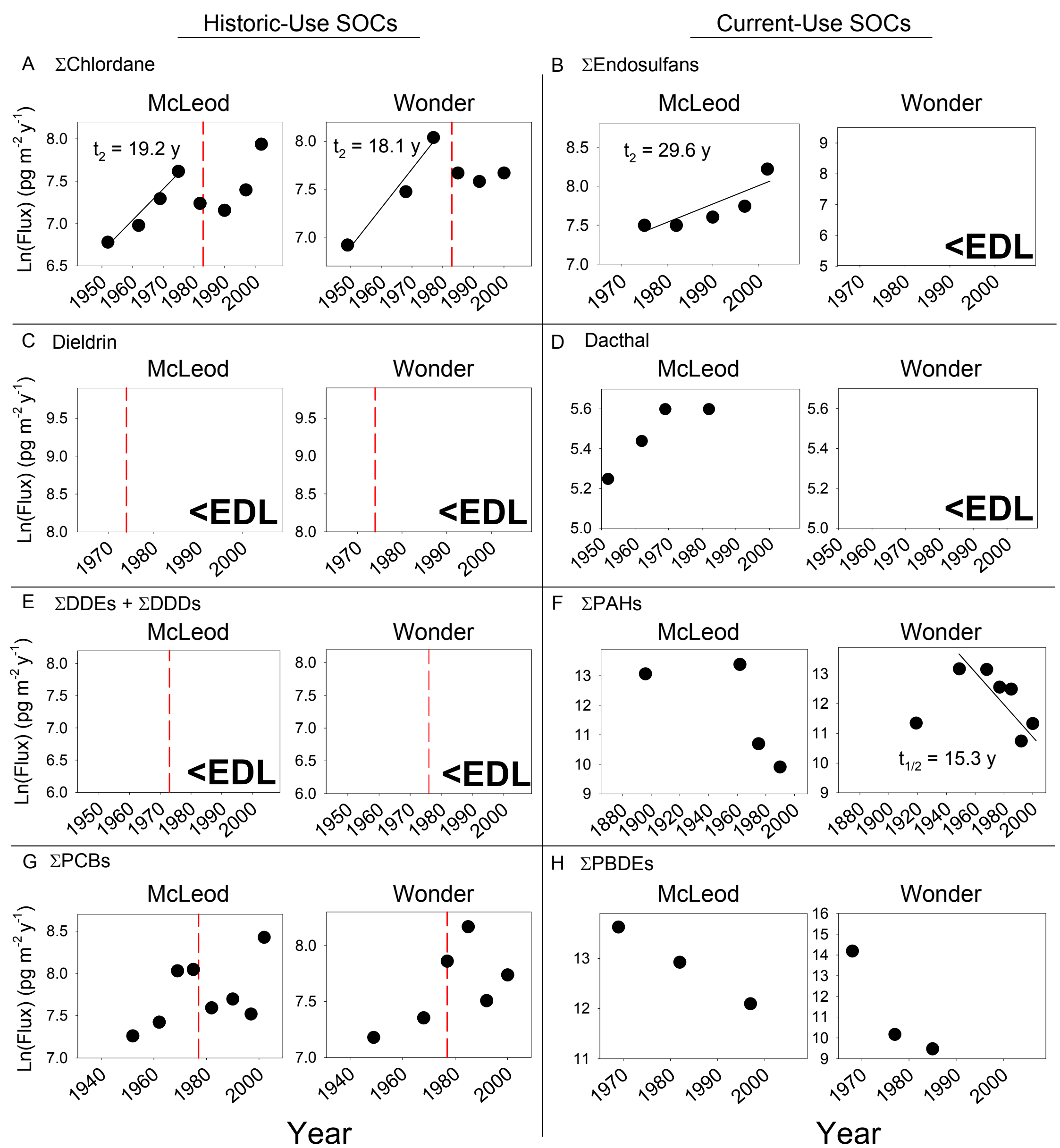


Figure 4.17: Natural log focus-corrected flux (ng m^{-2} y^{-1}) profiles of current and historic-use SOCs in Wonder Lake (DENA) and McLeod Lake (DENA) sediment cores. Doubling times (t_2) and half-lives ($t_{1/2}$) are given where linear regression lines are statistically significant ($p<0.05$). Dashed lines (——) indicate U.S. restriction date. ΣChlordane represents the sum of TC, TN, and CN. Plots start at U.S. registration.

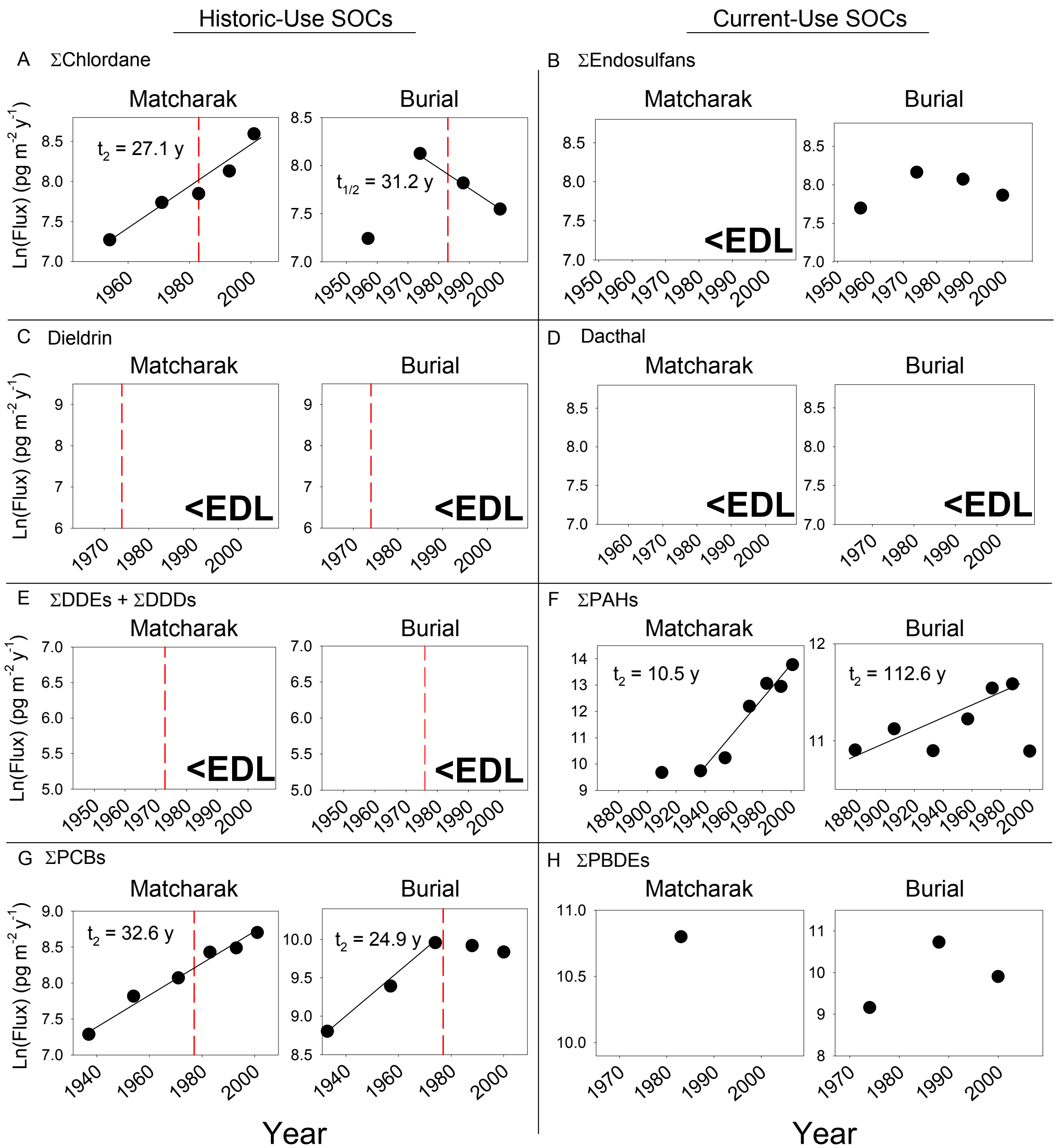


Figure 4.18: Natural log focus-corrected flux (ng m^{-2} y^{-1}) profiles of current and historic-use SOCs in Burial Lake (NOAT) and Lake Matcharak (GAAR) sediment cores. Doubling times (t_2) and half-lives ($t_{1/2}$) are given where linear regression lines are statistically significant ($p<0.05$). Dashed lines (——) indicate U.S. restriction date. ΣChlordane represents the sum of TC, TN, and CN. Plots start at U.S. registration.

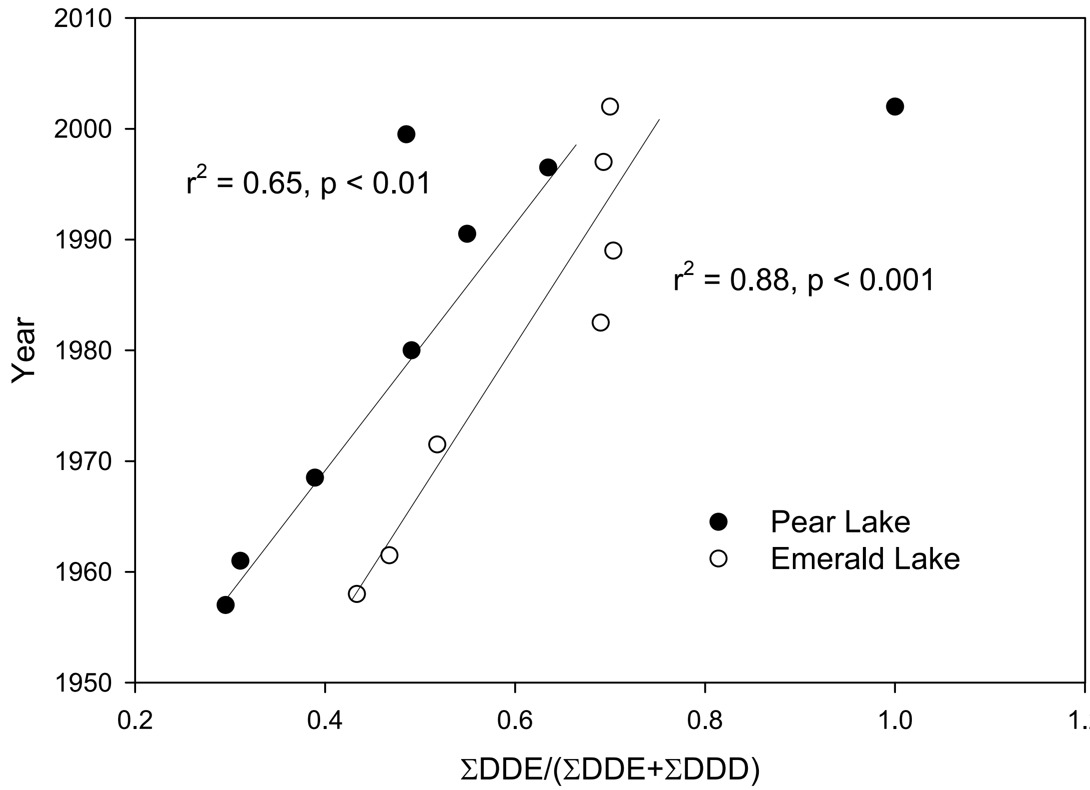


Figure 4.19. Pear Lake (SEKI) and Emerald Lake (SEKI) ΣDDE/(ΣDDE+ΣDDD) ratios.

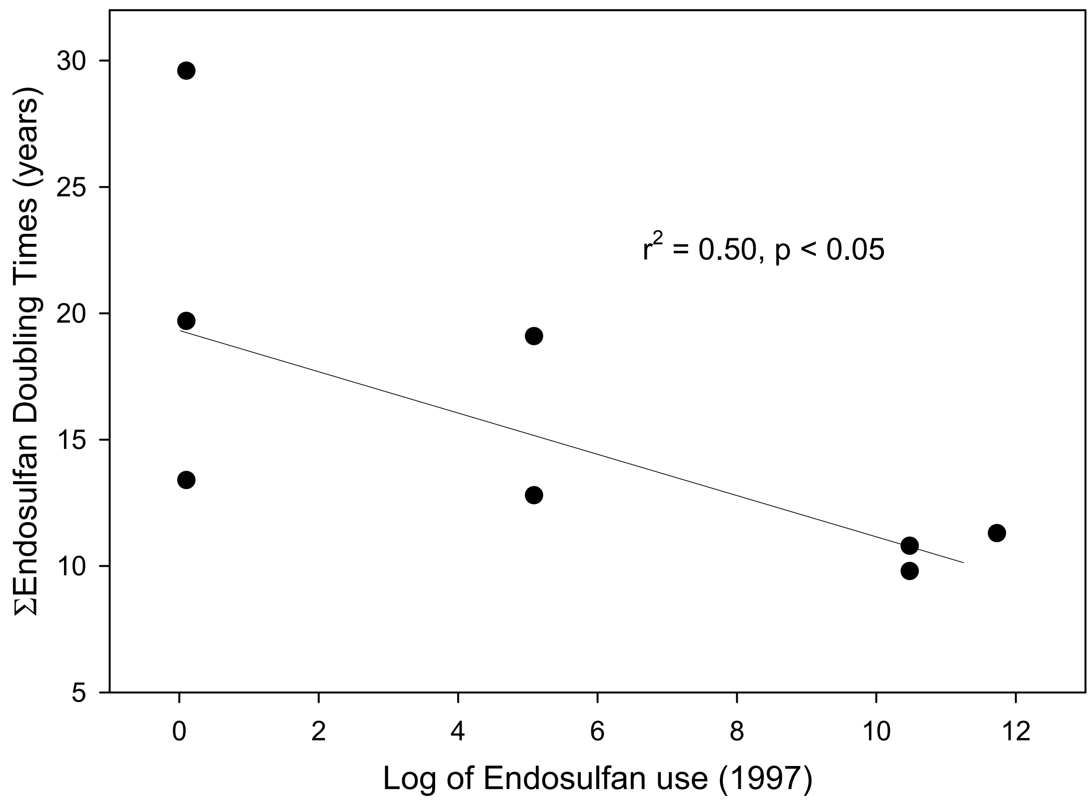
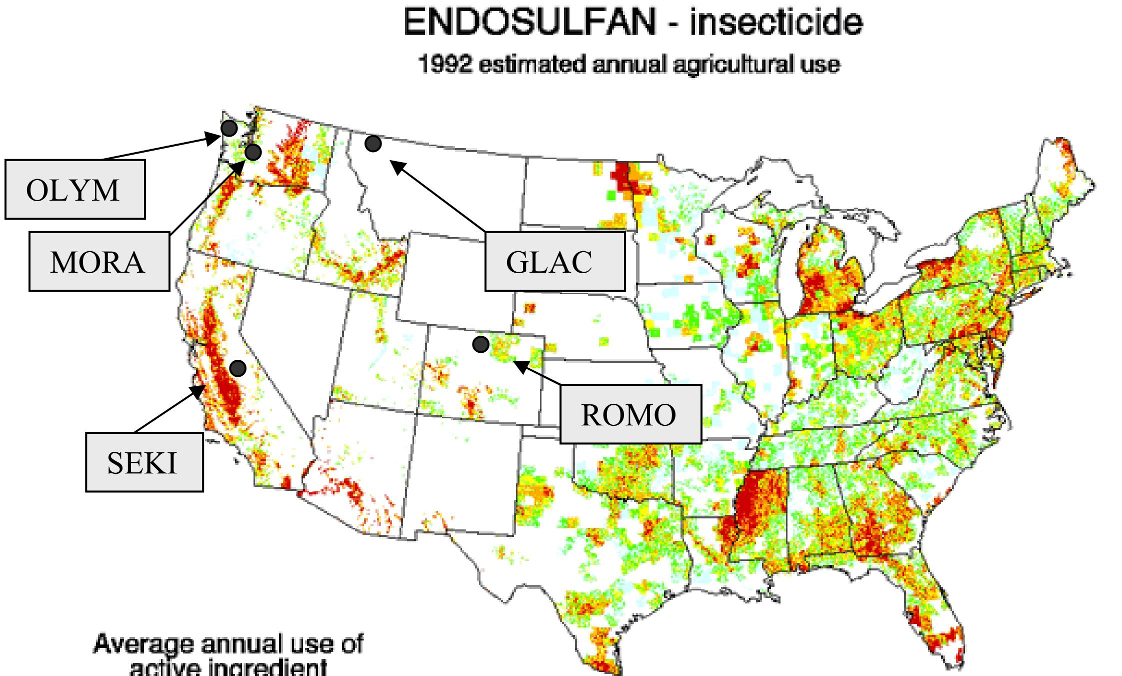


Figure 4.20. ΣEndosulfan doubling times in sediment cores versus endosulfan use within 150 km radius of the parks.



Crops	Total pounds applied	Percent national use
cotton	445,518	24.93
apples	231,089	12.93
potatoes	169,257	9.47
tomatoes	141,474	7.92
pecans	130,186	7.29
grapes	119,694	6.70
lettuce	82,367	4.61
pears	78,439	4.39
cantaloupes	65,166	3.65
squash	41,723	2.33

Figure 4.21: 1990-1993 estimated endosulfan use in the U.S. (*56*).

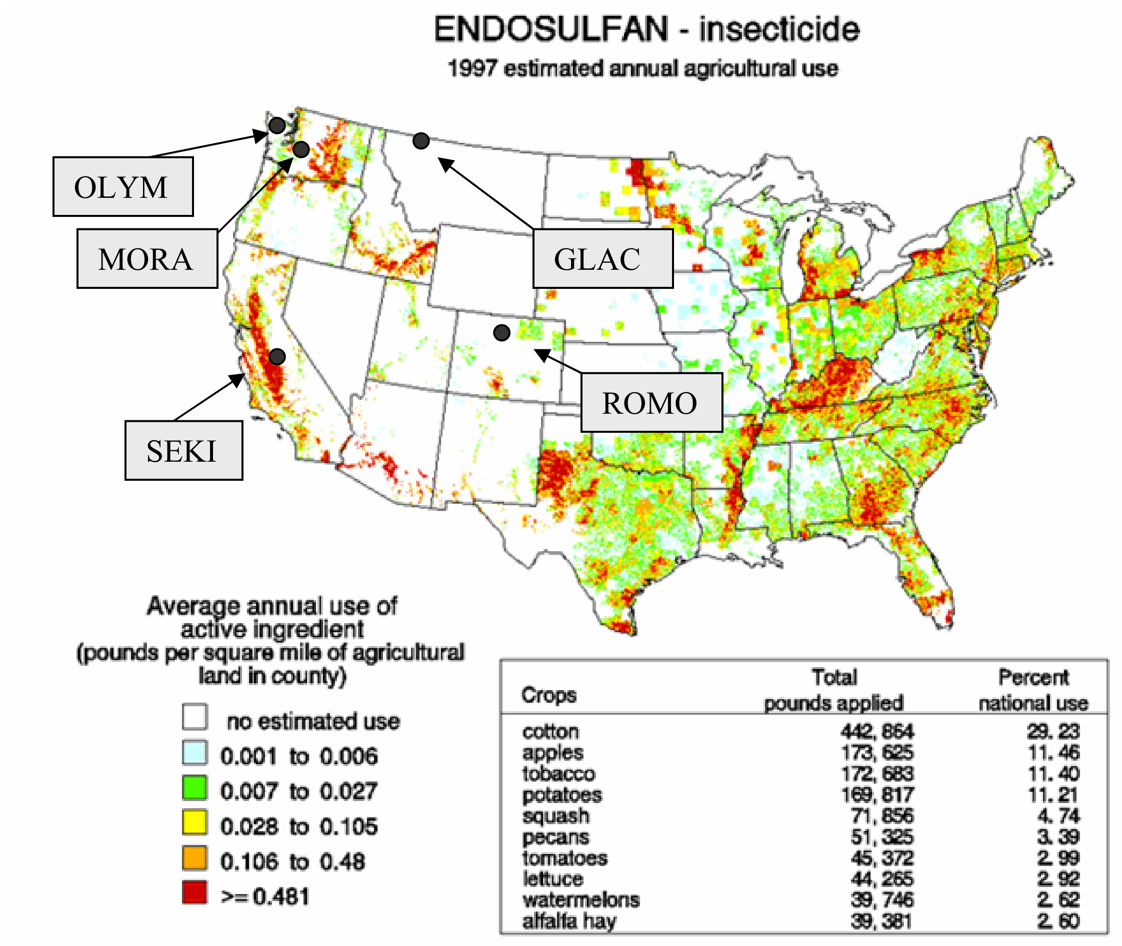
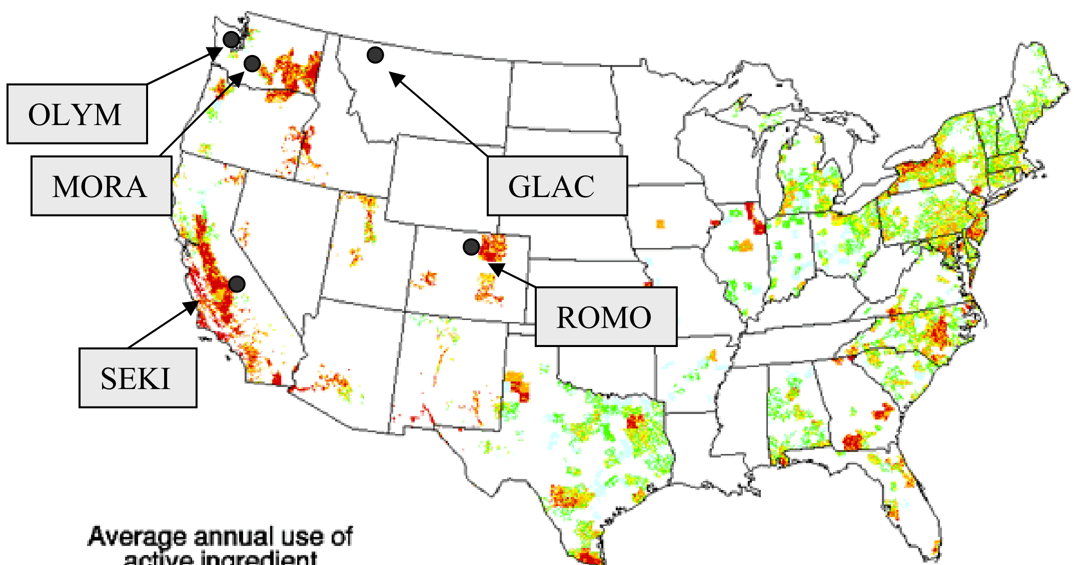


Figure 4.22: 1995-1998 estimated endosulfan use in the U.S. (*54*).

DCPA - herbicide

1992 estimated annual agricultural use

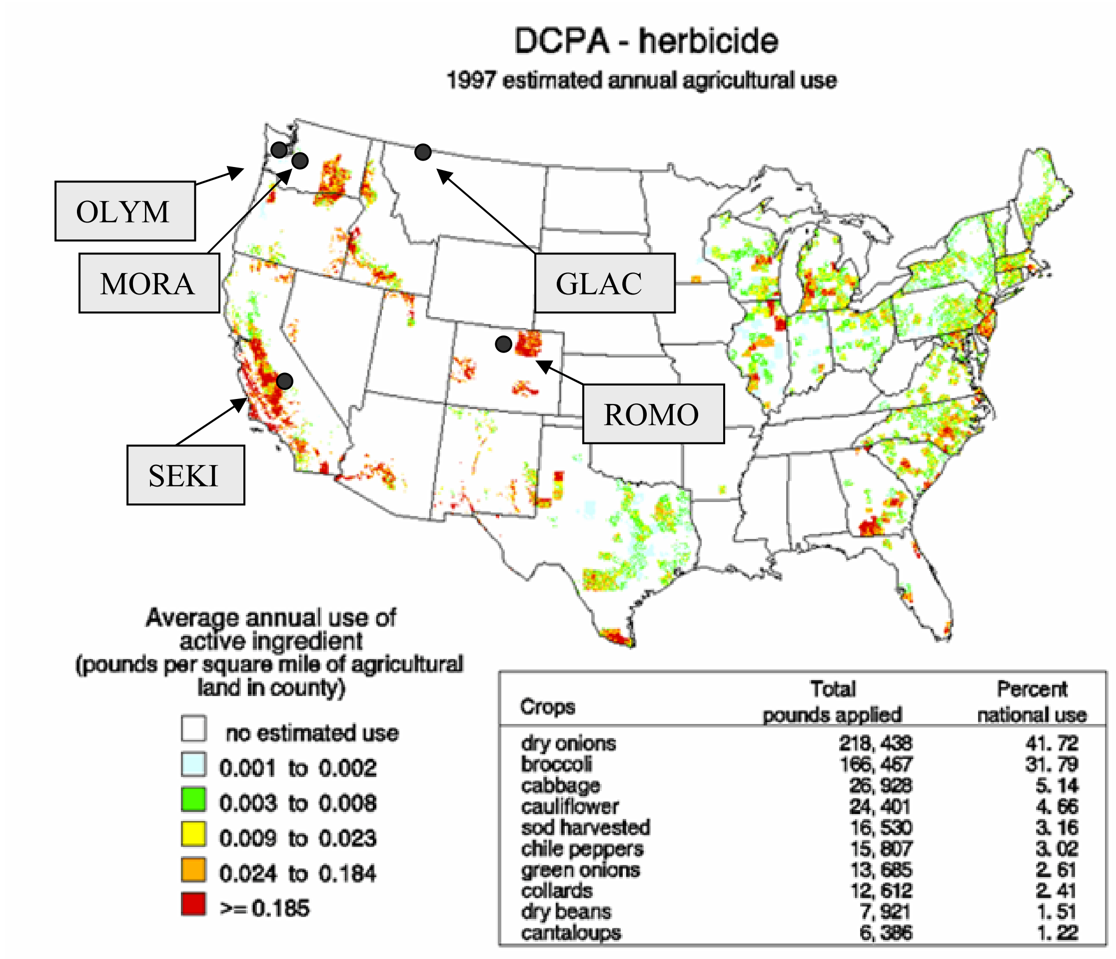


Average annual use of active ingredient (pounds per square mile of agricultural land in county)

- no estimated use
- 0.001 to 0.005
- 0.006 to 0.019
- 0.02 to 0.077
- 0.078 to 0.544
- >= 0.545

Crops	Total pounds applied	Percent national use
onions	606, 437	42. 08
broccoli	298, 587	20. 72
seed crops	115, 496	8. 01
cauliflower	100, 274	6. 96
cabbage	66, 800	4. 64
hot peppers	52, 005	3. 61
sod	40, 416	2. 80
sweet potatoes	30, 449	2. 11
strawberries	22, 951	1. 59
collards	19, 614	1. 36

Figure 4.23: 1990-1993 estimated dacthal (DCPA) use in the U.S. (*56*).



Crops	Total pounds applied	Percent national use
dry onions	218, 438	41. 72
broccoli	166, 467	31. 79
cabbage	26, 928	5. 14
cauliflower	24, 401	4. 66
sod harvested	16, 530	3. 16
chile peppers	15, 807	3. 02
green onions	13, 685	2. 61
collards	12, 612	2. 41
dry beans	7, 921	1. 51
cantaloups	6, 386	1. 22

Figure 4.24: 1995-1998 estimated dacthal (DCPA) use in the U.S. (*54*).

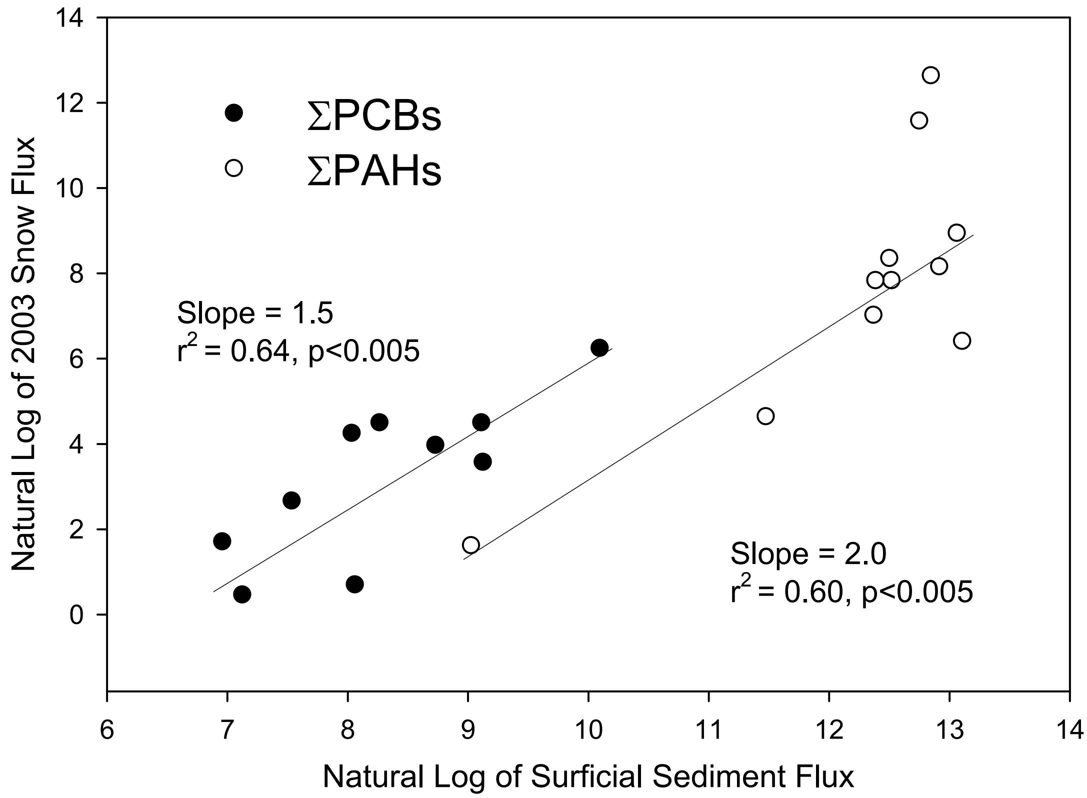


Figure 4.25 Linear regressions of ΣPCB and ΣPAH fluxes in surficial sediment and snow.

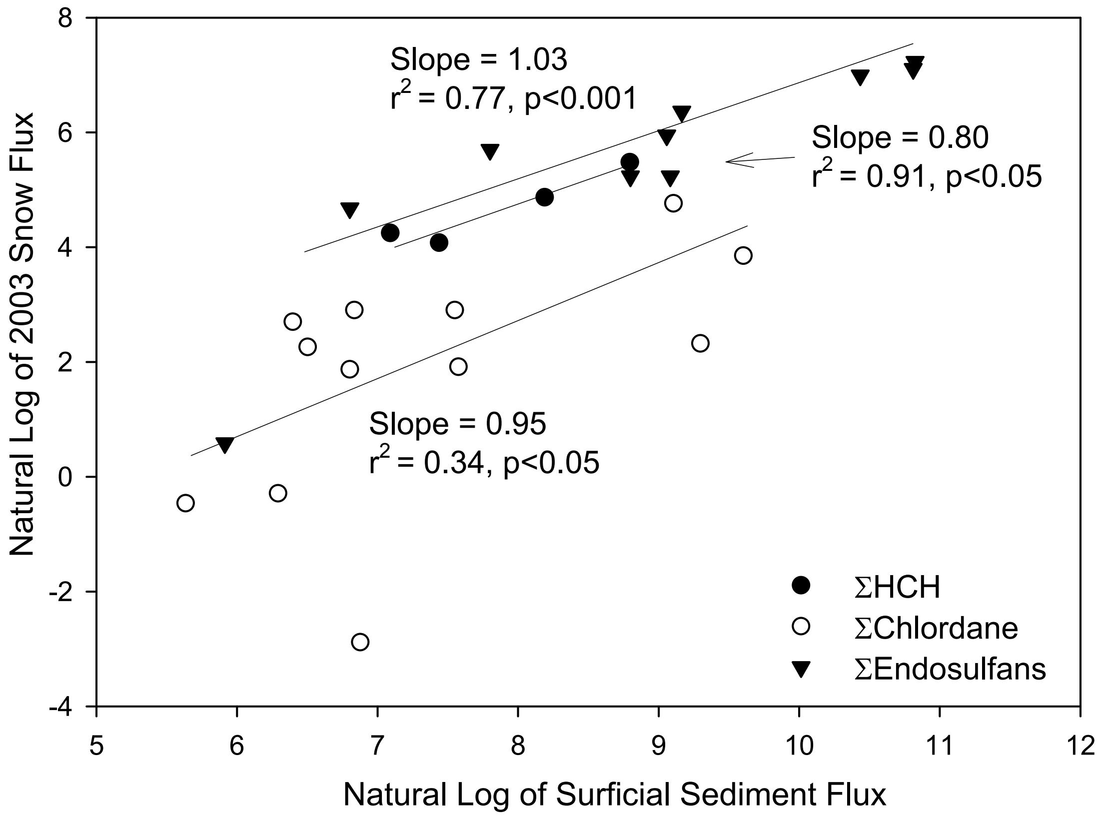


Figure 4.26 Linear regressions of ΣHCH, ΣChlordane, and ΣEndosulfan fluxes in surficial sediment and snow.

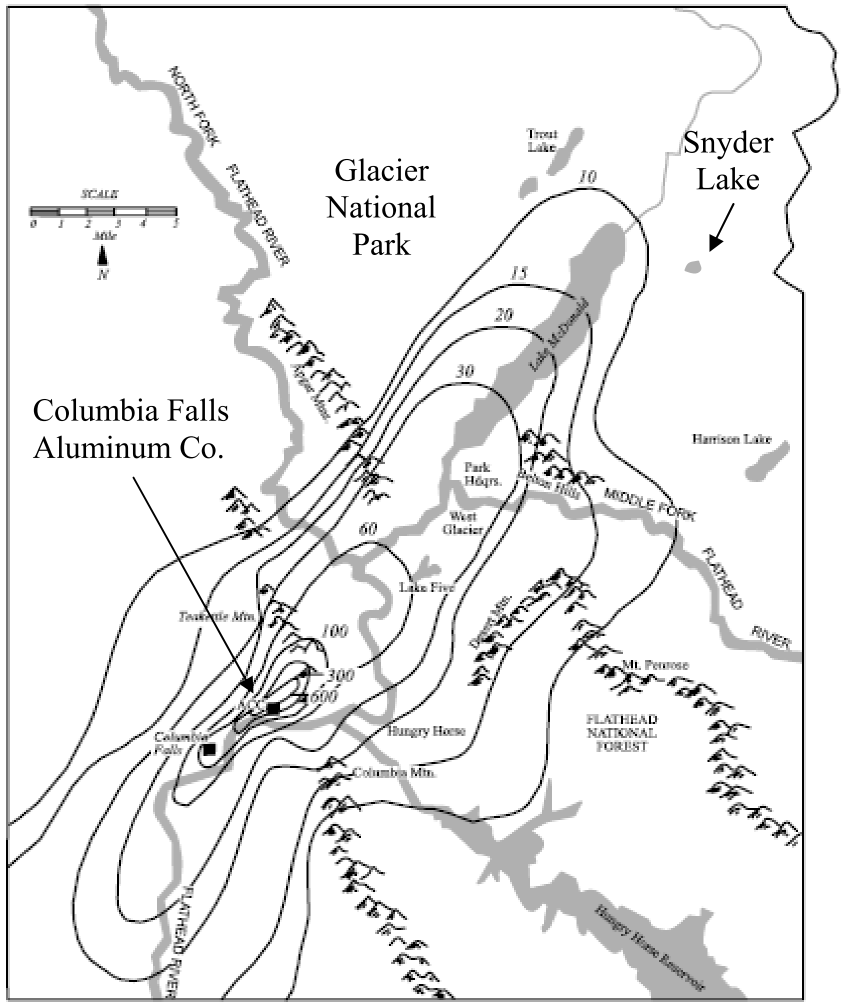


Figure 4.27: Isolines of fluoride (ppb) measured in foliage samples taken along transects from aluminum smelter in 1970 from reference (*66*).

Table 4.1: Physical and Chemical Limnological Characteristics of Lake sites. * indicates the data was obtained from the parameter-elevation regressions on independent slopes model (PRISM) (average annual total precipitation from 1971-2000, 800×800 m).

Sequoia National Park	Pear Lake	Emerald Lake	Pear/Emerald
Catchment Characteristics			
Latitude (dd)	36.6	36.58	1.00
Longitude (dd)	118.67	118.67	1.00
Elevation (masl)	2904	2800	1.04
Lake Volume (m^3)	578000	160000	3.61
Lake Surface Area (m^2)	73294	25342	2.89
Catchment Area (m^2)	1555595	1149318	1.35
Hydraulic Residence Time (d)	96.0	34.5	2.78
*Average Annual Precipitation (cm)	74.9	86.1	0.87
Focusing Factor	2.22	3.73	0.60
Limnological Characteristics (2003)			
Primary Productivity	Oligotrophic	Oligotrophic	
Dissolved Organic Carbon ($mg \cdot L^{-1}$)	0.82	0.94	0.87
Total Nitrogen ($mg \cdot L^{-1}$)	0.111	0.168	0.66
Total Phosphorus ($\mu g \cdot L^{-1}$)	0.59	1.47	0.40
Chlorophyll a ($\mu g \cdot L^{-1}$)	0.64	0.62	1.03
Turbidity (NTU)	0.232	0.259	0.90
Specific Conductivity ($\mu S \cdot cm^{-1}$)	4.02	5.42	0.74
pH	6.10	6.22	0.98

Rocky Mountain National Park	Lone Pine Lake	Mills Lake	ills Lake/ Lone Pine Lake
Catchment Characteristics			
Latitude (dd)	40.22	40.29	1.00
Longitude (dd)	105.73	105.64	1.00
Elevation (masl)	3024	3030	1.00
Lake Volume (m^3)	128325	78251	0.61
Lake Surface Area (m^2)	49134.9	61148	1.24
Catchment Area (m^2)	21144492	15093297	0.71
Hydraulic Residence Time (d)	4.3	3.3	0.77
*Average Annual Precipitation (cm)	97.6	107.1	1.10
Focusing Factor	1.87	1.48	0.79
Limnological Characteristics (2003)			
Primary Productivity	Oligotrophic	Oligotrophic	
Dissolved Organic Carbon ($mg \cdot L^{-1}$)	1.73	1.55	0.90
Total Nitrogen ($mg \cdot L^{-1}$)	0.17	0.38	2.24
Total Phosphorus ($\mu g \cdot L^{-1}$)	2.7	2.8	1.04
Chlorophyll a ($\mu g \cdot L^{-1}$)	2.0	2.1	1.05
Turbidity (NTU)	0.3	0.6	2.00
Specific Conductivity ($\mu S \cdot cm^{-1}$)	14.0	11.9	0.85
pH	6.67	6.05	0.91

Mt. Rainier National Park	Golden Lake	LP19	Golden/LP19
Catchment Characteristics			
Latitude (dd)	46.89	46.82	1.00
Longitude (dd)	121.90	121.89	1.00
Elevation (masl)	1372	1372	1.00
Lake Volume (m^3)	689578	99879	6.90
Lake Surface Area (m^2)	66104	18441	3.58
Catchment Area (m^2)	3914345	1591387	2.46
Hydraulic Residence Time (d)	24.8	9.1	2.73
*Average Annual Precipitation (cm)	228.4	231.2	0.99
Focusing Factor	1.00	1.50	0.67
Limnological Characteristics (2005)			
Primary Productivity	Oligotrophic	Oligotrophic	
Dissolved Organic Carbon ($mg \cdot L^{-1}$)	1.88	1.37	1.37
Total Nitrogen ($mg \cdot L^{-1}$)	0.069	0.074	0.93
Total Phosphorus ($\mu g \cdot L^{-1}$)	0.6	0.92	0.65
Chlorophyll a ($\mu g \cdot L^{-1}$)	0.35	0.6	0.58
Turbidity (NTU)	0.52	0.31	1.65
Specific Conductivity ($\mu S \cdot cm^{-1}$)	10.08	10.72	0.94
pH	6.47	6.63	0.98

Olympic National Park	Hoh Lake	PJ Lake	Hoh/PJ
Catchment Characteristics			
Latitude (dd)	47.90	47.95	1.00
Longitude (dd)	123.79	123.42	1.00
Elevation (masl)	1384	1433	0.97
Lake Volume (m^3)	396198	19099	20.74
Lake Surface Area (m^2)	76595	7551	10.14
Catchment Area (m^2)	2318604	3828864	0.61
Hydraulic Residence Time (d)	40.5	1.1	36.82
*Average Annual Precipitation (cm)	451.6	225.4	2.00
Focusing Factor	3.10	0.78	3.97
Limnological Characteristics (2005)			
Primary Productivity	Oligotrophic	Oligotrophic	
Dissolved Organic Carbon ($mg \cdot L^{-1}$)	0.74	1.05	0.70
Total Nitrogen ($mg \cdot L^{-1}$)	0.058	0.091	0.64
Total Phosphorus ($\mu g \cdot L^{-1}$)	1.16	2.78	0.42
Chlorophyll a ($\mu g \cdot L^{-1}$)	0.83	1.77	0.47
Turbidity (NTU)	0.39	0.36	1.06
Specific Conductivity ($\mu S \cdot cm^{-1}$)	63.69	127.40	0.50
pH	7.52	8.14	0.92

Table 4.1 (Continued): Physical and Chemical Limnological Characteristics of Lake sites. * indicates the data was obtained from the parameter-elevation regressions on independent slopes model (average annual total precipitation from 1971-2000, 800×800 m).

Glacier National Park	Snyder Lake	Oldman Lake	Sndyer/Oldman
Catchment Characteristics			
Latitude (dd)	48.62	48.5	1.00
Longitude (dd)	113.79	113.46	1.00
Elevation (masl)	1600	2026	0.79
Lake Volume (m^3)	38298	1266063	0.03
Lake Surface Area (m^2)	25629	181755	0.14
Catchment Area (m^2)	4012230	2653727	1.51
Hydraulic Residence Time (d)	1.8	92.0	0.02
*Average Annual Precipitation (cm)	155.9	82.5	1.89
Focusing Factor	1.37	4.55	0.30
Limnological Characteristics (2005)			
Primary Productivity	Oligotrophic	Oligotrophic	
Dissolved Organic Carbon ($mg \cdot L^{-1}$)	0.65	0.70	0.93
Total Nitrogen ($mg \cdot L^{-1}$)	0.095	0.065	1.46
Total Phosphorus ($\mu g \cdot L^{-1}$)	2.67	0.55	4.85
Chlorophyll a ($\mu g \cdot L^{-1}$)	4.73	0.77	6.14
Turbidity (NTU)	0.64	0.35	1.82
Specific Conductivity ($\mu S \cdot cm^{-1}$)	16.80	159.10	0.11
pH	6.42	8.24	0.78

Denali National Park	Wonder Lake	McLeod Lake	Wonder/Mcleod
Catchment Characteristics			
Latitude (dd)	63.48	63.38	1.00
Longitude (dd)	150.88	151.07	1.00
Elevation (masl)	610	609	1.00
Lake Volume (m^3)	77653853	1847704	42.03
Lake Surface Area (m^2)	2656472	358512	7.41
Catchment Area (m^2)	28965859	1722319	16.82
Hydraulic Residence Time (d)	2740	2170	1.26
*Average Annual Precipitation (cm)	66	70	0.94
Focusing Factor	3.49	2.60	1.34
Limnological Characteristics (2004)			
Primary Productivity	Oligotrophic	Oligotrophic	
Dissolved Organic Carbon ($mg \cdot L^{-1}$)	2.10	2.25	0.93
Total Nitrogen ($mg \cdot L^{-1}$)	0.105	0.131	0.80
Total Phosphorus ($\mu g \cdot L^{-1}$)	0.5	0.104	4.81
Chlorophyll a ($\mu g \cdot L^{-1}$)	0.49	0.61	0.80
Turbidity (NTU)	0.34	0.29	1.18
Specific Conductivity ($\mu S \cdot cm^{-1}$)	190.10	8.41	22.61
pH	8.18	7.24	1.13

Gates of the Arctic National Park and Noatak National Preserve	Matcharak Lake	Burial Lake	Matcharak/Burial
Catchment Characteristics			
Latitude (dd)	67.75	68.43	0.99
Longitude (dd)	156.21	159.18	0.98
Elevation (masl)	488	427	1.14
Lake Volume (m^3)	21889008	5297945	4.13
Lake Surface Area (m^2)	3006999	654630	4.59
Catchment Area (m^2)	20650752	1837879	11.24
Hydraulic Residence Time (d)	4050	88440	0.05
*Average Annual Precipitation (cm)	43	39	1.10
Focusing Factor	1.25	0.88	1.42
Limnological Characteristics (2004)			
Primary Productivity	Oligotrophic	Oligotrophic	
Dissolved Organic Carbon ($mg \cdot L^{-1}$)	4.71	3.32	1.42
Total Nitrogen ($mg \cdot L^{-1}$)	0.284	0.233	1.22
Total Phosphorus ($\mu g \cdot L^{-1}$)	1.09	9.06	0.12
Chlorophyll a ($\mu g \cdot L^{-1}$)	0.96	0.81	1.19
Turbidity (NTU)	0.35	0.32	1.11
Specific Conductivity ($\mu S \cdot cm^{-1}$)	248.10	35.08	7.07
pH	8.31	7.57	1.10

Table 4.2: Statistically significant ($p<0.05$) doubling times and half-lives of current and historic-use SOCs in sediment cores from high-altitude and high-latitude lake systems in western U.S. National Parks. Half-lives and doubling times were calculated from the natural log focus-corrected flux vs. year and the standard deviation was estimated from the slope of the linear regression. Linear regressions were calculated between the times of U.S. introduction to 2003. ns indicates the linear regression was not statistically significant ($p>0.05$).

	Current-use SOCs				Historic-use SOCs			
	ΣEndosulfans	Dacthal	ΣPAHs	ΣPBDEs	ΣChlordane	ΣDDDs + ΣDDEs	ΣPCBs	Dieldrin
Sequoia National Park								
Emerald Lake								
Doubling Time	ns	ns	ns	ns	ns	ns	ns	ns
Half-life	ns	ns	ns	ns	ns	18.7 ± 0.01	ns	ns
Pear Lake								
Doubling Time	11.3 ± 0.02	ns	ns	ns	8.8 ± 0.02	ns	ns	ns
Half-life	ns	ns	18.1 ± 0.02	ns	11.7 ± 0.02	10.5 ± 0.01	23.7 ± 0.01	15.8 ± 0.01
Rocky Mountain National Park								
Mills lake								
Doubling Time	12.8 ± 0.005	30.7 ± 0.02	ns	5.4 ± 0.001	10.9 ± 0.02	ns	8.3 ± 0.01, 13.6 ± 0.01	ns
Half-life	ns	ns	ns	ns	ns	ns	ns	ns
Lone Pine Lake								
Doubling Time	19.1 ± 0.004	ns	ns	ns	28.7 ± 0.01	46.3 ± 0.01	ns	ns
Half-life	ns	ns	28.3 ± 0.01	ns	28.5 ± 0.01	16.0 ± 0.01	ns	ns
Mt. Rainier National Park								
LP19								
Doubling Time	10.8 ± 0.02	ns	62.3 ± 0.01	ns	ns	ns	42 ± 0.01	ns
Half-life	ns	ns	ns	ns	21.1 ± 0.01	42.8 ± 0.01	ns	ns
Golden Lake								
Doubling Time	9.8 ± 0.01	ns	ns	ns	ns	ns	10.2 ± 0.02	ns
Half-life	ns	ns	15.4 ± 0.01	ns	17.7 ± 0.01	ns	25.4 ± 0.01	ns
Olympic National Park								
Hoh Lake								
Doubling Time	ns	ns	ns	ns	ns	ns	ns	ns
Half-life	ns	ns	20.5 ± 0.01	ns	70.9 ± 0.01	ns	40.3 ± 0.01	ns
PJ Lake								
Doubling Time	5.7 ± 0.04	15.6 ± 0.01	ns	ns	ns	ns	ns	ns
Half-life	ns	ns	ns	ns	ns	ns	ns	ns
Glacier National Park								
Oldman Lake								
Doubling Time	13.4 ± 0.01	25.7 ± 0.01	48.9 ± 0.01	ns	30 ± 0.01	ns	25 ± 0.01	ns
Half-life	ns	ns	ns	ns	ns	ns	ns	ns
Snyder Lake								
Doubling Time	19.7 ± 0.01	29.4 ± 0.01	ns	ns	ns	ns	ns	ns
Half-life	ns	ns	46.8 ± 0.01	ns	ns	23.7 ± 0.01	ns	ns
Denali National Park								
McLeod Lake								
Doubling Time	29.6 ± 0.01	ns	ns	ns	19.2 ± 0.01	ns	ns	ns
Half-life	ns	ns	ns	ns	ns	ns	ns	ns
Wonder Lake								
Doubling Time	ns	ns	ns	ns	18.1 ± 0.01	ns	ns	ns
Half-life	ns	ns	15.3 ± 0.02	ns	ns	ns	ns	ns
Gates of the Arctic National Park								
Matcharak Lake								
Doubling Time	ns	ns	10.5 ± 0.01	ns	27.1 ± 0.01	ns	32.6 ± 0.01	ns
Half-life	ns	ns	ns	ns	ns	ns	ns	ns
Noatak National Preserve								
Burial Lake								
Doubling Time	ns	ns	112.6 ± 0.01	ns	31.2 ± 0.01	ns	24.9 ± 0.01	ns
Half-life	ns	ns	ns	ns	ns	ns	ns	ns

Table 4.3: Fraction ratios of Ind/(Ind+BeP) and Ind/(Ind+BghiP) (average ± standard deviation) calculated from sediment and snow. [a] reference (*69*), [b] reference (*67*), [c] reference (*70*), and [d] reference (*68*). na indicates data was not available.

	Fraction Ratios	
	Ind/(Ind+BeP)	Ind/(Ind+BghiP)
PAHs Emission Sources		
Aluminum Smelter (Soderberg)	0.39[a]	0.42[a]
Wood Combustion	na	0.64 ± 0.07[b]
Pine Wood (Fireplace)	0.53[c]	0.54[c]
Gasoline Motor	0.74[d]	na
Sediment		
Snyder Lake (GLAC)		
Interval 1893	0.49	0.55
Intervals 1955-2005	0.35 ± 0.05	0.48 ± 0.05
Oldman Lake (GLAC)		
Interval 1906	0.66	0.50
Surficial Sediment 2005	0.45	0.51
Mills Lake (ROMO)		
Interval 1905	0.68	0.54
Intervals 1953-2003	0.66 ± 0.02	0.61 ± 0.08
LP19 (MORA)		
Interval 1903	0.66	na
Intervals 1956-2003	0.61 ± 0.02	na
Snow (2003)		
Snyder Lake (GLAC)	0.40	0.43
Oldman Lake (GLAC)	0.49	0.54
Mills Lake (ROMO)	0.55	0.57
Lone Pine (ROMO)	0.50	0.54
LP19 (MORA)	0.53	0.58

LITERATURE CITED:

(1) Bidleman, T. F. Atmospheric processes. *Environ. Sci. Technol.* **1988**, *22*, 361-367.

(2) U.S. Environmental Protection Agency. **2007**, http://www.epa.gov/pbt/index.htm.

(3) Wania, F.; Mackay, D. Global fractionation and cold condensation of low volatility organo-chlorine compounds in polar regions. *Ambio* **1993**, *22*, 10-12.

(4) Jaffe, D.; Anderson, T.; Covert, D.; Kotchenruther, R.; Trost, B.; Danielson, J.; Simpson, W.; Berntsen, T.; Karlsdottir, S.; Blake, D.; Harris, J.; Carmichael, G.; Uno, I. Transport of Asian air pollution to North America. *Geophys. Res. Let.* **1999**, *26*, 711-714.

(5) Wania, F.; Haugen, J. E.; Lei, Y. D.; Mackay, D. Temperature dependence of atmospheric concentrations of semivolatile organic compounds. *Environ. Sci. Technol.* **1998**, *32*, 1013-1021.

(6) Daly, G. L.; Wania, F. Organic Contaminants in Mountains. *Environ. Sci. Technol.* **2005**, *39*, 385-398.

(7) Wania, F.; Mackay, D.; Hoff, J. T. The importance of snow scavenging of polychlorinated biphenyl and polycyclic aromatic hydrocarbon vapors. *Environ. Sci. Technol.* **1999**, *33*, 195-197.

(8) Wania, F. a. M., D. Tracking the distribution of persistent organic pollutants. *Environ. Sci. Technol.* **1996**, *30*, 390A-396A.

(9) Usenko, S.; Hageman, K. J.; Schmedding, D. W.; Wilson, G. R.; Simonich, S. L. Trace Analysis of Semi-Volatile Organic Compounds in Large Volume Samples of Snow, Lake Water, and Groundwater. *Environ. Sci. Technol.* **2005**, *39*, 6006-6015.

(10) Simonich, S. L.; Hites, R. A. Global distribution of persistent organochlorine compounds. *Science* **1995**, *269*, 1851-1854.

(11) Bidleman, T. F.; Walla, M. D.; Roura, R.; Carr, E.; Schmidt, S. Organochlorine pesticides in the atmosphere of the Southern Ocean and Antarctica, January-March 1990. *Mar. Pollut. Bull.* **1993**, *26*, 258-262.

(12) Bidleman, T.; Jantunen, L. M.; Helm, P. A.; Lunden, E. B.; Juntto, S. Chlordane Enantiomers and Temporal Trends of Chlordane Isomers in Arctic Air. *Environ. Sci. Technol.* **2002**, *36*, 539-544.

(13) Fernandez, P.; Vilanova, R. M.; Grimalt, J. O. Sediment fluxes of polycyclic aromatic hydrocarbons in European high altitude mountain lakes. *Environ. Sci. Technol.* **1999**, *33*, 3716-3722.

(14) Fernandez, P.; Grimalt, J. O.; Vilanova, R. M. Atmospheric gas-particle partitioning of polycyclic aromatic hydrocarbons in high mountain regions of Europe. *Environ. Sci. Technol.* **2002**, *36*, 1162-1168.

(15) Fernandez, P.; Vilanova, R. M.; Martinez, C.; Appleby, P.; Grimalt, J. O. The historical record of atmospheric pyrolytic pollution over Europe registered in the sedimentary PAH from remote mountain lakes. *Environ. Sci. Technol.* **2000**, *34*, 1906-1913.

(16) Helm, P. A.; Diamond, M. L.; Semkin, R.; Strachan, W. M. J.; Teixeira, C.; Gregor, D. A mass balance model describing multiyear fate of organochlorine compounds in a high Arctic lake. *Environ. Sci. Technol.* **2002**, *36*, 996-1003.

(17) Mackay, D. W., F. Transport of contaminants to the Arctic: partitioning, processes, and models. *Sci. Total Environ.* **1995**, *160/161*, 25-38.

(18) Grimalt, J. O.; Fernandez, P.; Berdie, L.; Vilanova, R. M.; Catalan, J.; Psenner, R.; Hofer, R.; Appleby, P. G.; Rosseland, B. O.; Lien, L.; Massabuau, J. C.; Battarbee, R. W. Selective trapping of organochlorine compounds in mountain lakes of temperate areas. *Environ. Sci. Technol.* **2001**, *35*, 2690-2697.

(19) Grimalt, J. O.; van Drooge, B. L.; Ribes, A.; Vilanova, R. M.; Fernandez, P.; Appleby, P. Persistent organochlorine compounds in soils and sediments of European high altitude mountain lakes. *Chemosphere* **2004**, *54*, 1549-1561.

(20) Grimalt, J. O.; Drooge, B. L. V.; Ribes, A.; Fernandez, A. E.; Appleby, P. Polycyclic aromatic hydrocarbon composition in soils and sediments of high altitude lakes. *Environ. Pollut.* **2004**, *131*, 13-24.

(21) Van Metre, P. C.; Mahler, B. J. Trends in Hydrophobic Organic Contaminants in Urban and Reference Lake Sediments across the United States, 1970-2001. *Environ. Sci. Technol.* **2005**, *39*, 5567-5574.

(22) Vilanova, R.; Fernandez, P.; Martinez, C.; Grimalt, J. O. Organochlorine pollutants in remote mountain lake waters. *J. Environ. Qual.* **2001**, *30*, 1286-1295.

(23) Vilanova, R. M.; Fernandez, P.; Grimalt, J. O. Polychlorinated biphenyl partitioning in the waters of a remote mountain lake. *Sci. Total Environ.* **2001**, *279*, 51-62.

(24) Vilanova, R. M.; Fernandez, P.; Martinez, C.; Grimalt, J. O. Polycyclic aromatic hydrocarbons in remote mountain lake waters. *Water Res.* **2001**, *35*, 3916-3926.

(25) Blais, J. M.; Schindler, D. W.; Muir, D. C. G.; Kimpe, L. E.; Donald, D. B.; Rosenberg, B. Accumulation of persistent organochlorine compounds in mountains of western Canada. *Nature* **1998**, *395*, 585-588.

(26) McConnell, L. L.; LeNoir, J. S.; Datta, S.; Seiber, J. N. Wet deposition of current-use pesticides in the Sierra Nevada mountain range, California, USA. *Environ. Toxicol. Chem.* **1998**, *17*, 1908-1916.

(27) Mast, A.; Foreman, W. T.; Skaates, S. Current-Use Pesticides and Organochlorine Compounds in Precipitation and Lake Sediment from Two High-Elevation National Parks in the Western United States. *Arch. Environ. Contam. Toxicol.* **2007**, On line.

(28) Datta, S.; McConnell, L. L.; Baker, J. E.; Lenoir, J.; Seiber, J. N. Evidence for atmospheric transport and deposition of polychlorinated biphenyls to the Lake Tahoe basin, California - Nevada. *Environ. Sci. Technol.* **1998**, *32*, 1378-1385.

(29) Datta, S.; Ohyama, K.; Dunlap, D. Y.; Matsumura, F. Evidence for organochlorine contamination in tissues of salmonids in Lake Tahoe. *Ecotox. Environ. Safe.* **1999**, *42*, 94-101.

(30) Blais, J. M.; Muir, D. C. G. In *Tracking Environmental Change Using Lake Sediments*; Last, W. M., Smol, J. P., Eds.; Kluwer Academic Publishers, 2001; Vol. 2, pp 271-298.

(31) Gubala, C. P., Landers, D.H., Monetti, M., Heit, M., Wade, T., Lasorsa, B., Allen-Gil, S. The rates of accumulation and chronologies of atmospherically derived pollutants in Arctic Alaska, USA. *The Science of the Total Environment* **1995**, *160/161*, 347-361.

(32) Hageman, K. J.; Simonich, S. L.; Campbell, D. H.; Wilson, G. R.; Landers, D. H. Atmospheric Deposition of Current-Use and Historic-Use Pesticides in Snow at

National Parks in the Western United States. *Environ. Sci. Technol.* **2006**, *40*, 3174-3180.

(33) Kannan, K.; Johnson-Restrepo, B.; Yohn, S. S.; Giesy, J. P.; Long, D. T. Spatial and Temporal Distribution of Polycyclic Aromatic Hydrocarbons in Sediments from Michigan Inland Lakes. *Environ. Sci. Technol.* **2005**, *39*, 4700-4706.

(34) Muir, D. C. G.; Omelchenko, A.; Grift, N. P.; Savoie, D. A.; Lockhart, W. L.; Wilkinson, P.; Brunskill, G. J. Spatial trends and historical deposition of polychlorinated biphenyls in Canadian midlatitude and Arctic lake sediments. *Environ. Sci. Technol.* **1996**, *30*, 3609-3617.

(35) Appleby, P. G.; Nolan, P. J.; Gifford, D. W.; Godfrey, M. J.; Oldfield, F.; Anderson, N. J.; Battarbee, R. W. ^{210}Pb Dating by low background gamma counting. *Hydrobiologia* **1986**, *141*, 21-27.

(36) Appleby, P. G. In *Tracking Environmental Change Using Lake Sediments*; Smol, J. P., Ed.; Kluwer Academic Publishers, 2001; Vol. 1.

(37) Appleby, P. G.; Piliposian, G. T. Radiometric dating of sediment records from mountain lakes in the Tatra Mountains. *Biologia* **2006**, *61*, S51-S64.

(38) Appleby, P. G. Radiometric dating of sediment cores. WACAPs Project - Year 1 Report. **2003**.

(39) Appleby, P. G. Radiometric dating of sediment cores. WACAPs Project - Year 2 Report. **2004**.

(40) Appleby, P. G. Radiometric dating of additional sediment cores from Matcharak and Wonder Lakes. WACAPs Project - Year 2 Supplementary Report. **2004**.

(41) Appleby, P. G. Radiometric dating of sediment cores. WACAPs Project - Year 3 Report. **2005**.

(42) Daly, C.; Neilson, R. P.; Phillips, D. L. A statistical-topographic model for mapping climatological precipitation over mountainous terrain. *Journal of Applied Meteorology* **1994**, *33*, 140-158.

(43) Likens, G. E.; Davis, M. B. Post-glacier history of Mirrow Lake and its watershed in New Hampshire U.S.A.: An initial report. *Internationale Vereinigung fuer Theoretische und Angewandte Limnologie Verhandlungen* **1975**, *19*, 982-993.

(44) Zhu, L. Y.; Hites, R. A. Brominated Flame Retardants in Sediment Cores from Lake Michigan and Erie. *Environ. Sci. Technol.* **2005**, *39*, 3488-3494.

(45) Granstein, W. C.; Turekian, K. K. ^{210}Pb and ^{137}Cs in Air and Soils Measure the Rate and Vertical Profile of Aerosol Scavenging. *Journal of Geophysical Research* **1986**, *91*, 14,355-314,366.

(46) Carpenter, R.; Peterson, M. L.; Bennett, J. T.; Somayajulu, B. L. K. Mixing and cycling of uranium, thorium and 210 Pb in Puget Sound sediments. *Geochimica et Cosmochimica Acta* **1984**, *48*, 1949-1963.

(47) Monaghan, M. C. Lead 210 in Surface Air and Soils From California: Implications for the Behavior of Trace Constituents in the Planetary Boundary Laker. *Journal of Geophysical Research* **1989**, *94*, 6449-6456.

(48) Monaghan, M. C.; Holdsworth, G. The origin of non-sea-salt sulphate in the Mount Logan ice core. *Nature* **1990**, *343*, 245 - 248.

(49) Nevissi, A. E. Measurement of 210Pb Atmospheric Flux in the Pacific Northwest. *Health Physics* **1985**, *48*, 169-174.

(50) Sethajintanin, D.; Anderson, K. A. Temporal bioavailability of organochlorine pesticides and PCBs. *Environ. Sci. Technol.* **2006**, *40*, 3689-3695.

(51) John F. Quensen III; Sherry A. Mueller; Mahendra K. Jain; Tiedje, J. M. Reductive Dechlorination of DDE to DDMU in Marine Sediment Microcosms. *Science* **1998**, *280*, 722 - 724.

(52) Sickman, J. O. Characterization of Year-Round Sensitivity of California's Montane Lakes to Acidic Deposition. *California Air Resources Board* **1989**, *A5-203-32*.

(53) Oldman River Basin Water Qualilty Initiative, Five Year Report Summary,. *Oldman Watershed Council, Alberta Agriculture, Food and Rural Development* **2002**, http://www.oldmanbasin.org/.

(54) U.S. Geological Survey; Pesticide National Synthesis Project Annual Use Maps. *http://ca.water.usgs.gov/pnsp/use92/* **1997**.

(55) Muir, D.; Teixeira, C.; Wania, F. Emperical and Modeling evidence of Regional Atmospheric Transport of Current-use Pesticides. *Environ. Toxicol. Chem.* **2004**, *23*, 2421–2432.

(56) U.S. Geological Survey; Pesticide National Synthesis Project Annual Use Maps. *http://ca.water.usgs.gov/pnsp/use92/* **1992**.

(57) Yao, Y.; T., H.; Ma, J.; Tuduri, L.; Blanchard, P. Sources and Occurrence of Dacthal in the Canadian Atmosphere. *Environ. Sci. Technol.* **2007**, *41*, 688-694.

(58) Hafner, W. D.; Hites, R. A. Effects of wind and air trajectory directions on atmospheric concentrations of persistent organic pollutants near the great lakes. *Environ. Sci. Technol.* **2005**, *39*, 7817-7825.

(59) Garban, B.; Blanchoud, H.; Motelay-Massei, A.; Chevreuil, M.; Ollivon, D. Atmospheric bulk deposition of PAHs onto France: trends from urban to remote sites. *Atmos. Environ.* **2002**, *36*, 5395-5403.

(60) United States Census Bureau. **2000**, *http://quickfacts.census.gov/qfd/states/*.

(61) Monohan, K.; Tinsley, I. J.; Shepherd, S. F.; Field, J. A. Quantitative determination of the acidic metabolites of dacthal in ground water by strong anion exchange solid-phase extraction. *J. Agric. Food Chem.* **1995**, *43*, 2418-2423.

(62) Field, J. A.; Monohan, K.; Reed, R. Coupling supercritical CO2 and subcritical (hot) water for the determination of Dacthal and its acid metabolites in soil. *Anal. Chem.* **1998**, *70*, 1956-1962.

(63) Columbia Falls Aluminum Company. **2007**, *http://www.cfaluminum.com/*.

(64) National Park Service. U.S. Department of the Interior. **2007**, *http://www.nps.gov/*.

(65) International Aluminium Institute. **2007**, *http://www.world-aluminium.org/*.

(66) Peterson, D. L.; Sullivan, T.; Eilers, J. M.; Brace, S.; Horner, D.; Savig, K.; Morse, D. Assessment of Air Quality and Air Pollutant Impacts in National Parks of the Rocky Mountains and Northern Great Plains. *U.S. Department of the Interior National Park Service.* **1998**, *http://www2.nature.nps.gov/air/Pubs/*.

(67) Yunker, M. B.; Macdonald, R. W.; Vingarzan, R.; Mitchell, R. H.; Goyette, D.; Sylvestre, S. PAHs in the Fraser River basin: a critical appraisal of PAH ratios as indicators of PAH source and composition. *Org Geochem* **2002**, *33*, 489-515.

(68) Schauer, J. J.; Kleeman, M. J.; Cass, G. R.; Simoneit, B. R. T. Measurement of emissions from air pollution sources. 5. C-1-C-32 organic compounds from gasoline-powered motor vehicles. *Environ. Sci. Technol.* **2002**, *36*, 1169-1180.

(69) Sanderson, E. G.; Farant, J. P. Atmospheric size distribution of PAHs: Evidence of a high-volume sampling artifact. *Environ. Sci. Technol.* **2005**, *39*, 7631-7637.

(70) Schauer, J. J.; Kleeman, M. J.; Cass, G. R.; Simoneit, B. R. T. Measurement of emissions from air pollution sources. 3. C-1-C- 29 organic compounds from fireplace combustion of wood. *Environ. Sci. Technol.* **2001**, *35*, 1716-1728.

CHAPTER 5. CONCLUSIONS

The study and assessment of remote ecosystems in the western U.S. requires a systematic spatial and temporal evaluation of high-altitude and/or high-latitude ecosystems. Research was needed to improve the overall understanding of the fate and transport of semi-volatile organic contaminants (SOCs) in high-altitude and/or high-latitude ecosystems of the western U.S. In addition, an assessment was needed to determine the potential current and future impacts of SOCs on remote ecosystems and their downstream consequence on human residents relying on these ecosystems. Remote ecosystems that are at increased risk from SOCs were identified.

Prior to this research, analytical methods necessary for accessing SOCs in high-altitude and/or high-latitude ecosystems were limited by high analyte detection limits, limited analyte lists, sample matrix interferences, and the logistical limitations of sampling in remote locations. To fulfill these analytical and sampling requirements, two separate analytical methods (with lower analyte detections limits, capable of measuring low ppb or low ppt SOC concentrations in aqueous (lake water and precipitation) and solid (sediment) matrices) were developed and validated. In addition, the spatial and temporal distribution of SOCs was determined in western U.S. National Parks, using lake water and sediment collected from high-altitude and/or high-latitude ecosystems.

The analytical method developed for the trace analysis of a diverse list of 75 SOCs in ~50-L snow, lake water, and groundwater samples was published in peer review journal, Environmental Science and Technology. Large volume extractions (50 L) were conducted in order to lower detection limits to pg/L by increasing the overall contaminant mass extracted. Due to the large extraction volumes and diverse analyte list, a solid phase extraction device with hydrophobic and hydrophilic sorbents was developed. This analytical method results in lower analyte detection limits for a diverse analyte list with a wide range of physical and chemical properties This is due to the use of more sensitive ionization modes of mass spectrometry, increased sample volumes, and increased extraction efficiency. In addition, this dissertation also described the development and validation of an analytical method for quantifying 98 SOCs in sediment to reconstruct the current and historical SOC deposition, and to identify possible SOC trends within the sediment record.

The geographical trends and historical deposition profiles for SOCs measured in sediment cores from 14 lakes located in western U.S. National Parks was presented. Sedimentary SOC profiles and their spatial trends were evaluated. We hypothesized that the atmospheric transport of SOCs in the western U.S. is be governed by the global fractionation model and predominantly westerly winds. SOC surficial sediment fluxes ranged over two to four orders of magnitude. Typically, the lowest SOC sediment fluxes were measured in the Alaskan's sites and the highest SOC sediment fluxes were measured at sites situated near SOC sources, such as agricultural areas, industrial areas, and/or areas of urban growth. This suggests that many SOCs are undergoing long-range atmospheric transport to high-altitude and/or high-latitude ecosystems in the western U.S.

In this dissertation, three previously unanswered questions related to SOC transport in mountainous areas were addressed. First, what is the relative importance of large-scale winds on the atmospheric transport of SOCs compared to local/regional upslope winds? Second, how are these two wind patterns and the associated atmospheric transport and deposition of SOCs affected by topography, such as the Continental

Divide? Third, is the deposition of SOCs increasing or decreasing in western U.S. high-altitude and/or high-latitude ecosystems? These previously unanswered questions are crucial to understanding the fate and transport of SOC in mountainous areas.

Sedimentary SOC profiles from two high-elevation lakes on opposing sides of the Continental Divide, within Rocky Mountain National Park (ROMO), were examined to address these questions. We hypothesized that Mills Lake, on the east side, receives upslope winds and SOCs that originate from the eastern low lands and that Lone Pine Lake, which is on the west side, receives upslope winds and SOCs that originate from the western low lands. The eastern low lands have a larger number of SOC sources, with more intense SOC emissions, when compared to the western low lands. Similar SOCs were measured in both lake sediment cores, however for many SOCs, Mills Lake (east) had a statistically higher SOC sediment flux, than Lone Pine Lake (west). In 2003, Mills Lake (east) snow concentrations of dacthal, trans-chlordane, and sum of polycyclic aromatic hydrocarbons (ΣPAH) were not statistically different than Lone Pine Lake (west), suggesting SOC air concentrations were similar on both sides of the Continental Divide during the snow accumulation season.

The SOCs, which consistently had higher fluxes in Mills Lake (east) surficial sediment, had higher snow fluxes and therefore ecosystem loads during the 2003 snow accumulation season. This suggests that the difference in SOC sediment flux between the two lakes may be partially explained by differences in snow deposition. The 2003 lake water concentrations of ΣEndosulfans (endosulfan I, II, and sulfate) and dacthal, collected at the same time as the sediment cores, in Mills Lake (east) were greater than Lone Pine Lake (west) by a factor of 4.0 and 1.5, respectively. Significant differences in the historical deposition, measured in sediment cores, of many SOCs to Mills Lake (east) and Lone Pine Lake (west) were not explained by differences in lake catchment characteristics or precipitation. This suggests that, similar to atmospheric nitrogen deposition in this region, a majority of the SOC deposition to the Mills Lake catchment arrived via upslope winds from the east during the summer months. This is counter to prevailing westerly winds and implies that the Continental Divide influences SOC deposition.

The ΣPAH and ΣEndosulfan fluxes, profiles, and trends within sediment from Glacier National Park (GLAC) also illustrate that the Continental Divide impacts the atmospheric transport and deposition of SOCs. Improved understanding of the fate and transport of SOCs in mountainous areas has direct implications on SOC source apportionment. In this dissertation, the improved understanding of the fate and transport of SOC in mountainous areas gained from ROMO and GLAC was used to identify a local PAH source in Snyder Lake (GLAC). Biogenic molecular markers and PAH source apportionment methods were used to eliminate biomass combustion and urban sources as major PAH emission sources to Snyder Lake (GLAC) and suggests that the major PAH emission source to the Snyder Lake catchment (GLAC) is likely a local aluminum smelter.

Many SOCs measured in snow were also measured in surficial sediment, including ΣEndosulfans, dacthal, ΣChlordanes (trans-chlordane, cis-nonachlor, and trans-nonachlor), ΣHCH (γ-HCH + α-HCH), ΣPCBs (sum of polychlorinated biphenyls), and ΣPAH. Linear regression analysis indicated that the natural log of surficial sediment fluxes of ΣEndosulfans, ΣChlordanes, ΣHCH, ΣPCBs, and ΣPAHs were significantly correlated ($p<0.05$) with the natural log of snow fluxes for these same SOCs. These statistically significant regressions indicate the importance of winter time SOC deposition in western U.S. National Parks. However, Dacthal surficial sediment fluxes were not correlated with dacthal snow flux. This is most likely due to dacthal being hydrolyzed to tetrachloroterephthalic acid in water column prior to accumulating in sediment.

Some SOCs have physical and chemical properties that, when combined with the climatic conditions of high-altitude and high-latitude ecosystems, result in the contaminant undergoing atmospheric transport and deposition to these remote ecosystems. Seasonal and daily wind patterns, as well as topographic barriers such as the Continental Divide can affect the atmospheric transport and deposition of SOCs to these remote ecosystems. Understanding SOC physical and chemical properties, climatic conditions, and the role of topographic features is crucial when identifying and evaluating SOC environmental fate and potential ecological impacts on these remote ecosystems.

Future work should be directed at investigating how lake physical and limnological characteristics impact the environmental fate of SOCs in remote ecosystems. This could be achieved through an intensive SOC study in Pear Lake and Emerald Lake with a high temporal resolution sediment cores as well as SOCs measurements in biota (plankton, benthic organism, and fish), precipitation (both snow and rain), and dry deposition over the course of a few years. In addition, examine lake water SOC concentrations both in the epilimnion and hypolimnion during summer and winter stratification, especially during snowmelt. With focuses on primary productivity, hydraulic resident time, and ecosystem SOC mass balance.

LITERATURE CITED:

Certificate of analysis (2004) SRM 1941b, organics in marine sediment. National Institute of Standards and Technology, Gaithersburg, MD.

United States Census Bureau. **2000**, *http://quickfacts.census.gov/qfd/states/*.

Mountain Watch Report. *UNEP World Conservation Monitoring Centre* **2002**.

Oldman River Basin Water Qualilty Initiative, Five Year Report Summary,. *Oldman Watershed Council, Alberta Agriculture, Food and Rural Development* **2002**, http://www.oldmanbasin.org/.

U.S. Department of Agriculture -- National Agriculture Statistics Service,. **2002**, *http://151.121.3.33:8080/Census/Create_Census_US_CNTY.jsp#top*.

Columbia Falls Aluminum Company. **2007**, *http://www.cfaluminum.com/*.

International Aluminium Institute. **2007**, *http://www.world-aluminium.org/*.

National Park Service. U.S. Department of the Interior. **2007**, *http://www.nps.gov/*.

U.S. Environmental Protection Agency. **2007**, *http://www.epa.gov/pbt/index.htm*.

U.S. Environmental Protection Agency. **(accessed Jan. 2007)**, *http://www.epa.gov/pbt/index.htm*.

Ackerman, L. K.; Wilson, G. R.; Simonich, S. L. Quantitative Analysis of 39 Polybrominated Diphenyl Ethers by Isotope Dilution GC/Low-Resolution MS. *Anal. Chem.* **2005**, *77*, 1979-1987.

Anderson, C. W.; Wood, T. M.; Morace, J. L. Distribution of Dissolved Pesticides and Other Water Quality Constituents in Small Streams, and their Relation to Land Use, in the Willamette River Basin, Oregon,. *U.S. Geological Survey, Water-Resources Investigations* **1996**, *Report 97–4268*.

Appleby, P. G. In *Tracking Environmental Change Using Lake Sediments*; Smol, J. P., Ed.; Kluwer Academic Publishers, 2001; Vol. 1.

Appleby, P. G. Radiometric dating of sediment cores. WACAPs Project - Year 1 Report. **2003**.

Appleby, P. G. Radiometric dating of additional sediment cores from Matcharak and Wonder Lakes. WACAPs Project - Year 2 Supplementary Report. **2004**.

Appleby, P. G. Radiometric dating of sediment cores. WACAPs Project - Year 2 Report. **2004**.

Appleby, P. G. Radiometric dating of sediment cores. WACAPs Project - Year 3 Report. **2005**.

Appleby, P. G.; Nolan, P. J.; Gifford, D. W.; Godfrey, M. J.; Oldfield, F.; Anderson, N. J.; Battarbee, R. W. ^{210}Pb Dating by low background gamma counting. *Hydrobiologia* **1986**, *141*, 21-27.

Appleby, P. G.; Piliposian, G. T. Radiometric dating of sediment records from mountain lakes in the Tatra Mountains. *Biologia* **2006**, *61*, S51-S64.

Baker, J. I.; Hites, R. A. Siskiwit Lake revisited: Time trends of polychlorinated dibenzo-p-dioxin and dibenzofuran deposition at Isle Royale, Michigan. *Environ. Sci. Technol.* **2000**, *34*, 2887-2891.

Barbash, J. E.; Thelin, G. P.; Kolpin, D. W.; Gilliom, R. J. Major Herbicides in Ground Water: Results from the National Water-Quality Assessment. *J. Environ. Qual.* **2001**, *30*, 831-845.

Baron, J. S.; Rueth, H. M.; Wolfe, A. M.; Nydick, K. R.; Allstott, E. J.; Minear, J. T.; Moraska, B. Ecosystem responses to nitrogen deposition in the Colorado Front Range. *Ecosystems* **2000**, *3*, 352-368.

Beyer, A.; Mackay, D.; Matthies, M.; Wania, F.; Webster, E. Assessing long-range transport potential of persistent organic pollutants. *Environ. Sci. Technol.* **2000**, *34*, 699-703.

Beyer, A.; Wania, F.; Gouin, T.; Mackay, D.; Matthies, M. Temperature dependence of the characteristic travel distance. *Environ. Sci. Technol.* **2003**, *37*, 766-771.

Bidleman, T.; Jantunen, L. M.; Helm, P. A.; Lunden, E. B.; Juntto, S. Chlordane Enantiomers and Temporal Trends of Chlordane Isomers in Arctic Air. *Environ. Sci. Technol.* **2002**, *36*, 539-544.

Bidleman, T. F. Atmospheric processes. *Environ. Sci. Technol.* **1988**, *22*, 361-367.

Bidleman, T. F.; Walla, M. D.; Roura, R.; Carr, E.; Schmidt, S. Organochlorine pesticides in the atmosphere of the Southern Ocean and Antarctica, January-March 1990. *Mar. Pollut. Bull.* **1993**, *26*, 258-262.

Blais, J. M.; Muir, D. C. G. In *Tracking Environmental Change Using Lake Sediments*; Last, W. M., Smol, J. P., Eds.; Kluwer Academic Publishers, 2001; Vol. 2, pp 271-298.

Blais, J. M.; Schindler, D. W.; Muir, D. C. G.; Kimpe, L. E.; Donald, D. B.; Rosenberg, B. Accumulation of persistent organochlorine compounds in mountains of western Canada. *Nature* **1998**, *395*, 585-588.

Burns, D. A. Atmospheric nitrogen deposition in the Rocky Mountains of Colorado and southern Wyoming - a review and new analysis of past study results. *Atmos. Environ.* **2003**, *37*, 921-932.

Carpenter, R.; Peterson, M. L.; Bennett, J. T.; Somayajulu, B. L. K. Mixing and cycling of uranium, thorium and 210 Pb in Puget Sound sediments. *Geochimica et Cosmochimica Acta* **1984**, *48*, 1949-1963.

Carrera, G.; Fernandez, P.; Grimalt, J. O.; Ventura, M.; Camarero, L.; Catalan, J.; Nickus, U.; Thies, H.; Psenner, R. Atmospheric deposition of organochlorine compounds to remote high mountain lakes of Europe. *Environ. Sci. Technol.* **2002**, *36*, 2581-2588.

Carrera, G.; Fernandez, P.; Vilanova, R. M.; Grimalt, J. O. Persistent organic pollutants in snow from European high mountain areas. *Atmos. Environ.* **2001**, *35*, 245-254.

Catalan, J.; Ventura, M.; Vives, I.; Grimalt, J. O. The Roles of Food and Water in the Bioaccumulation of Organochlorine Compounds in High Mountain Lake Fish. *Environ. Sci. Technol.* **2004**, *38*, 4269-4275.

Cook, P. M.; Robbins, J. A.; Endicott, D. D.; Lodge, K. B.; Guiney, P. D.; Walker, M. K.; Zabel, E. W.; Peterson, R. E. Effects of aryl hydrocarbon receptor-mediated early life stage toxicity on lake trout populations in Lake Ontario during the 20th century. *Environ. Sci. Technol.* **2003**, *37*, 3864-3877.

Daly, C.; Neilson, R. P.; Phillips, D. L. A statistical-topographic model for mapping climatological precipitation over mountainous terrain. *Journal of Applied Meteorology* **1994**, *33*, 140-158.

Daly, G. L.; Wania, F. Simulating the influence of snow on the fate of organic compounds. *Environ. Sci. Technol.* **2004**, *38*, 4176-4186.

Daly, G. L.; Wania, F. Organic Contaminants in Mountains. *Environ. Sci. Technol.* **2005**, *39*, 385-398.

Datta, S.; McConnell, L. L.; Baker, J. E.; Lenoir, J.; Seiber, J. N. Evidence for atmospheric transport and deposition of polychlorinated biphenyls to the Lake Tahoe basin, California - Nevada. *Environ. Sci. Technol.* **1998**, *32*, 1378-1385.

Datta, S.; Ohyama, K.; Dunlap, D. Y.; Matsumura, F. Evidence for organochlorine contamination in tissues of salmonids in Lake Tahoe. *Ecotox. Environ. Safe.* **1999**, *42*, 94-101.

Dearth, M. A.; Hites, R. A. Complete Analysis of Technical Chlordane Using Negative Ionization Mass Spectrometry. *Environ. Sci. Technol.* **1991**, *25*, 245-254.

Fellin, P.; Barrie, L. A.; Dougherty, D.; Toom, D.; Muir, D.; Grift, N.; Lockhart, L.; Billeck, B. Air monitoring in the arctic: Results for selected persistent organic pollutants for 1992. *Environ. Toxicol. Chem.* **1996**, *15*, 253-261.

Fernandez, P.; Grimalt, J. O.; Vilanova, R. M. Atmospheric gas-particle partitioning of polycyclic aromatic hydrocarbons in high mountain regions of Europe. *Environ. Sci. Technol.* **2002**, *36*, 1162-1168.

Fernandez, P.; Vilanova, R. M.; Grimalt, J. O. Sediment fluxes of polycyclic aromatic hydrocarbons in European high altitude mountain lakes. *Environ. Sci. Technol.* **1999**, *33*, 3716-3722.

Fernandez, P.; Vilanova, R. M.; Martinez, C.; Appleby, P.; Grimalt, J. O. The historical record of atmospheric pyrolytic pollution over Europe registered in the sedimentary PAH from remote mountain lakes. *Environ. Sci. Technol.* **2000**, *34*, 1906-1913.

Field, J. A.; Monohan, K.; Reed, R. Coupling supercritical CO2 and subcritical (hot) water for the determination of Dacthal and its acid metabolites in soil. *Anal. Chem.* **1998**, *70*, 1956-1962.

Franz, T. P.; Eisenreich, S. J. Snow scavenging of polychlorinated biphenyls and polycyclic aromatic hydrocarbons in Minnesota. *Environ. Sci. Technol.* **1998**, *32*, 1771-1778.

Franz, T. P.; Eisenreich, S. J.; Holsen, T. M. Dry deposition of particulate polychlorinated biphenyls and polycyclic aromatic hydrocarbons to Lake Michigan. *Environ. Sci. Technol.* **1998**, *32*, 3681-3688.

Galloway, J. N.; Cowling, E. B. The effects of precipitation on aquatic and terestrial ecosystems - a proposed precipitation chemistry network. *Journal of Air Pollution Control Association* **1978**, *28*, 229-235.

Garban, B.; Blanchoud, H.; Motelay-Massei, A.; Chevreuil, M.; Ollivon, D. Atmospheric bulk deposition of PAHs onto France: trends from urban to remote sites. *Atmos. Environ.* **2002**, *36*, 5395-5403.

Granstein, W. C.; Turekian, K. K. ^{210}Pb and ^{137}Cs in Air and Soils Measure the Rate and Vertical Profile of Aerosol Scavenging. *Journal of Geophysical Research* **1986**, *91*, 14,355-314,366.

Gregor, D. J.; Gummer, W. D. Evidence of atmospheric transport and deposition of organochlorine pesticides and polychlorinated biphenyls in Canadian Arctic snow. *Environ. Sci. Technol.* **1989**, *23*, 561-565.

Grimalt, J. O.; Drooge, B. L. V.; Ribes, A.; Fernandez, A. E.; Appleby, P. Polycyclic aromatic hydrocarbon composition in soils and sediments of high altitude lakes. *Environ. Pollut.* **2004**, *131*, 13-24.

Grimalt, J. O.; Fernandez, P.; Berdie, L.; Vilanova, R. M.; Catalan, J.; Psenner, R.; Hofer, R.; Appleby, P. G.; Rosseland, B. O.; Lien, L.; Massabuau, J. C.; Battarbee, R. W. Selective trapping of organochlorine compounds in mountain lakes of temperate areas. *Environ. Sci. Technol.* **2001**, *35*, 2690-2697.

Grimalt, J. O.; van Drooge, B. L.; Ribes, A.; Vilanova, R. M.; Fernandez, P.; Appleby, P. Persistent organochlorine compounds in soils and sediments of European high altitude mountain lakes. *Chemosphere* **2004**, *54*, 1549-1561.

Gubala, C. P., Landers, D.H., Monetti, M., Heit, M., Wade, T., Lasorsa, B., Allen-Gil, S. The rates of accumulation and chronologies of atmospherically derived pollutants in Arctic Alaska, USA. *The Science of the Total Environment* **1995**, *160/161*, 347-361.

Hafner, W. D.; Carlson, D. L.; Hites, R. A. Influence of local human population on atmospheric polycyclic aromatic hydrocarbon concentrations. *Environ. Sci. Technol.* **2005**, *39*, 7374-7379.

Hafner, W. D.; Hites, R. A. Effects of wind and air trajectory directions on atmospheric concentrations of persistent organic pollutants near the great lakes. *Environ. Sci. Technol.* **2005**, *39*, 7817-7825.

Hageman, K. J.; Simonich, S. L.; Campbell, D. H.; Wilson, G. R.; Landers, D. H. Atmospheric Deposition of Current-Use and Historic-Use Pesticides in Snow at National Parks in the Western United States. *Environ. Sci. Technol.* **2006**, *40*, 3174-3180.

Helm, P. A.; Diamond, M. L.; Semkin, R.; Bidleman, T. F. Degradation as a loss mechanism in the fate of alpha- hexachlorocyelohexane in arctic watersheds. *Environ. Sci. Technol.* **2000**, *34*, 812-818.

Helm, P. A.; Diamond, M. L.; Semkin, R.; Strachan, W. M. J.; Teixeira, C.; Gregor, D. A mass balance model describing multiyear fate of organochlorine compounds in a high Arctic lake. *Environ. Sci. Technol.* **2002**, *36*, 996-1003.

Heuer, K.; Tonnessen, K. A.; Ingersoll, G. P. Comparison of precipitation chemistry in the Central Rocky Mountains, Colorado, USA. *Atmos. Environ.* **2000**, *34*, 1713-1722.

Hinckley, D. A.; Bidleman, T. F.; Foreman, W. T. Determination of Vapor Pressures for Nonpolar and Semipolar Organic Compounds from Gas Chromatographic Retention Data. *Journal of Chemical & Engineering Data* **1990**, *35*, 232-237.

Hofer, R.; Lackner, R.; Kargl, J.; Thaler, B.; Tait, D.; Bonetti, L.; Vistocco, R.; Flaim, G. Organochlorine and metal accumulation in fish (Phoxinus phoxinus) along a north-south transect in the Alps. *Water Air Soil Pollut.* **2001**, *125*, 189-200.

Jaffe, D.; Anderson, T.; Covert, D.; Kotchenruther, R.; Trost, B.; Danielson, J.; Simpson, W.; Berntsen, T.; Karlsdottir, S.; Blake, D.; Harris, J.; Carmichael, G.; Uno, I. Transport of Asian air pollution to North America. *Geophys. Res. Let.* **1999**, *26*, 711-714.

Jaffe, D., Bertschi, I., Jaegle, L., Novelli, P., Reid, J., Tanimoto, H., Vingarzan, R., Westphal, D. Long-Range transport of Siberian biomass burning emissions and impact on surface ozone in western North America. *Geophys. Res. Let.* **2004**, *31*.

John F. Quensen III; Sherry A. Mueller; Mahendra K. Jain; Tiedje, J. M. Reductive Dechlorination of DDE to DDMU in Marine Sediment Microcosms. *Science* **1998**, *280*, 722 - 724.

Kannan, K.; Johnson-Restrepo, B.; Yohn, S. S.; Giesy, J. P.; Long, D. T. Spatial and Temporal Distribution of Polycyclic Aromatic Hydrocarbons in Sediments from Michigan Inland Lakes. *Environ. Sci. Technol.* **2005**, *39*, 4700-4706.

Kidd, K.; Bootsma, H.; Hesslein, R.; Muir, D. C. G.; Hecky, R. Biomagnification of DDT through the Benthic and Pelagic Food Webs of Lake Malawi, East Africa: Importance of Trophic Level and Carbon Source. *Environ. Sci. Technol.* **2001**, *35*, 14-20.

Landers, D. H.; Simonich, S. L.; Campbell, D. H.; Erway, M. M.; Geiser, L.; Jaffe, D.; Kent, M.; Schreck, C.; Blett, T.; Taylor, H. E. Western Airborne Contaminants Assessment Project Research Plan. **2003**, *Western Airborne Contaminants Assessment Project Research Plan. EPA/600/R-03/035. U.S. EPA, ORD, NHEERL, WED, Corvallis, OR(www2.nature.nps.gov/air/Studies/air_toxics/wacap.htm)*.

Landers, D. H.; Simonich, S. L.; Jaffe, D. A.; Geiser, L.; Campbell, D. H.; Schwindt, A.; Schreck, C.; Kent, M.; Hafner, W. D.; Taylor, G. E.; Hageman, K. J.; Blett, T.; Erway, M. M.; Pierson, S.; Christie, S. An Assessment of Airborne Contaminants in National Parks of the Western United States. **2007**.

Larsson, P.; Collivin, L.; Okla, L.; Meyer, G. Lake Productivity and Water Chemistry as Governors of the Uptake of Persistent Pollutants in Fish. *Environ. Sci. Technol.* **1992**, *26*, 346-352.

LeNoir, J. S.; McConnell, L. L.; Fellers, G. M.; Cahill, T. M.; Seiber, J. N. Summertime transport of current-use pesticides from California's Central Valley to the Sierra Nevada Mountain Range, USA. *Environ. Toxicol. Chem.* **1999**, *18*, 2715-2722.

Li, A.; Rockne, K. J.; Sturchio, N.; Song, W. L.; Ford, J. C.; Buckley, D. R.; Mills, W. J. Polybrominated diphenyl ethers in the sediments of the Great Lakes. 4. Influencing factors, trends, and implications. *Environ. Sci. Technol.* **2006**, *40*, 7528-7534.

Likens, G. E.; Davis, M. B. Post-glacier history of Mirrow Lake and its watershed in New Hampshire U.S.A.: An initial report. *Internationale Vereinigung fuer Theoretische und Angewandte Limnologie Verhandlungen* **1975**, *19*, 982-993.

Mackay, D. W., F. Transport of contaminants to the Arctic: partitioning, processes, and models. *Sci. Total Environ.* **1995**, *160/161*, 25-38.

Mallinchkrodt Baker. http://www.jtbaker.com/ **2005**.

Mast, A.; Foreman, W. T.; Skaates, S. Current-Use Pesticides and Organochlorine Compounds in Precipitation and Lake Sediment from Two High-Elevation National Parks in the Western United States. *Archives of Environmental Contamination and Toxicology* **2006**, In Press.

Mast, A.; Foreman, W. T.; Skaates, S. Current-Use Pesticides and Organochlorine Compounds in Precipitation and Lake Sediment from Two High-Elevation National Parks in the Western United States. *Arch. Environ. Contam. Toxicol.* **2007**, On line.

McConnell, L. L.; LeNoir, J. S.; Datta, S.; Seiber, J. N. Wet deposition of current-use pesticides in the Sierra Nevada mountain range, California, USA. *Environ. Toxicol. Chem.* **1998**, *17*, 1908-1916.

Meijer, S. N.; Shoeib, M.; Jantunen, L. M. M.; Jones, K. C.; Harner, T. Air-soil exchange of organochlorine pesticides in agricultural soils. 1. Field measurements using a novel in situ sampling device. *Environ. Sci. Technol.* **2003**, *37*, 1292-1299.

Method-8280A, E. P. A. The analysis of polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans by high resolution gas chromatography/low resolution mass spectrometry (HRGC/LRMS). http://www.epa.gov/epaoswer/hazwaste/test/pdfs/8280a.pdf.

Monaghan, M. C. Lead 210 in Surface Air and Soils From California: Implications for the Behavior of Trace Constituents in the Planetary Boundary Laker. *Journal of Geophysical Research* **1989**, *94*, 6449-6456.

Monaghan, M. C.; Holdsworth, G. The origin of non-sea-salt sulphate in the Mount Logan ice core. *Nature* **1990**, *343*, 245 - 248.

Monohan, K.; Tinsley, I. J.; Shepherd, S. F.; Field, J. A. Quantitative determination of the acidic metabolites of dacthal in ground water by strong anion exchange solid-phase extraction. *J. Agric. Food Chem.* **1995**, *43*, 2418-2423.

Muir, D.; Teixeira, C.; Wania, F. Emperical and Modeling evidence of Regional Atmospheric Transport of Current-use Pesticides. *Environ. Toxicol. Chem.* **2004**, *23*, 2421–2432.

Muir, D. C. G.; Omelchenko, A.; Grift, N. P.; Savoie, D. A.; Lockhart, W. L.; Wilkinson, P.; Brunskill, G. J. Spatial trends and historical deposition of polychlorinated biphenyls in Canadian midlatitude and Arctic lake sediments. *Environ. Sci. Technol.* **1996**, *30*, 3609-3617.

Nevissi, A. E. Measurement of 210Pb Atmospheric Flux in the Pacific Northwest. *Health Physics* **1985**, *48*, 169-174.

Peterson, D. L.; Sullivan, T.; Eilers, J. M.; Brace, S.; Horner, D.; Savig, K.; Morse, D. Assessment of Air Quality and Air Pollutant Impacts in National Parks of the Rocky Mountains and Northern Great Plains. *U.S. Department of the Interior National Park Service.* **1998**, http://www2.nature.nps.gov/air/Pubs/.

Ramankutty, N.; Foley, J. A. Estimating historical changes in land cover: North American croplands from 1850 to 1992. *Global Ecol Biogeogr* **1999**, *8*, 381-396.

Sanderson, E. G.; Farant, J. P. Atmospheric size distribution of PAHs: Evidence of a high-volume sampling artifact. *Environ. Sci. Technol.* **2005**, *39*, 7631-7637.

Schauer, J. J.; Kleeman, M. J.; Cass, G. R.; Simoneit, B. R. T. Measurement of emissions from air pollution sources. 3. C-1-C- 29 organic compounds from fireplace combustion of wood. *Environ. Sci. Technol.* **2001**, *35*, 1716-1728.

Schauer, J. J.; Kleeman, M. J.; Cass, G. R.; Simoneit, B. R. T. Measurement of emissions from air pollution sources. 5. C-1-C-32 organic compounds from gasoline-powered motor vehicles. *Environ. Sci. Technol.* **2002**, *36*, 1169-1180.

Schwarzenbach, R.; Gschwend, P.; Imboden, D. *Environmental Organic Chemistry*; 2nd ed.; Wiley-Interscience: New York, 2003.

Sethajintanin, D.; Anderson, K. A. Temporal bioavailability of organochlorine pesticides and PCBs. *Environ. Sci. Technol.* **2006**, *40*, 3689-3695.

Shen, L.; Wania, F.; Lei, Y. D.; Teixeira, C.; Muir, D. C. G.; Bidleman, T. F. Atmospheric distribution and long-range transport behavior of organochlorine pesticides in north America. *Environ. Sci. Technol.* **2005**, *39*, 409-420.

Sickman, J. O. Characterization of Year-Round Sensitivity of California's Montane Lakes to Acidic Deposition. *California Air Resources Board* **1989**, *A5-203-32*.

Simonich, S. L.; Begley, W. M.; Debaere, G.; Eckhoff, W. S. Trace analysis of fragrance materials in wastewater and treated wastewater. *Environ. Sci. Technol.* **2000**, *34*, 959-965.

Simonich, S. L.; Federle, T. W.; Eckhoff, W. S.; Rottiers, A.; Webb, S.; Sabaliunas, D.; De Wolf, W. Removal of fragrance materials during US and European wastewater treatment. *Environ. Sci. Technol.* **2002**, *36*, 2839-2847.

Simonich, S. L.; Hites, R. A. Global distribution of persistent organochlorine compounds. *Science* **1995**, *269*, 1851-1854.

Strandberg, B.; Dodder, N. G.; Basu, I.; Hites, R. A. Concentrations and spatial variations of polybrominated diphenyl ethers and other organohalogen compounds in Great Lakes air. *Environ. Sci. Technol.* **2001**, *35*, 1078-1083.

U.S. Geological Survey; Pesticide National Synthesis Project Annual Use Maps. *http://ca.water.usgs.gov/pnsp/use92/* **1992**.

U.S. Geological Survey; Pesticide National Synthesis Project Annual Use Maps. *http://ca.water.usgs.gov/pnsp/use92/* **1997**.

Usenko, S.; Hageman, K. J.; Schmedding, D. W.; Wilson, G. R.; Simonich, S. L. Trace Analysis of Semi-Volatile Organic Compounds in Large Volume Samples of Snow, Lake Water, and Groundwater. *Environ. Sci. Technol.* **2005**, *39*, 6006-6015.

USGS Annual Use Maps. *http://ca.water.usgs.gov/pnsp/use92/* **1998**.

Van Metre, P. C.; Mahler, B. J. Trends in Hydrophobic Organic Contaminants in Urban and Reference Lake Sediments across the United States, 1970-2001. *Environ. Sci. Technol.* **2005**, *39*, 5567-5574.

VarianInc. Abselut Nexus Instruction Guide. www.varianinc.com.

Vilanova, R.; Fernandez, P.; Martinez, C.; Grimalt, J. O. Organochlorine pollutants in remote mountain lake waters. *J. Environ. Qual.* **2001**, *30*, 1286-1295.

Vilanova, R. M.; Fernandez, P.; Grimalt, J. O. Polychlorinated biphenyl partitioning in the waters of a remote mountain lake. *Sci. Total Environ.* **2001**, *279*, 51-62.

Vilanova, R. M.; Fernandez, P.; Martinez, C.; Grimalt, J. O. Polycyclic aromatic hydrocarbons in remote mountain lake waters. *Water Res.* **2001**, *35*, 3916-3926.

Wania, F. On the origin of elevated levels of persistent chemicals in the environment. *Environ. Sci. Pollut. Res.* **1999**, *6*, 11-19.

Wania, F.; Haugen, J. E.; Lei, Y. D.; Mackay, D. Temperature dependence of atmospheric concentrations of semivolatile organic compounds. *Environ. Sci. Technol.* **1998**, *32*, 1013-1021.

Wania, F.; Mackay, D. Global fractionation and cold condensation of low volatility organo-chlorine compounds in polar regions. *Ambio* **1993**, *22*, 10-12.

Wania, F.; Mackay, D.; Hoff, J. T. The importance of snow scavenging of polychlorinated biphenyl and polycyclic aromatic hydrocarbon vapors. *Environ. Sci. Technol.* **1999**, *33*, 195-197.

Wania, F. a. M., D. Tracking the distribution of persistent organic pollutants. *Environ. Sci. Technol.* **1996**, *30*, 390A-396A.

Webster, E.; Mackay, D.; Wania, F. Evaluating environmental persistence. *Environ. Toxicol. Chem.* **1998**, *17*, 2148-2158.

Wilkinson, A. C.; Kimpe, L. E.; Blais, J. M. Air-water gas exchange of chlorinated pesticides in four lakes spanning a 1,205 meter elevation range in the Canadian Rocky Mountains. *Environ. Toxicol. Chem.* **2005**, *24*, 61–69.

Wise, S. A.; Poster, D. L.; Schantz, M. M.; Kucklick, J. R.; Sander, L. C.; de Alda, M. L.; Schubert, P.; Parris, R. M.; Porter, B. J. Two new marine sediment standard reference materials (SRMs) for the determination of organic contaminants. *Anal Bioanal Chem* **2004**, *378*, 1251-1264.

Wong, C. S.; Sanders, G.; Engstrom, D. R.; Long, D. T.; Swackhamer, D. L.; Eisenreich, S. J. Accumulation, Inventory, and Diagenesis of Chlorinated Hydrocarbons in Lake Ontario Sediment. *Environ. Sci. Technol.* **1995**, *29*, 2661-2672.

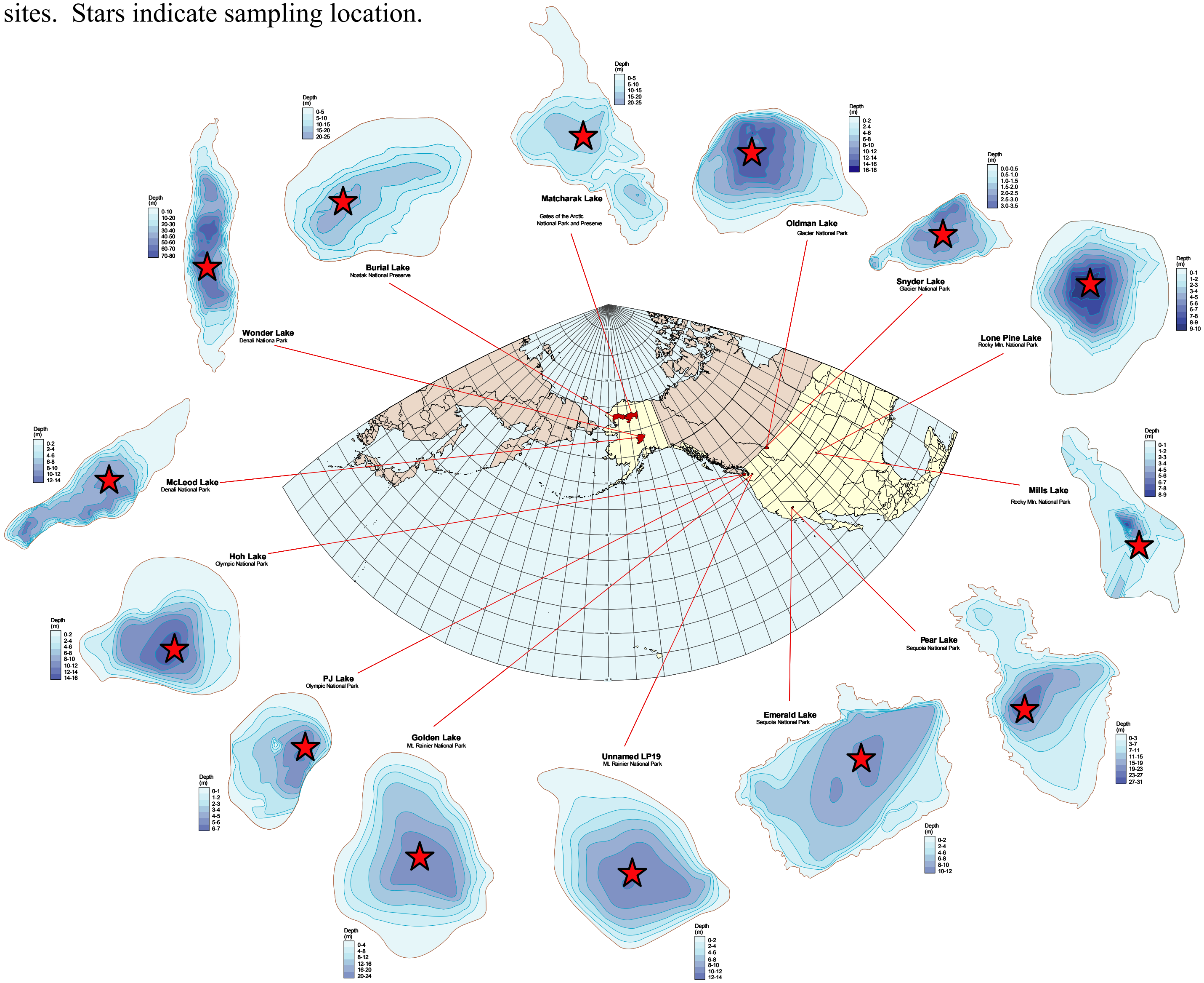
Yao, Y.; T., H.; Ma, J.; Tuduri, L.; Blanchard, P. Sources and Occurrence of Dacthal in the Canadian Atmosphere. *Environ. Sci. Technol.* **2007**, *41*, 688-694.

Yunker, M. B.; Macdonald, R. W.; Vingarzan, R.; Mitchell, R. H.; Goyette, D.; Sylvestre, S. PAHs in the Fraser River basin: a critical appraisal of PAH ratios as indicators of PAH source and composition. *Org Geochem* **2002**, *33*, 489-515.

Zhu, L. Y.; Hites, R. A. Brominated Flame Retardants in Sediment Cores from Lake Michigan and Erie. *Environ. Sci. Technol.* **2005**, *39*, 3488-3494.

Zuagg, S. D.; Sandstrom, M. W.; Smith, S. G.; Fehlberg, K. M. "Methods of analysis by the U.S. Geological Survey National Water Quality Laboratory--Determination of pesticides in water by C-18 solid-phase extraction and capillary-column gas chromatography/mass spectrometry with selected-ion monitoring," U.S. Geological Survey Open-File Report 95-181, 1995.

APPENDIX A: Figure A.1. Lake bathymetry of WACAP sampling sites. Stars indicate sampling location.



APPENDIX B. Total and supported ^{210}Pb activity plots and sedimentation rate vs. age plots.

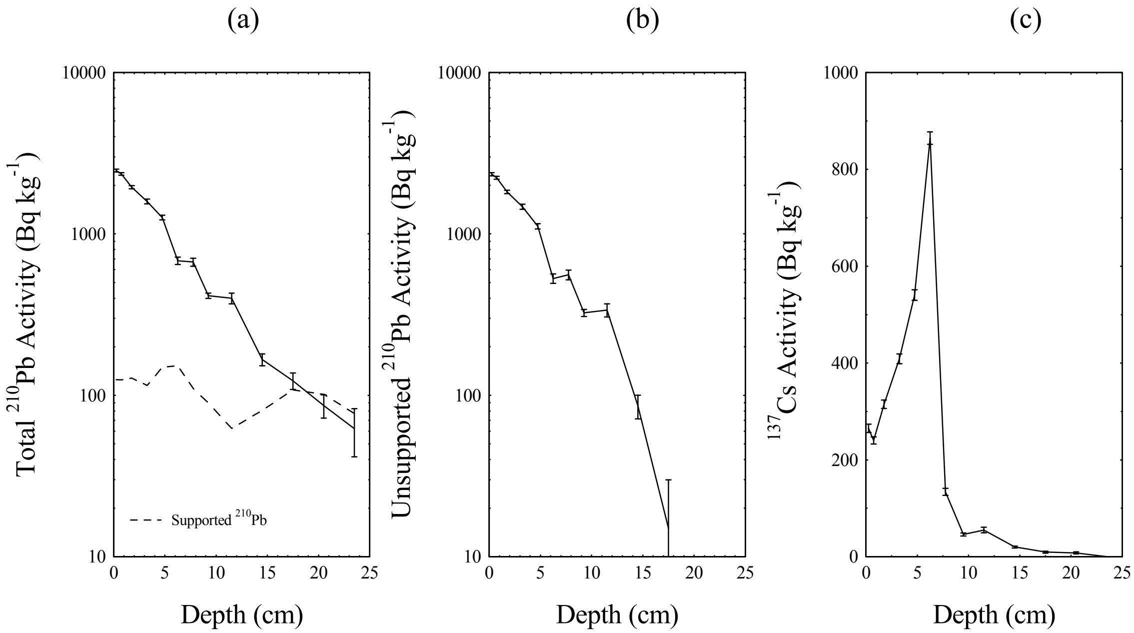


Figure B.1.i. Fallout radionuclides in Pear Lake core #1 showing (a) total and supported ^{210}Pb, (b) unsupported ^{210}Pb, (c) ^{137}Cs concentrations versus depth (*1*).

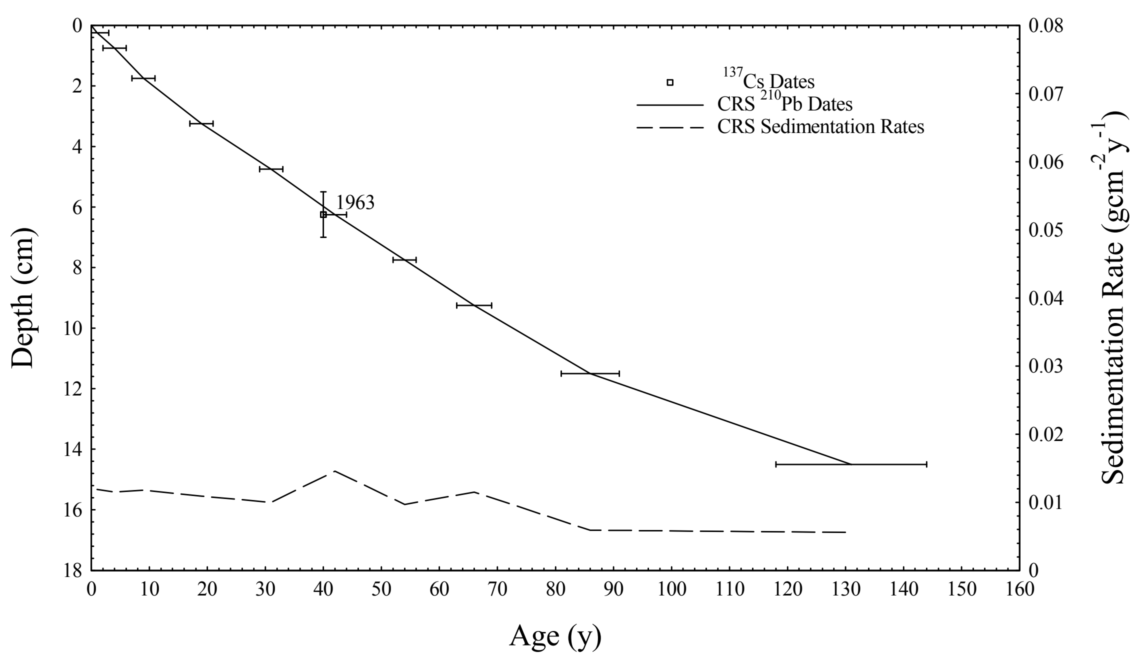


Figure B.1.ii. Radiometric chronology of Pear Lake core #1 showing the CRS model dates and sedimentation rates and also the 1963 depth determined from the ^{137}Cs stratigraphy (*1*).

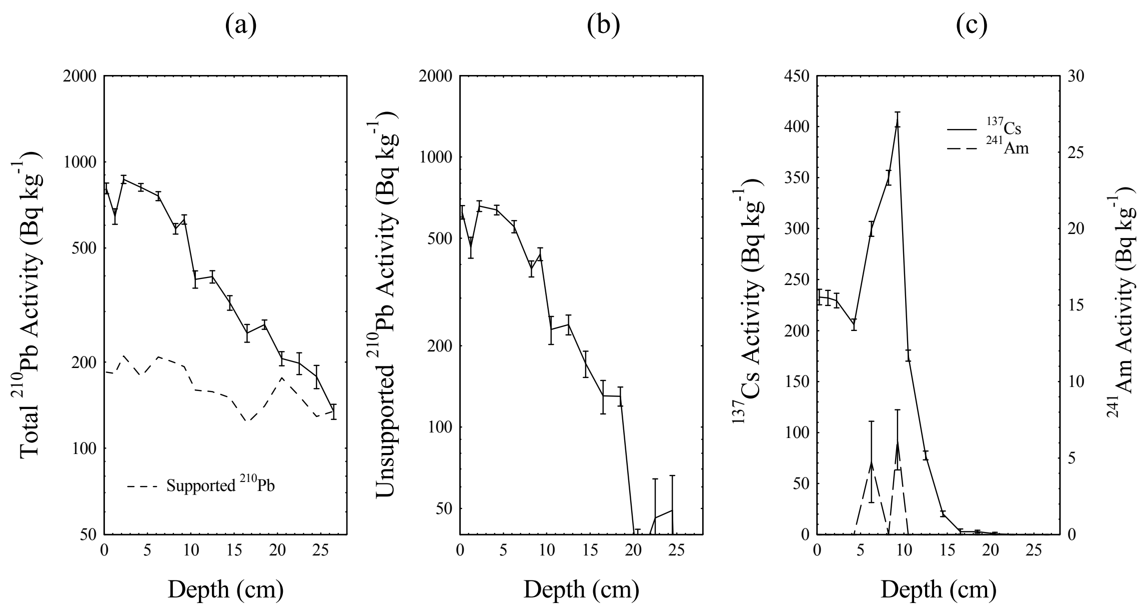


Figure B.2.i. Fallout radionuclides in Emerald Lake core #1 showing (a) total and supported ^{210}Pb, (b) unsupported ^{210}Pb, (c) ^{137}Cs and ^{241}Am concentrations versus depth (*1*).

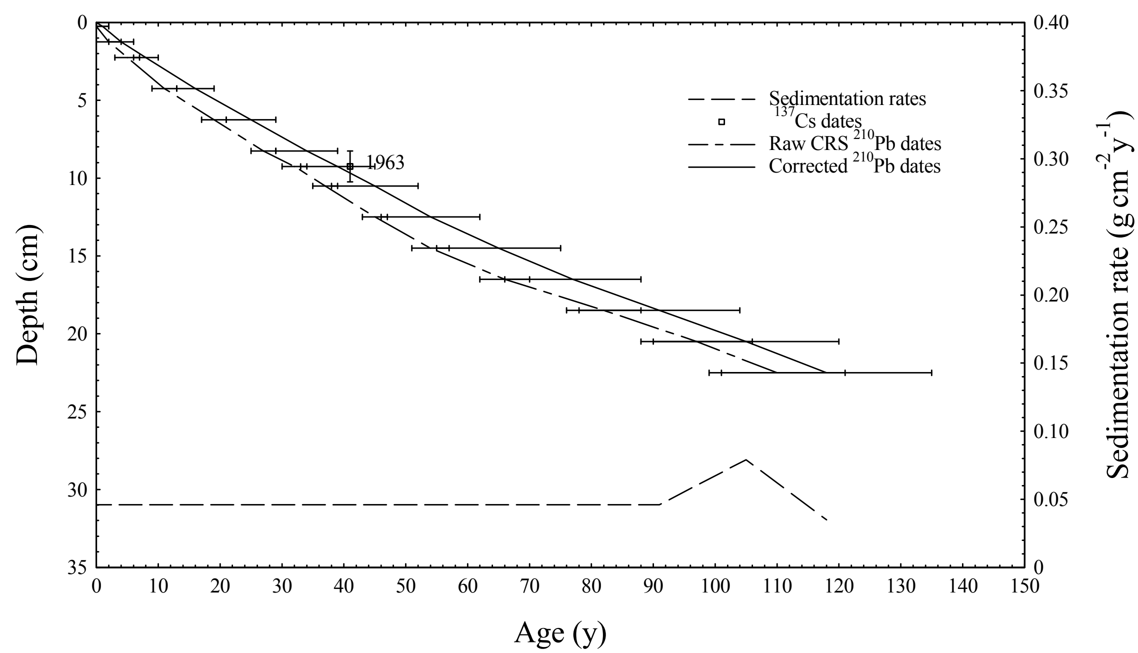


Figure B.2.ii. Radiometric chronology of Emerald Lake core #1 showing the raw CRS model dates, the 1963 depth determined from the ^{137}Cs record, and the corrected ^{210}Pb dates and sedimentation rates (*1*).

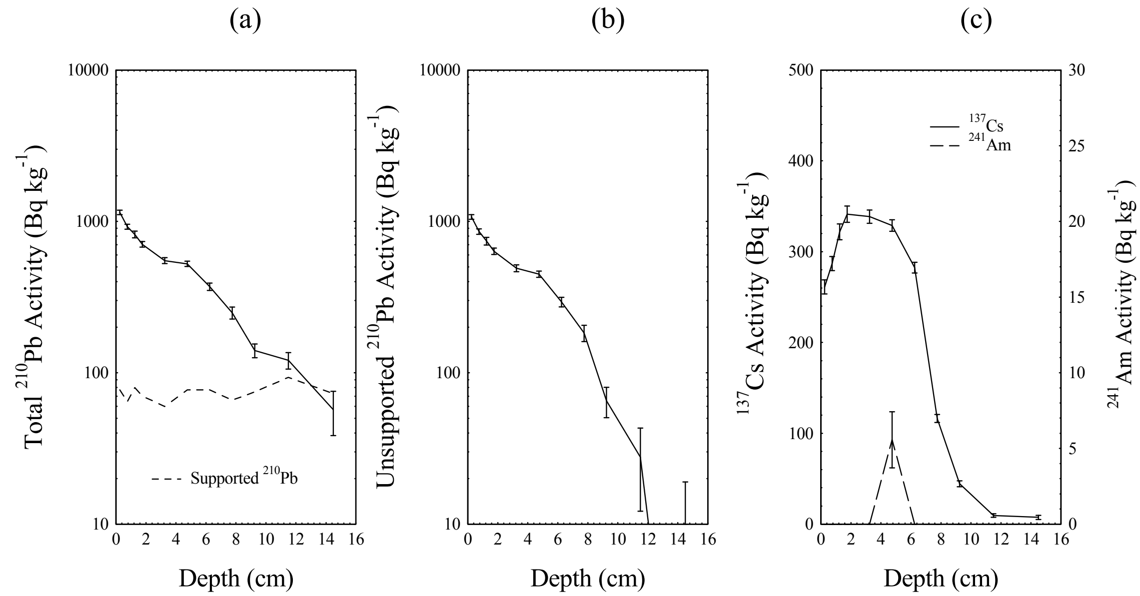


Figure B.3.i. Fallout radionuclides in Lone Pine Lake core #1 showing (a) total and supported ^{210}Pb, (b) unsupported ^{210}Pb, (c) ^{137}Cs and ^{241}Am concentrations versus depth (*1*).

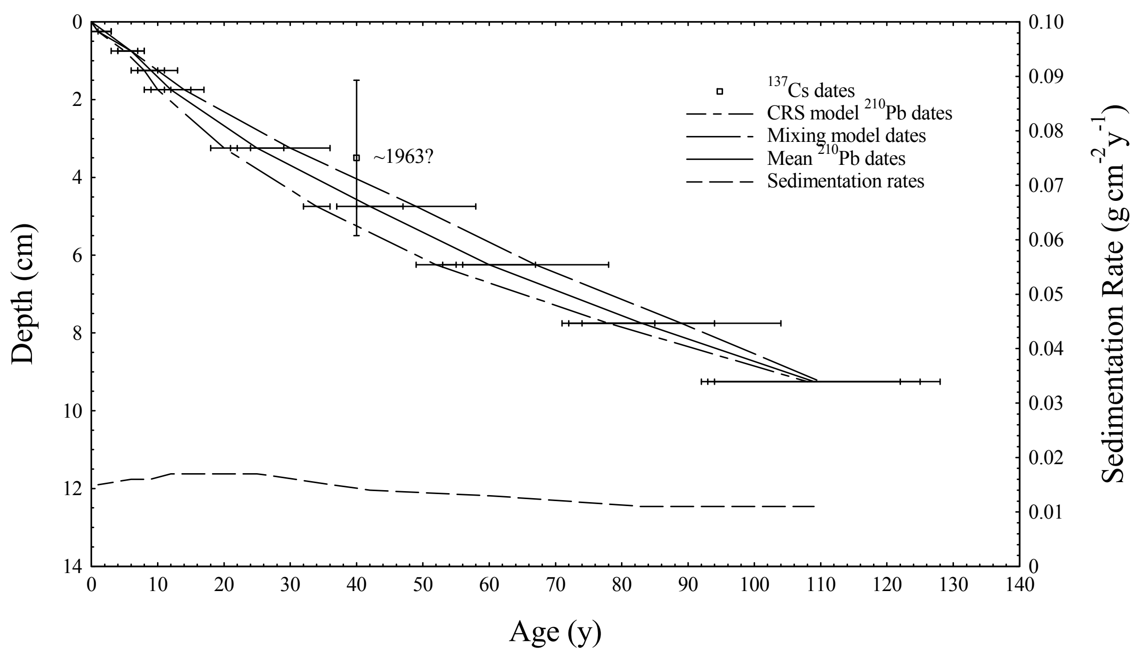


Figure B.3.ii. Radiometric chronology of Lone Pine Lake core #1 showing dates calculated using the simple CRS model, a mixing model, and the chronology determined from the means of these two set of dates. Also shown is the range of depths spanned by the ^{137}Cs peak (*1*).

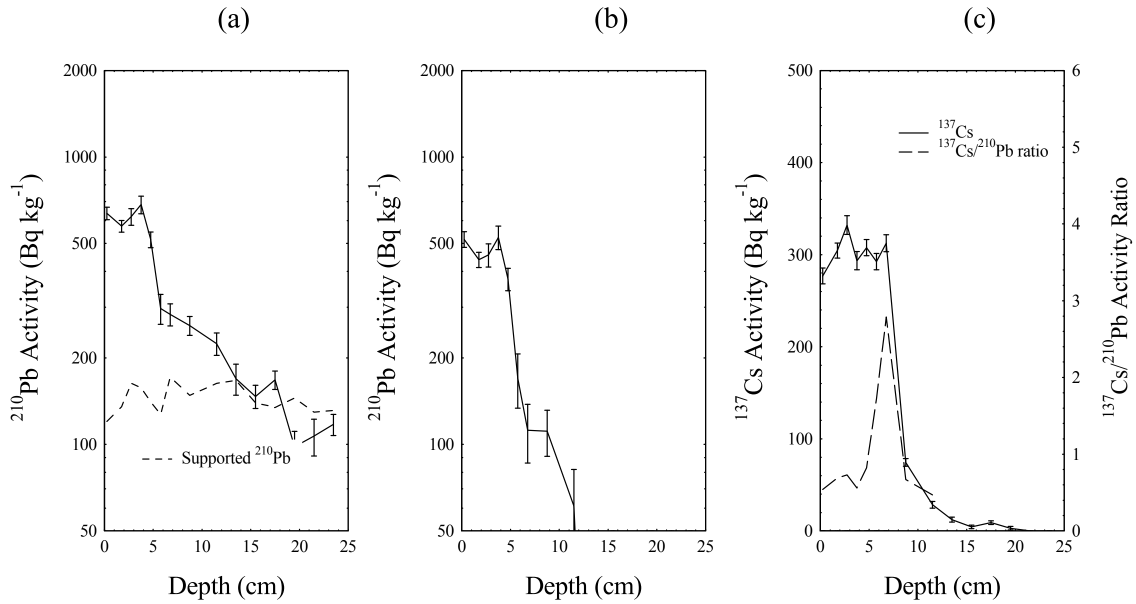


Figure B.4.i. Fallout radionuclides in Mills Lake core #1 showing (a) total and supported ^{210}Pb, (b) unsupported ^{210}Pb, (c) ^{137}Cs concentrations and $^{137}Cs/^{210}Pb$ activity ratios versus depth (*1*).

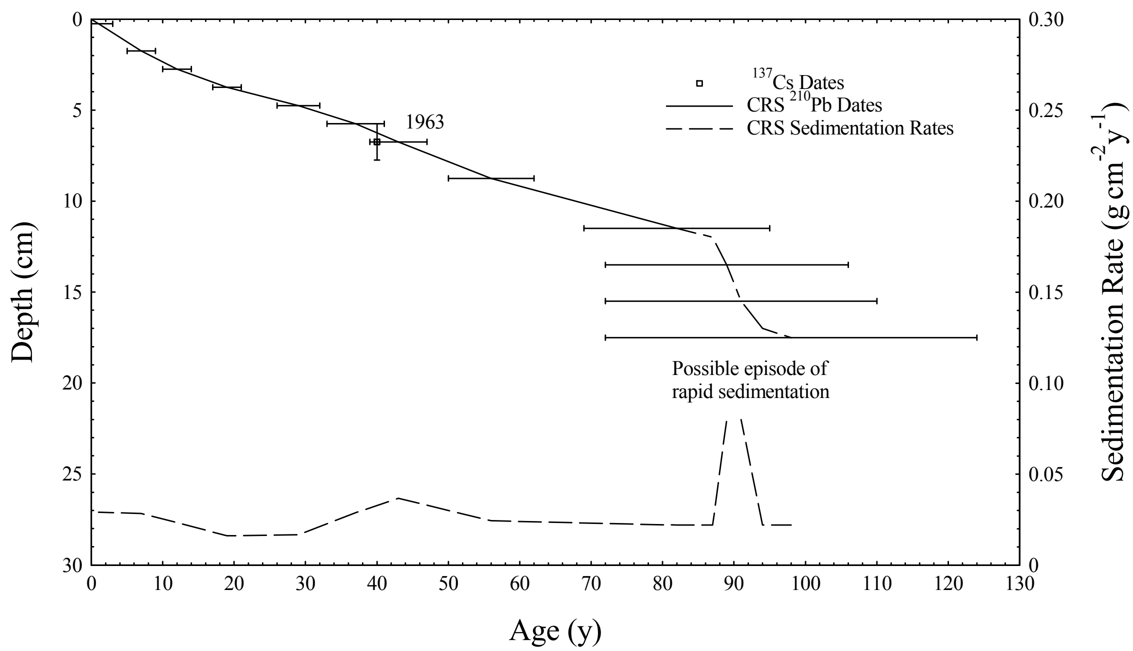


Figure B.4.ii. Radiometric chronology of Mills Lake core #1 showing the CRS model dates and sedimentation rates and the 1963 depth determined from the ^{137}Cs record (*1*).

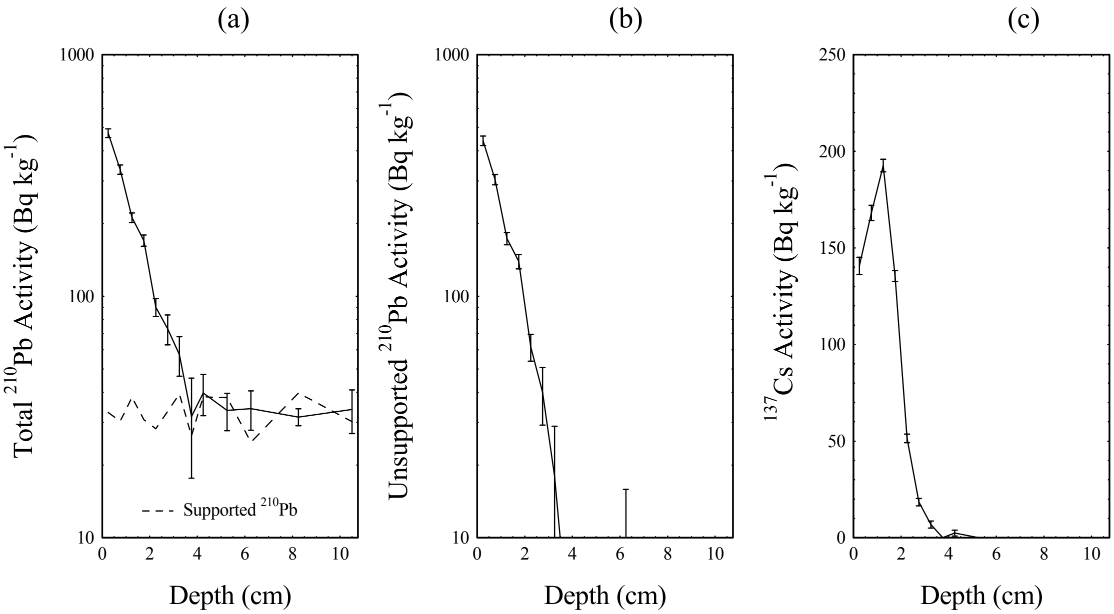


Figure B.5.i. Fallout radionuclides in Burial Lake core #1 showing (a) total and supported ^{210}Pb, (b) unsupported ^{210}Pb, (c) ^{137}Cs and ^{241}Am concentrations versus depth (*2*).

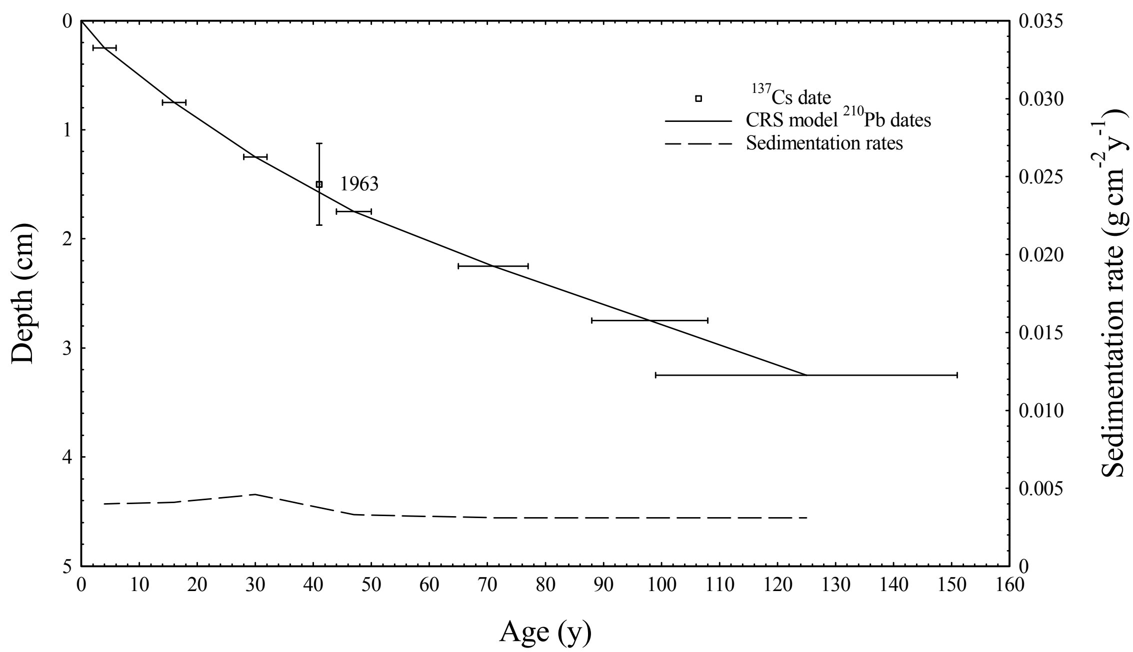


Figure B.5.ii. Radiometric chronology of Burial Lake core #1 showing the CRS model dates and sedimentation rates, and the 1963 depth determined from the ^{137}Cs record (*2*).

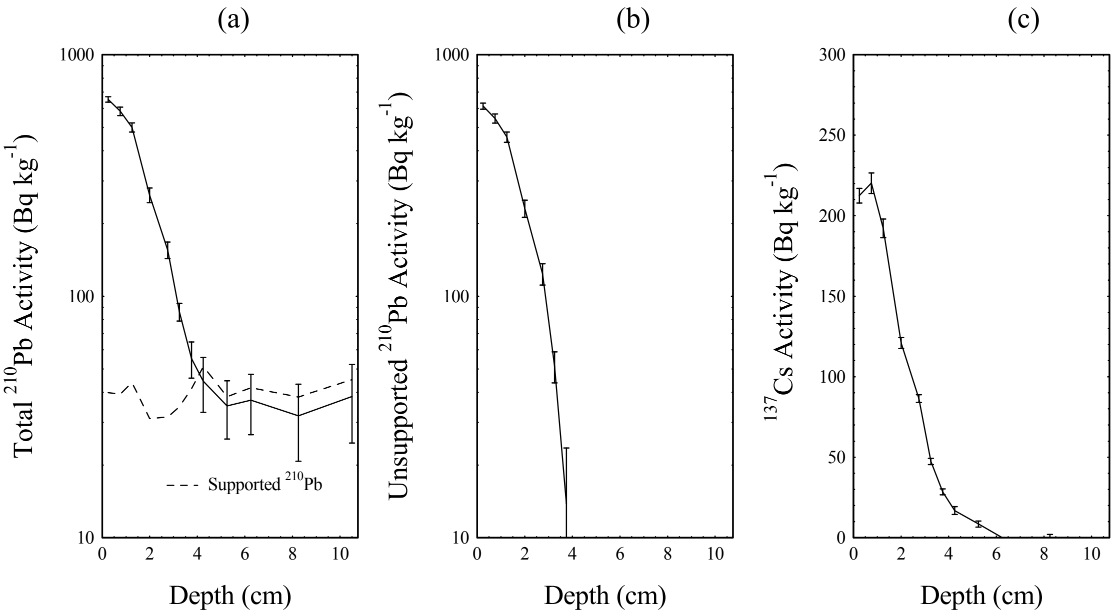


Figure B.6.i. Fallout radionuclides in Wonder Lake core #1 showing (a) total and supported ^{210}Pb, (b) unsupported ^{210}Pb, (c) ^{137}Cs and ^{241}Am concentrations versus depth (*3*).

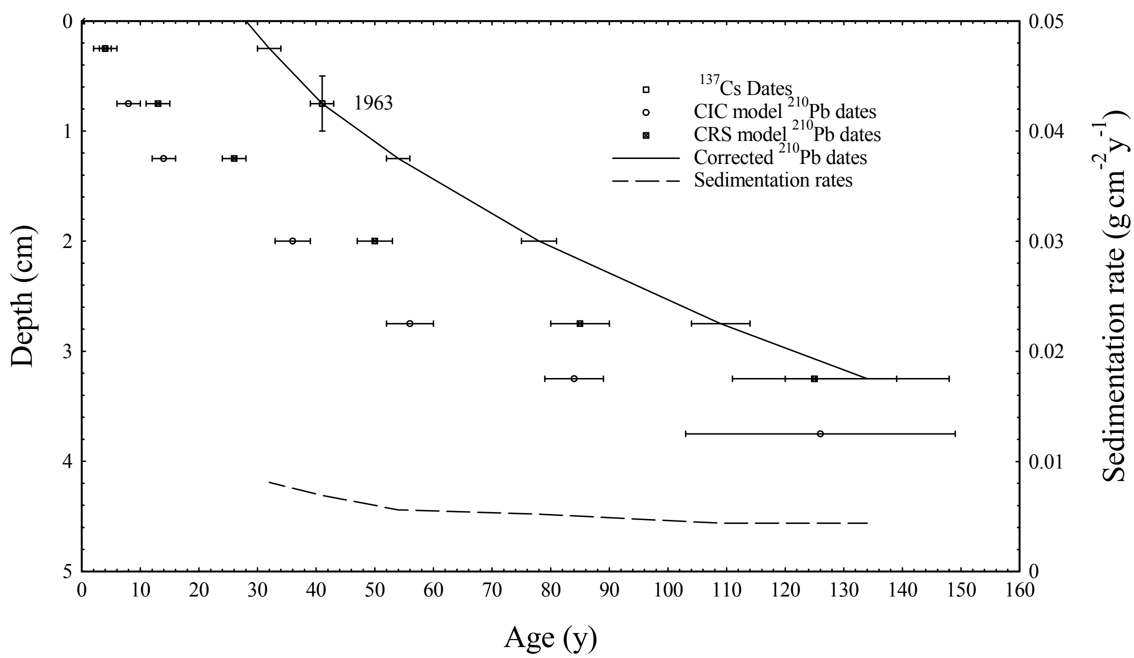


Figure B.6.ii. Radiometric chronology of Wonder Lake core #1 showing CRS and CIC model dates together with the 1963 depth determined from the ^{137}Cs stratigraphy. Also shown are corrected dates and sedimentation rates assuming a loss of about 1 cm from the top of the core (*3*).

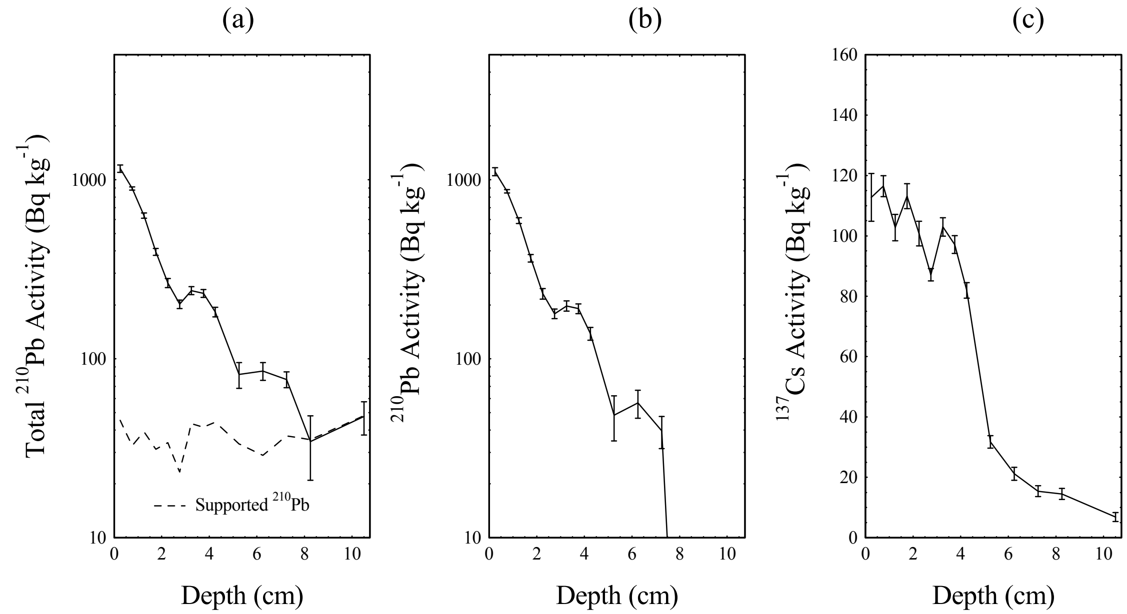


Figure B.7.i. Fallout radionuclides in McLeod Lake core #1 showing (a) total and supported ^{210}Pb, (b) unsupported ^{210}Pb, (c) ^{137}Cs concentrations versus depth (*2*).

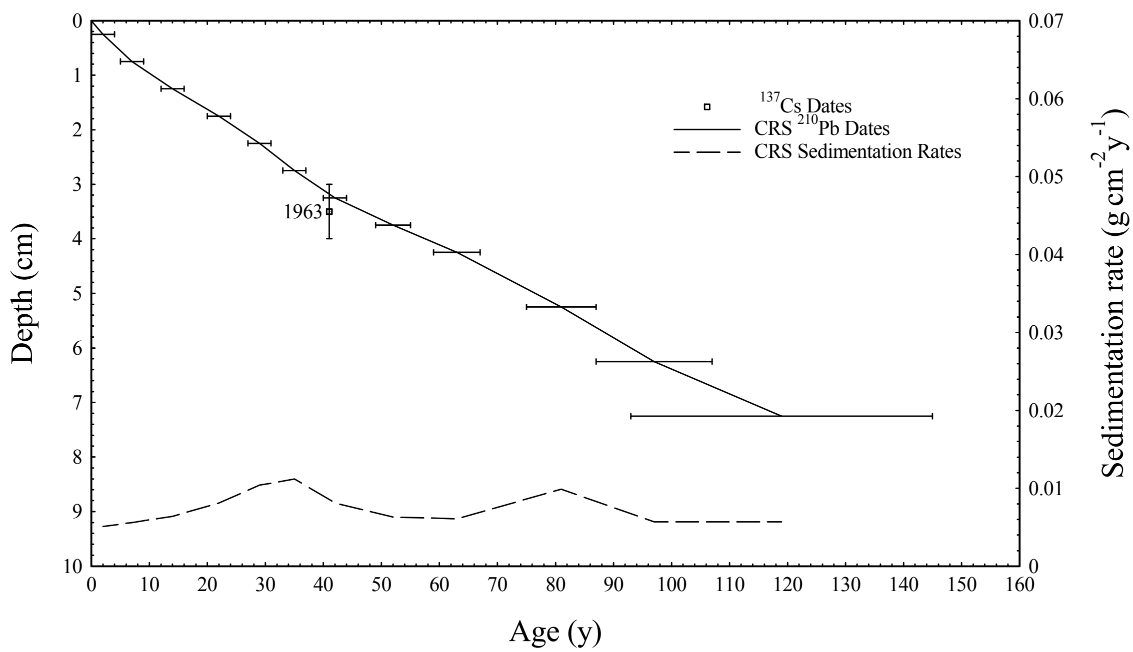


Figure B.7.ii. Radiometric chronology of McLeod Lake core #1 showing the CRS model dates and sedimentation rates and the 1963 depth determined from the ^{137}Cs record (*2*).

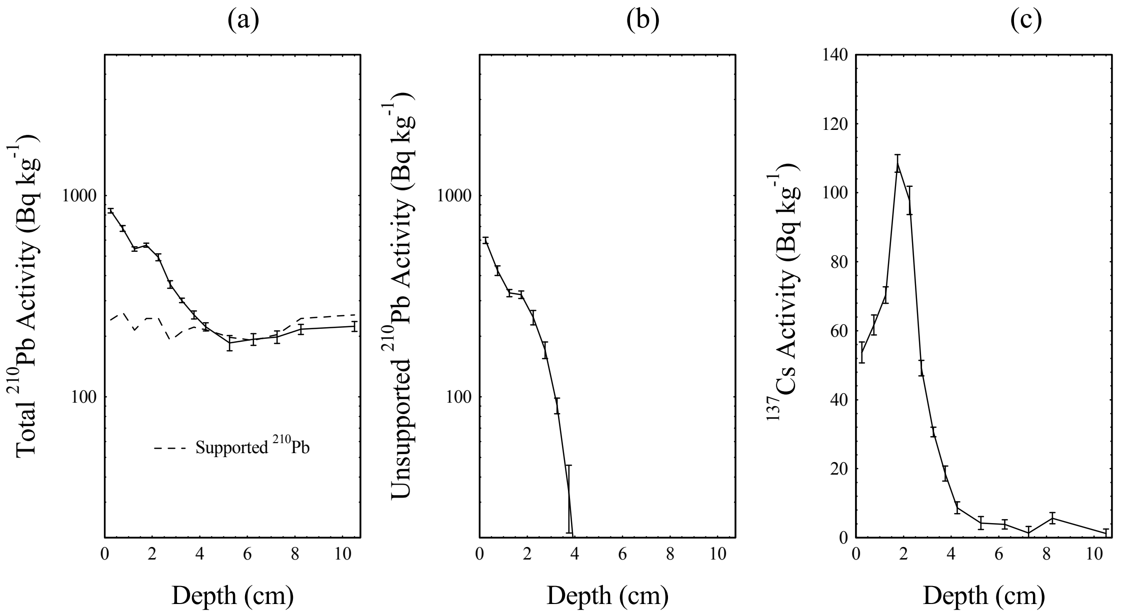


Figure B.8.i. Fallout radionuclides in Matcharak Lake core #1 showing (a) total and supported ^{210}Pb, (b) unsupported ^{210}Pb, (c) ^{137}Cs concentrations versus depth (*2*).

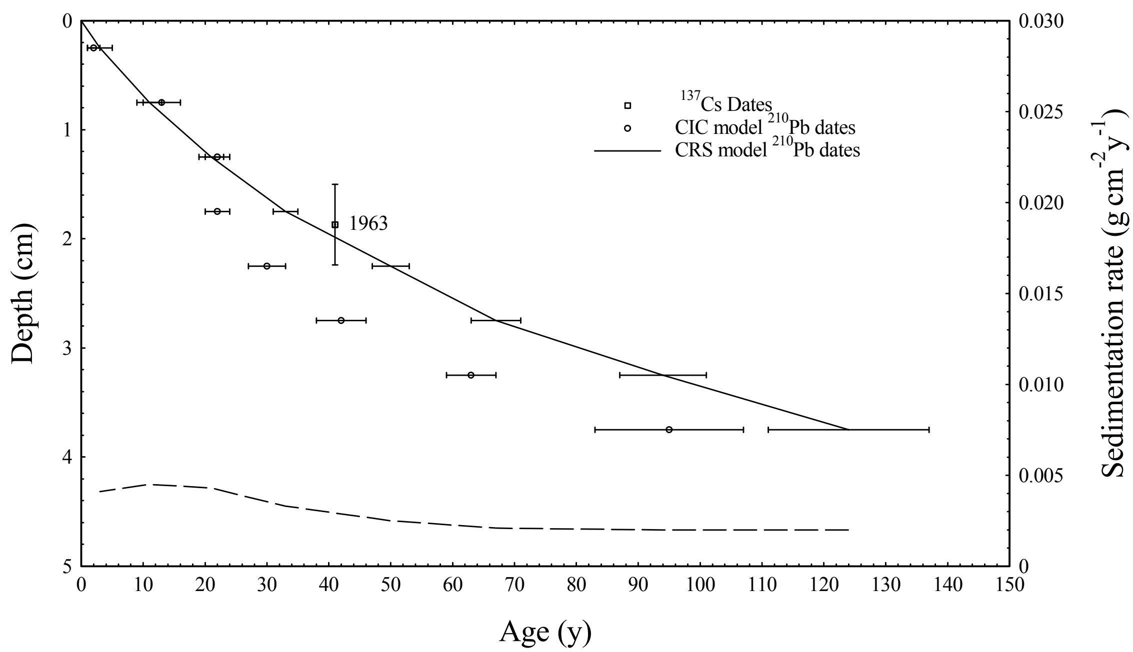


Figure B.8.ii. Radiometric chronology of Matcharak Lake core #1 showing the CIC model ^{210}Pb dates, the CRS model dates and sedimentation rates, and the 1963 depth determined from the ^{137}Cs stratigraphy (*2*).

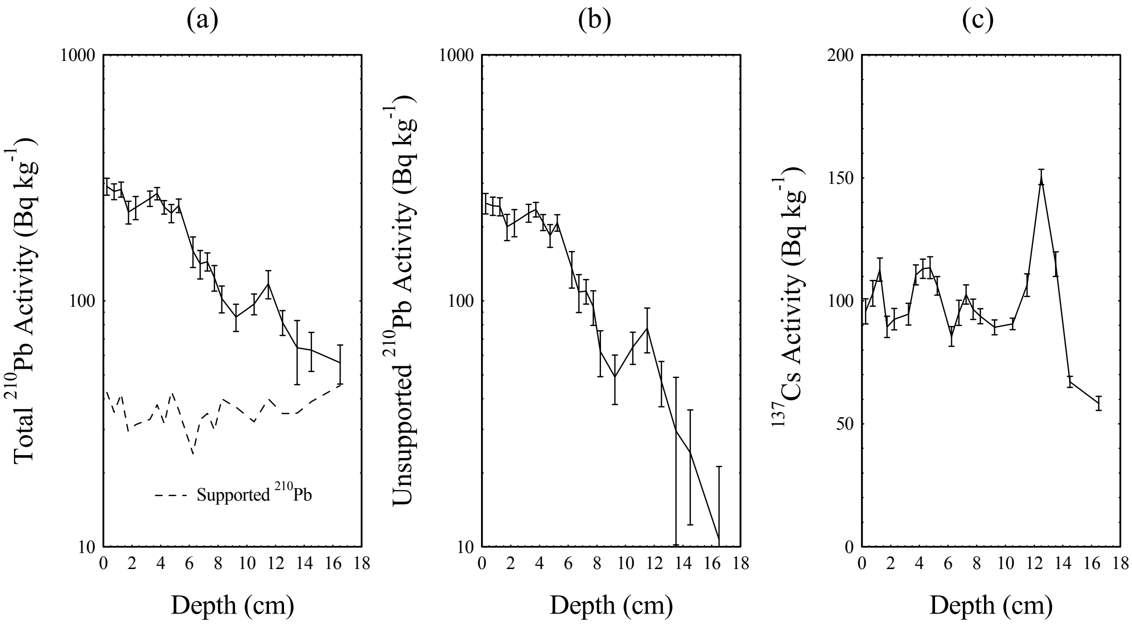


Figure B.9.i. Fallout radionuclides in PJ Lake core #2 showing (a) total and supported ^{210}Pb, (b) unsupported ^{210}Pb, (c) ^{137}Cs concentrations versus depth (*4*).

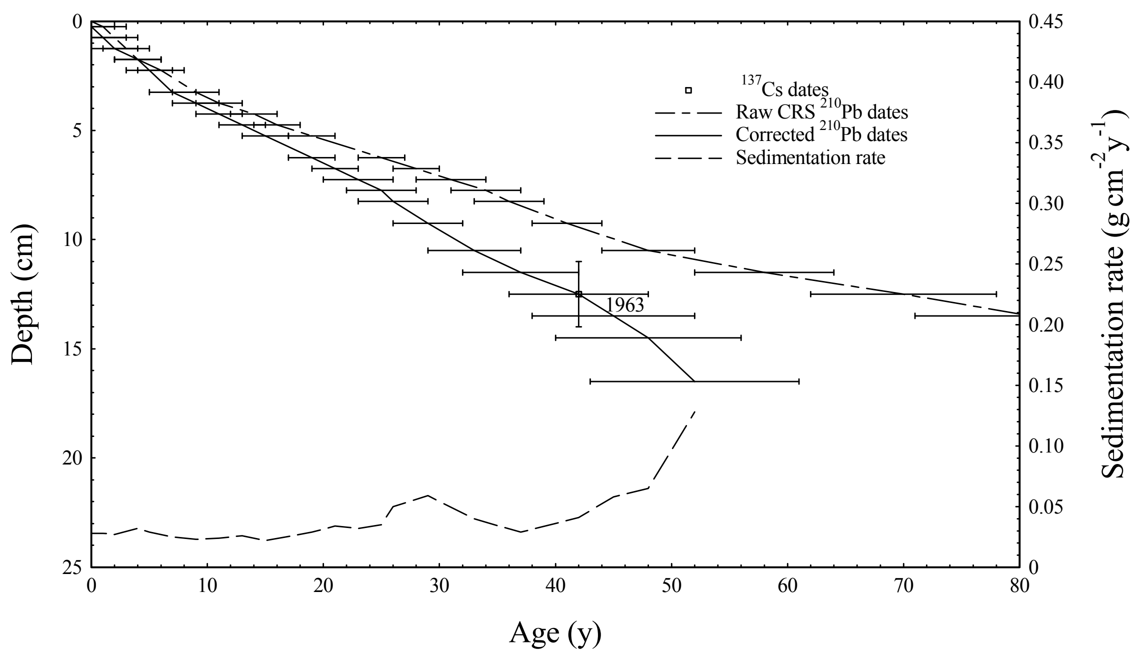


Figure B.9.ii. Radiometric chronology of PJ Lake core #2 showing the CRS model ^{210}Pb dates and the 1963 depth determined from the ^{137}Cs stratigraphy. Also shown are the corrected ^{210}Pb dates and sedimentation rates calculated using the 1963 ^{137}Cs date as a reference point (*4*).

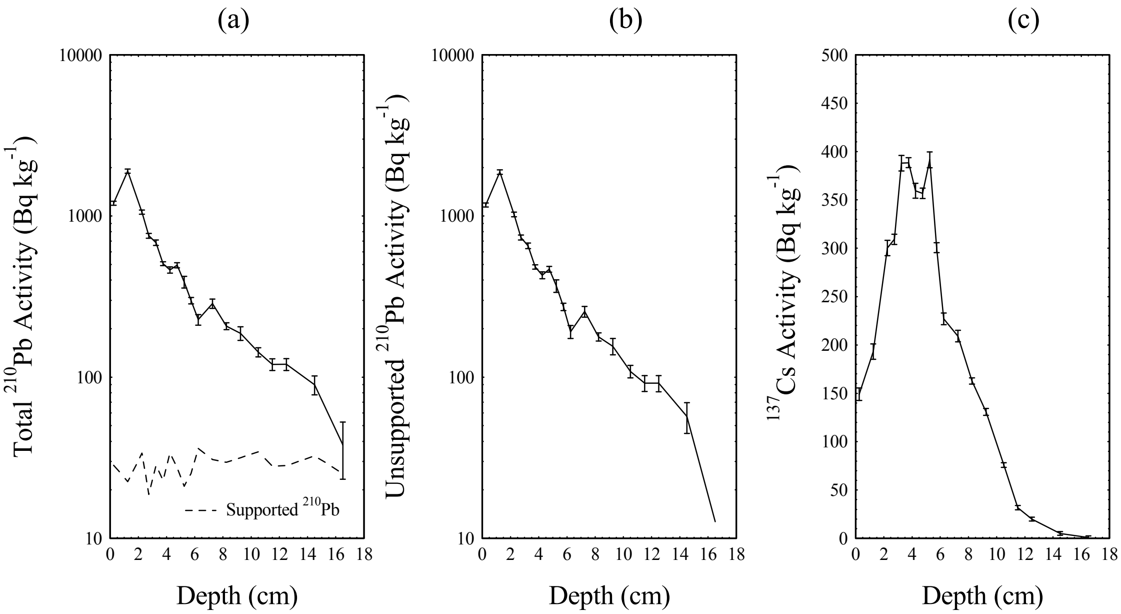


Figure B.10.i. Fallout radionuclides in Hoh Lake core #2 showing (a) total and supported ^{210}Pb, (b) unsupported ^{210}Pb, (c) ^{137}Cs concentrations versus depth (*4*).

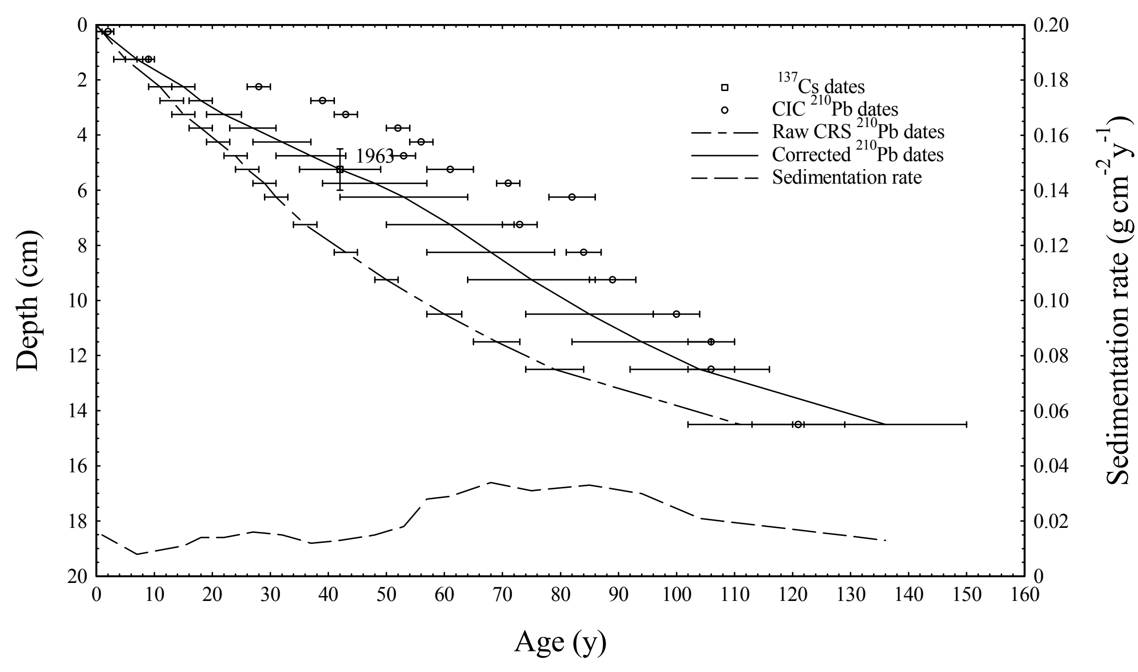


Figure B.10.ii. Radiometric chronology of Hoh Lake core #2 showing the CRS and CIC model dates, and the 1963 depth determined from the ^{137}Cs record. Also shown are the corrected ^{210}Pb dates and sedimentation rates calculated using the 1963 ^{137}Cs date as a reference point (*4*).

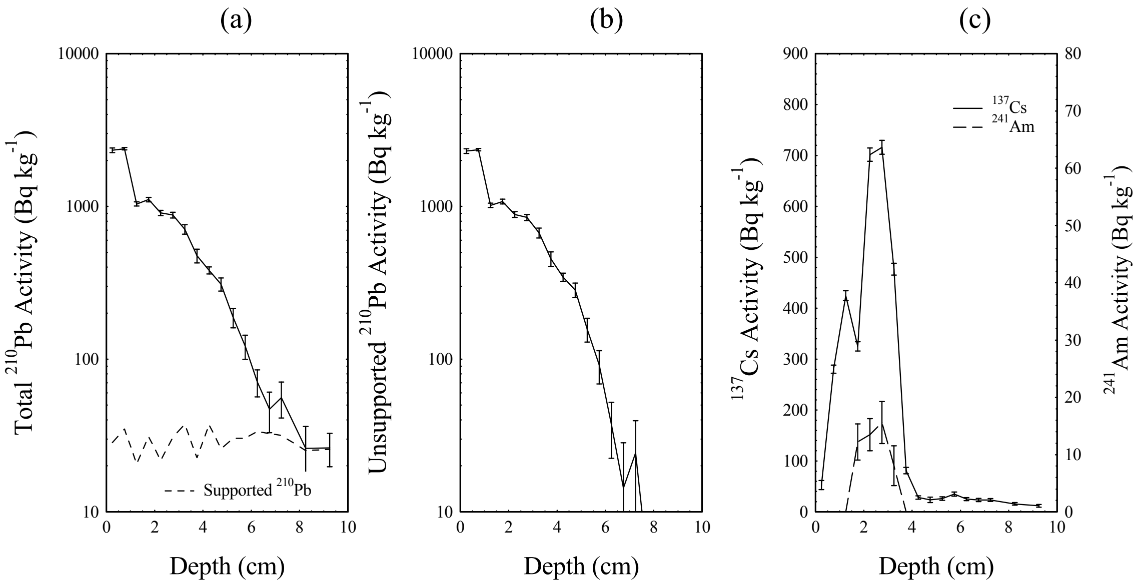


Figure B.11.i. Fallout radionuclides in Golden Lake core #1 showing (a) total and supported ^{210}Pb, (b) unsupported ^{210}Pb, (c) ^{137}Cs and ^{241}Am concentrations versus depth (*4*).

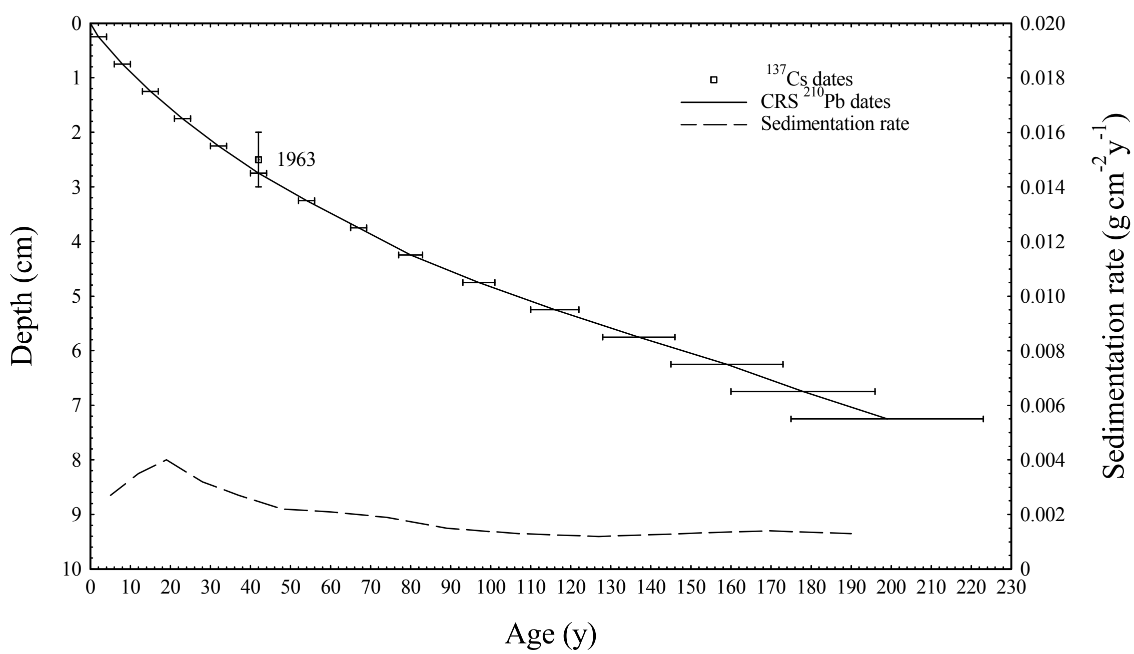


Figure B.11.ii. Radiometric chronology of Golden Lake core #1 showing CRS model dates and sedimentation rates together with the 1963 depth determined from the ^{137}Cs stratigraphy (*4*).

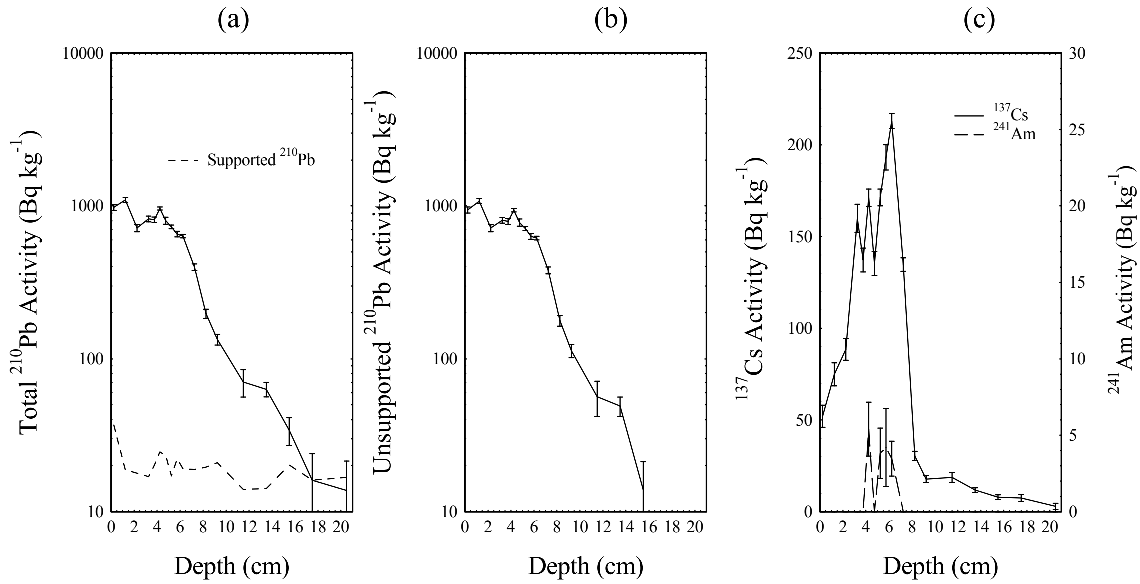


Figure B.12.i. Fallout radionuclides in LP19 Lake core #1 showing (a) total and supported ^{210}Pb, (b) unsupported ^{210}Pb, (c) ^{137}Cs and ^{241}Am concentrations versus depth (*4*).

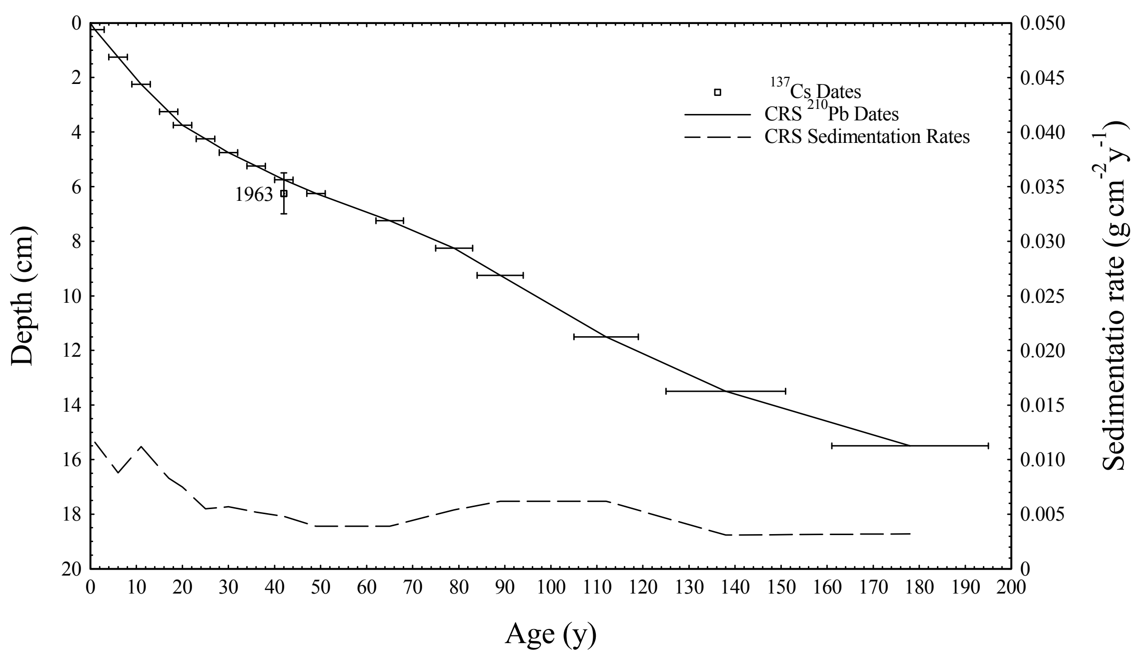


Figure B.12.ii. Radiometric chronology of LP19 Lake core #1 showing the CRS model dates and sedimentation rates and the 1963 depth determined from the ^{137}Cs record (*4*).

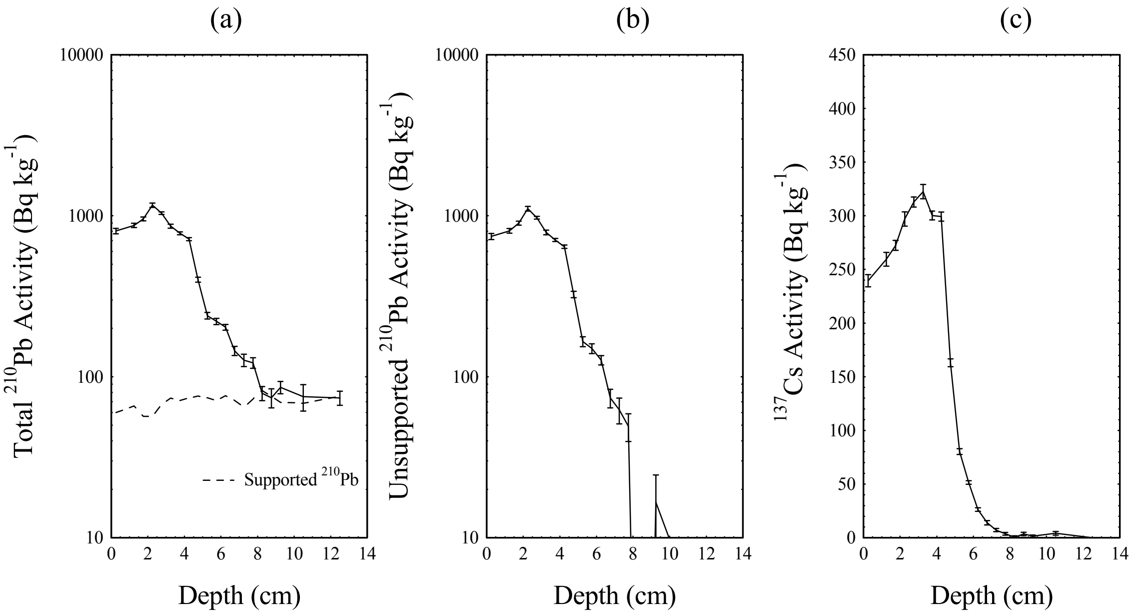


Figure B.13.i. Fallout radionuclides in Oldman Lake core #2 showing (a) total and supported ^{210}Pb, (b) unsupported ^{210}Pb, (c) ^{137}Cs concentrations versus depth (*4*).

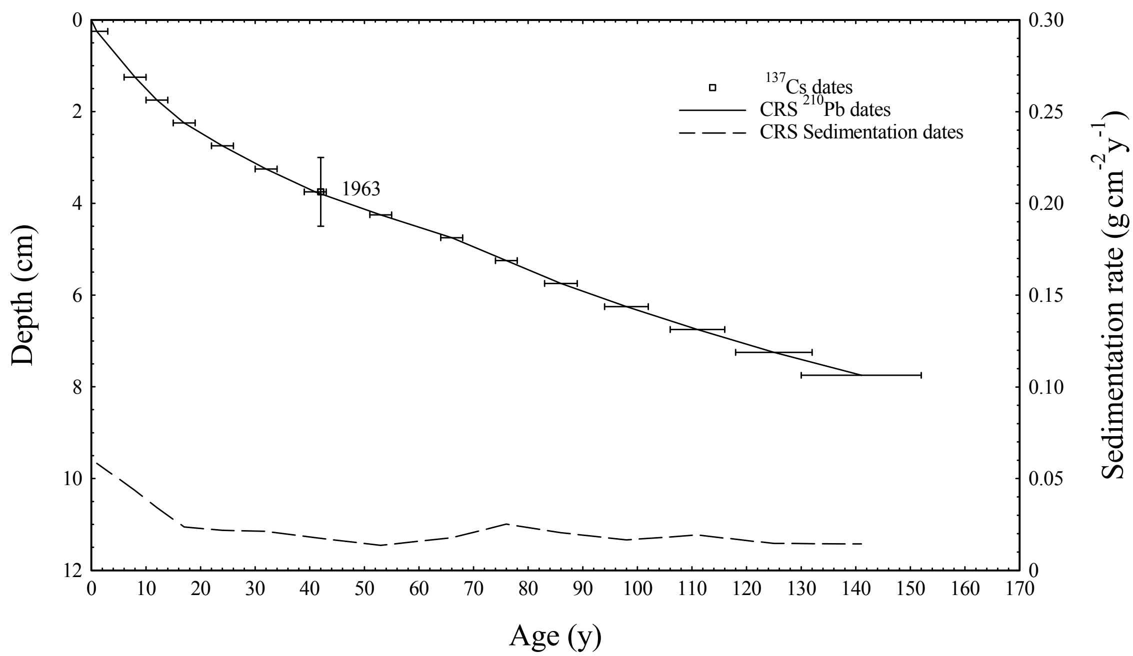


Figure B.13.ii. Radiometric chronology of Oldman Lake core #2 showing the CRS model dates and sedimentation rates and the 1963 depth determined from the ^{137}Cs record (*4*).

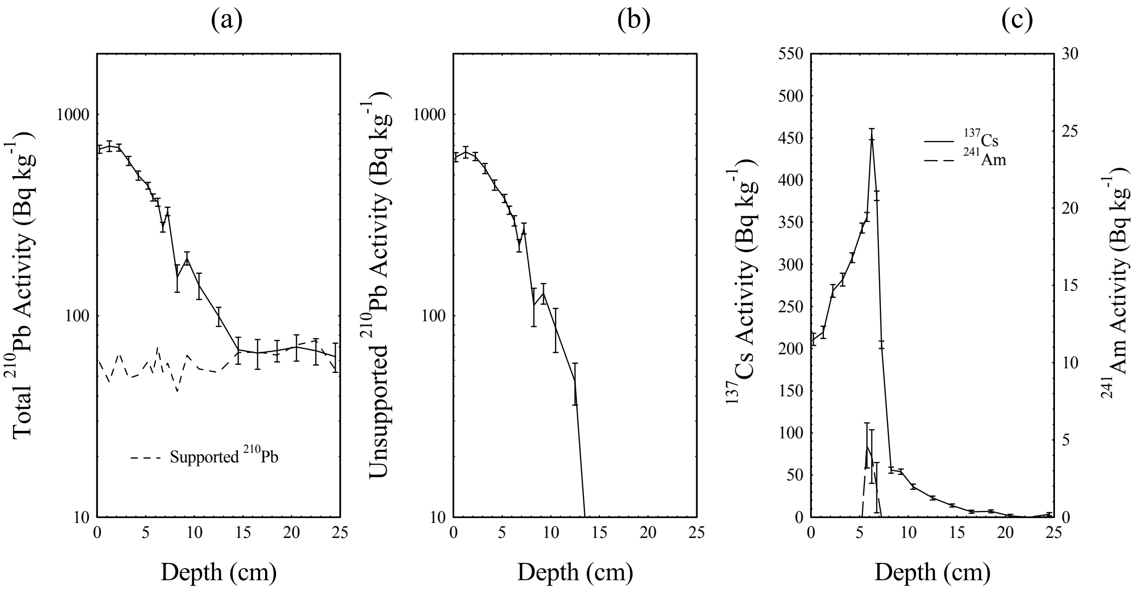


Figure B.14.i. Fallout radionuclides in Snyder Lake core #1 showing (a) total and supported ^{210}Pb, (b) unsupported ^{210}Pb, (c) ^{137}Cs and ^{241}Am concentrations versus depth (*4*).

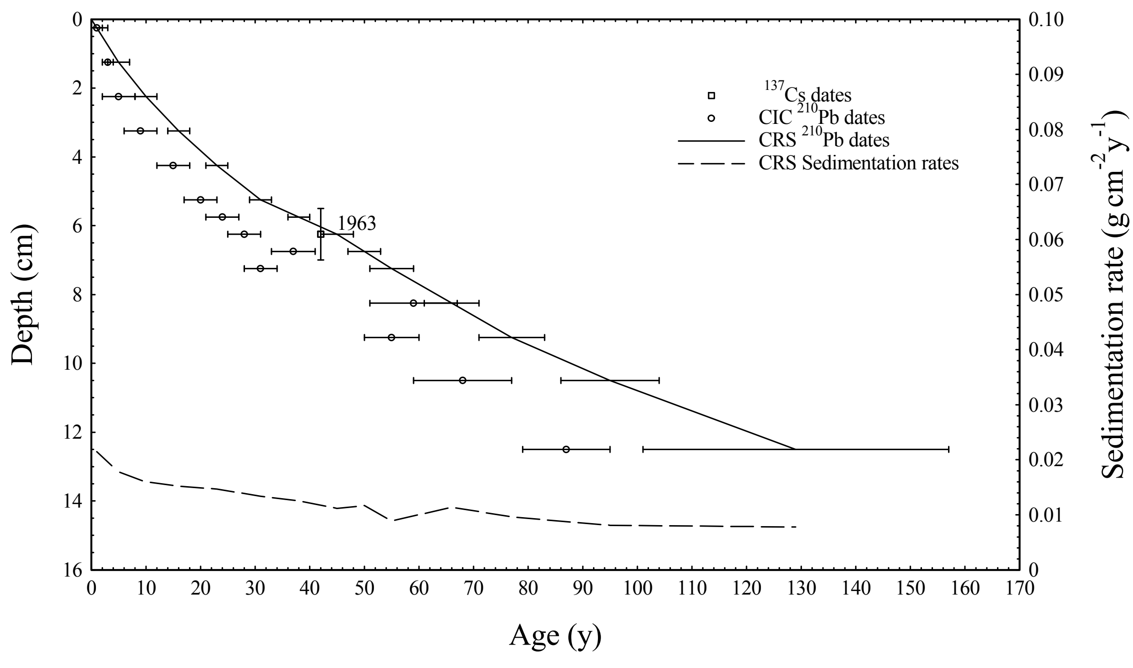


Figure B.14.ii. Radiometric chronology of Snyder Lake core #1 showing the CRS model dates and sedimentation rates, the CIC model dates, and the 1963 depth determined from the ^{137}Cs/^{241}Am record (*4*).

Reference:

(1) Appleby, P. G. Radiometric dating of sediment cores. WACAPs Project - Year 1 Report. **2003**.

(2) Appleby, P. G. Radiometric dating of sediment cores. WACAPs Project - Year 2 Report. **2004**.

(3) Appleby, P. G. Radiometric dating of additional sediment cores from Matcharak and Wonder Lakes. WACAPs Project - Year 2 Supplementary Report. **2004**.

(4) Appleby, P. G. Radiometric dating of sediment cores. WACAPs Project - Year 3 Report. **2005**.

Appendix C: Lake Water SOC Database

Site	Volume (L)	Speedisk /Filter	TFLN pg/L	TFLN FLAG	HCB pg/L	HCB FLAG	a-HCH pg/L	a-HCH FLAG	b-HCH pg/L	b-HCH FLAG	g-HCH pg/L	g-HCH FLAG
Emerald	41	Speedisk	-0.046			X	-5.5		-32		-7.1	
Emerald	41	Filter	20			X	-5.5		-32		-7.1	
Emerald	35	Speedisk	-0.054			X	-6.4		-37		-8.3	
Emerald	35	Filter	-0.054			X	-6.4		-37		-8.3	
Emerald	25	Speedisk	-0.076			X	-9		-52		-12	
Emerald	25	Filter	-0.076			X	-9		-52		-12	
Pear	49	Speedisk	-0.039			X	-4.6		-27		-5.9	
Pear	49	Filter	-0.039			X	-4.6		-27		-5.9	
Pear	34	Speedisk	-0.056			X	50	a	-38		45	a
Pear	34	Filter	-0.056			X	-6.6		-38		-8.6	
Mills	59	Speedisk	-0.032			X	-3.8		-22		-4.9	
Mills	59	Filter	14			X	-3.8		-22		-4.9	
Lone Pine	35	Speedisk	32	d		X	-6.4		-37		-8.3	
Lone Pine	35	Filter	27	d		X	-6.4		-37		-8.3	
Lone Pine	35	Speedisk	47			X	-6.4		-37		-8.3	
Lone Pine	35	Filter	44			X	-6.4		-37		27	
Lone Pine	52	Speedisk	-0.036	d		X	-4.3	d	-25	d	-5.6	d
Lone Pine	52	Filter	1.2	d		X	-4.3		-25		-5.6	
Lone Pine	48	Speedisk	-0.002	d		X	-0.19		-1.1		-0.24	
Lone Pine	48	Filter	-0.002	d		X	-0.19		-1.1		-0.24	
Burial	50	Speedisk		X		X	68.00		-8.00		-1.80	
Burial	50	Filter		X		X	-1.40		-8.00		-1.80	
Burial	50	Speedisk	-0.01			X	77.00		-8.00		-1.80	
Burial	50	Filter		X		X	-1.40		-8.00		-1.80	
Burial	50	Speedisk	-0.01			X	120.00	d	-8.00	d	13.00	d
Burial	50	Filter		X		X	-1.40		-8.00		-1.80	
Burial	50	Speedisk	-0.01			X	-1.40	d	-8.00	d	-1.80	d
Burial	50	Filter		X		X	-1.40		-8.00		-1.80	
Matcharak	50	Speedisk	-0.012			X	93		-8		12	
Matcharak	50	Filter	-0.012	d	1.3	e	-1.4		-8		-1.8	

Matcharak	37	Speedisk	-0.012	d		X	100	d	-8	d	15	d
Matcharak	37	Filter	-0.012	d	1.5	e	-1.4	d	-8	d	-1.8	d
Matcharak	50	Speedisk	-0.012			X	91		-8		-1.8	
Matcharak	50	Filter	-0.012	d		X	-1.4		-8		-1.8	
Matcharak	50	Speedisk	-0.012			X	-1.4	d	-8	d	-1.8	d
Matcharak	50	Filter	-0.012	d	1.8	e	-1.4		-8		-1.8	
McLeod	34	Speedisk	-0.01			X	180.00		-8.00		28.00	
McLeod	34	Filter	-0.01			X	-1.40		-8.00		-1.80	
McLeod	21	Speedisk	-0.01			X	-1.40		-8.00		-1.80	
McLeod	21	Filter	-0.01			X	-1.40		-8.00		-1.80	
McLeod	21	Speedisk	3.00	a	11.00		-1.40		-8.00		-1.80	
McLeod	21	Filter	-0.01			X	-1.40		-8.00		-1.80	
McLeod	34	Speedisk		X	5.70		-1.40		-8.00		-1.80	
McLeod	34	Filter	-0.01			X	-1.40		-8.00		-1.80	
McLeod	32	Speedisk		X	4.90		-1.40		-8.00		33.00	
McLeod	32	Filter	-0.01	d		X	-1.40		-8.00		-1.80	
Wonder	50	Speedisk		X		X	-1.4		-8		-1.8	
Wonder	50	Filter	-0.012	d		X	-1.4		-8		-1.8	
Wonder	50	Speedisk		X		X	-1.4		-8		24	
Wonder	50	Filter	-0.012	d		X	-1.4		-8		-1.8	
Wonder	50	Speedisk	-0.012			X	-1.4		-8		-1.8	
Wonder	50	Filter	-0.012	d		X	-1.4		-8		-1.8	
Wonder	50	Speedisk	-0.012			X	-1.4		-8		30	
Wonder	50	Filter	-0.012	d		X	-1.4		-8		-1.8	
Wonder	50	Speedisk	-0.012		3.7	e	-1.4		-8		88	
Wonder	50	Filter	-0.012	d		X	-1.4		-8		-1.8	
LP19	50	Speedisk	2.60	d	8.10	e	87.00		-8.00		12.00	
LP19	50	Filter		X		X	-1.40		-8.00		-1.80	
LP19	50	Speedisk	-0.01	d		X	62.00		-8.00		10.00	
LP19	50	Filter		X		X	-1.40		-8.00		-1.80	
LP19	50	Speedisk	-0.01		7.90	e	-1.40		-8.00		-1.80	
LP19	50	Filter		X		X	-1.40		-8.00		-1.80	
LP19	50	Speedisk	-0.01		2.80	e	-1.40		-8.00		-1.80	

LP19	50	Filter		X		X	-1.40		-8.00		-1.80	
Golden	32	Speedisk	-0.01		3.10	f	170.00		-8.00		-1.80	
Golden	32	Filter		X		X	-1.40		-8.00		-1.80	
Golden	42	Speedisk	-0.01		3.50		140.00	d	-8.00	d	-1.80	d
Golden	42	Filter		X		X	-1.40		-8.00		-1.80	
Golden	50	Speedisk	-0.01	d	2.00	f	-1.40	d	-8.00	d	-1.80	d
Golden	50	Filter	-0.01	d		X	-1.40	d	-8.00	d	-1.80	d
Oldman	50	Speedisk	-0.01		5.30	e	90.00		-8.00		35.00	
Oldman	50	Filter	12.00	d		X	-1.40	d	-8.00	d	-1.80	d
Oldman	50	Speedisk	-0.01	d	3.80	e,f	120.00		-8.00		36.00	
Oldman	50	Filter		X		X	-1.40		-8.00		-1.80	
Oldman	50	Speedisk	-0.01	d	3.70	e,f	110.00		-8.00		24.00	
Oldman	50	Filter		X		X	-1.40		-8.00		-1.80	
Snyder	46	Speedisk	-0.01			X	-1.40		-8.00		-1.80	
Snyder	46	Filter		X		X	-1.40		-8.00		-1.80	
Snyder	38	Speedisk	-0.01	d		X	-1.40		-8.00		-1.80	
Snyder	38	Filter	19.00			X	-1.40		-8.00		-1.80	
Snyder	43	Speedisk	-0.01	d	3.30	e,f	-1.40		-8.00		-1.80	
Snyder	43	Filter		X		X	-1.40		-8.00		-1.80	
Hoh	50	Speedisk	-0.01		5.50		-1.40		-8.00		-1.80	
Hoh	50	Filter		X		X	-1.40		-8.00		-1.80	
Hoh	50	Speedisk	-0.01	d	2.80	e	-1.40		-8.00		-1.80	
Hoh	50	Filter		X		X	-1.40		-8.00		-1.80	
Hoh	50	Speedisk	-0.01	d	3.50	e	-1.40		-8.00		-1.80	
Hoh	50	Filter		X		X	-1.40		-8.00		-1.80	
PJ	36	Speedisk	-0.01		1.70	e,f	-1.40		-8.00		-1.80	
PJ	36	Filter		X		X	-1.40		-8.00		-1.80	
PJ	40	Speedisk	-0.01		5.10	e	-1.40		-8.00		-1.80	
PJ	40	Filter		X		X	-1.40		-8.00		-1.80	

Site	Volume (L)	Speedisk /Filter	d-HCH pg/L	d-HCH FLAG	TRLTE pg/L	TRLTE FLAG	MBZN pg/L	MBZN FLAG	HCLR pg/L	HCLR FLAG	DCPA pg/L	DCPA FLAG
Emerald	41	Speedisk	-10		-27		-130		-680		39	
Emerald	41	Filter	-10		-27		-130		-680		-0.17	

Emerald	35	Speedisk	-12		270		-150		-800		74	
Emerald	35	Filter	-12		-32		-150		-800		1.7	a
Emerald	25	Speedisk	-16		-45		-210		-1100		200	
Emerald	25	Filter	-16		-45		-210		-1100		-0.28	
Pear	49	Speedisk	-8.4		-23		-110		-570		79	
Pear	49	Filter	-8.4		-23		-110		-570		-0.14	
Pear	34	Speedisk	-12		180		-150		-820		110	
Pear	34	Filter	-12		-33		-150		-820		0.35	a
Mills	59	Speedisk	-7		-19		-88		-480		27	
Mills	59	Filter	-7		-19		-88		-480		-0.12	
Lone Pine	35	Speedisk	-12		-32		-150		-800		8.6	
Lone Pine	35	Filter	-12		-32		-150		-800		-0.2	
Lone Pine	35	Speedisk	-12		-32		-150		-800		38	
Lone Pine	35	Filter	-12		220		-150		-800		79	
Lone Pine	52	Speedisk	-7.9	d	-22	d	-100	d	-540	d	25	d
Lone Pine	52	Filter	-7.9		20		-100		-540		4.8	
Lone Pine	48	Speedisk	-0.34		-0.94		-4.3		-23	d	0.39	d
Lone Pine	48	Filter	-0.34		-0.94		-4.3		-23		-0.006	
Burial	50	Speedisk	-2.50		-6.90		-32.00		-170.00			X
Burial	50	Filter	-2.50		-6.90		-32.00		-170.00			X
Burial	50	Speedisk	-2.50		-6.90		-32.00		-170.00		-0.04	
Burial	50	Filter	-2.50		-6.90		-32.00		-170.00			X
Burial	50	Speedisk	-2.50	d	-6.90	d	-32.00	d	-170.00			X
Burial	50	Filter	-2.50		-6.90		-32.00		-170.00	c		X
Burial	50	Speedisk	-2.50	d	-6.90	d	-32.00	d	-170.00		-0.04	
Burial	50	Filter	-2.50		-6.90		-32.00		-170.00	c		X
Matcharak	50	Speedisk	-2.5		-6.9		-32		-170	c		X
Matcharak	50	Filter	-2.5		-6.9		-32		-170		1.1	a
Matcharak	37	Speedisk	-2.5	d	-6.9	d	-32	d	-170	c,d		X
Matcharak	37	Filter	-2.5	d	-6.9	d	-32	d	-170	d	-0.043	d
Matcharak	50	Speedisk	-2.5		-6.9		-32		-170	c	0.3	a
Matcharak	50	Filter	-2.5		-6.9		-32		-170		-0.043	
Matcharak	50	Speedisk	-2.5	d	-6.9	d	-32	d	-170	c	-0.043	

Matcharak	50	Filter	-2.5		-6.9		-32		-170		-0.043	
McLeod	34	Speedisk	-2.50		-6.90		-32.00		-170.00		1.50	a
McLeod	34	Filter	-2.50		-6.90		-32.00		-170.00		-0.04	
McLeod	21	Speedisk	-2.50		-6.90		-32.00		-170.00			X
McLeod	21	Filter	-2.50		-6.90		-32.00		-170.00		-0.04	
McLeod	21	Speedisk	-2.50		-6.90		-32.00		-170.00		43.00	
McLeod	21	Filter	-2.50		-6.90		-32.00		-170.00		-0.04	
McLeod	34	Speedisk	-2.50		-6.90		-32.00		-170.00		8.20	
McLeod	34	Filter	-2.50		-6.90		-32.00		-170.00		-0.04	
McLeod	32	Speedisk	-2.50		-6.90		-32.00		-170.00		5.30	
McLeod	32	Filter	-2.50		-6.90		-32.00		-170.00		-0.04	
Wonder	50	Speedisk	-2.5		-6.9		-32	c	-170		0.96	a,f
Wonder	50	Filter	-2.5		-6.9		-32		-170			X
Wonder	50	Speedisk	-2.5		-6.9		-32	c	-170		0.6	a,f
Wonder	50	Filter	-2.5		-6.9		-32		-170		-0.043	
Wonder	50	Speedisk	-2.5		-6.9		-32	c	-170		0.54	a,f
Wonder	50	Filter	-2.5		-6.9		-32		-170		-0.043	
Wonder	50	Speedisk	-2.5		-6.9		-32		-170			X
Wonder	50	Filter	-2.5		-6.9		-32		-170		-0.043	
Wonder	50	Speedisk	-2.5		-6.9		-32		-170		1.4	a
Wonder	50	Filter	-2.5		-6.9		-32		-170		-0.043	
LP19	50	Speedisk	-2.50		-6.90		-32.00		-170.00		100.00	
LP19	50	Filter	-2.50		-6.90		-32.00		-170.00		0.78	
LP19	50	Speedisk	-2.50		-6.90		-32.00		-170.00		73.00	
LP19	50	Filter	-2.50		-6.90		-32.00		-170.00		-0.04	
LP19	50	Speedisk	-2.50		-6.90		-32.00		-170.00		320.00	
LP19	50	Filter	-2.50		-6.90		-32.00		-170.00		-0.04	
LP19	50	Speedisk	-2.50		-6.90		-32.00		-170.00		330.00	
LP19	50	Filter	-2.50		-6.90		-32.00		-170.00		-0.04	
Golden	32	Speedisk	-2.50		-6.90		-32.00		-170.00		470.00	
Golden	32	Filter	-2.50		-6.90		-32.00		-170.00		-0.04	
Golden	42	Speedisk	-2.50	d	-6.90	d	-32.00	d	-170.00	d	350.00	d
Golden	42	Filter	-2.50		-6.90		-32.00		-170.00		-0.04	

Golden	50	Speedisk	-2.50	d	-6.90	d	-32.00	d	-170.00	d	-0.04	d
Golden	50	Filter	-2.50	d	-6.90	d	-32.00	d	-170.00	d	-0.04	d
			0	0	0	0	0	0	0	0	0	0
Oldman	50	Speedisk	-2.50		-6.90		-32.00		-170.00		780.00	
Oldman	50	Filter	-2.50	d	-6.90	d	-32.00	d	-170.00	d	-0.04	d
Oldman	50	Speedisk	-2.50		-6.90		-32.00		-170.00		670.00	
Oldman	50	Filter	-2.50		-6.90		-32.00		-170.00		-0.04	
Oldman	50	Speedisk	-2.50		-6.90		-32.00		-170.00		440.00	
Oldman	50	Filter	-2.50		-6.90		-32.00		-170.00		-0.04	
Snyder	46	Speedisk	-2.50		-6.90		-32.00		-170.00		8.00	
Snyder	46	Filter	-2.50		-6.90		-32.00		-170.00		-0.04	
Snyder	38	Speedisk	-2.50		-6.90		-32.00		-170.00		61.00	
Snyder	38	Filter	-2.50		-6.90		-32.00		-170.00		-0.04	
Snyder	43	Speedisk	-2.50		-6.90		-32.00		-170.00		130.00	
Snyder	43	Filter	-2.50		-6.90		-32.00		-170.00		-0.04	
Hoh	50	Speedisk	-2.50		-6.90		-32.00		-170.00		38.00	
Hoh	50	Filter	-2.50		-6.90		-32.00		-170.00		-0.04	
Hoh	50	Speedisk	-2.50		-6.90		-32.00		-170.00		37.00	
Hoh	50	Filter	-2.50		-6.90		-32.00		-170.00		-0.04	
Hoh	50	Speedisk	-2.50		-6.90		-32.00		-170.00		50.00	
Hoh	50	Filter	-2.50		-6.90		-32.00		-170.00		-0.04	
PJ	36	Speedisk	-2.50		-6.90		-32.00		-170.00		4.00	
PJ	36	Filter	-2.50		-6.90		-32.00		-170.00		-0.04	
PJ	40	Speedisk	-2.50		-6.90		-32.00		-170.00		6.80	
PJ	40	Filter	-2.50		-6.90		-32.00		-170.00		-0.04	

Site	Volume (L)	Speedisk /Filter	Aldrin pg/L	Aldrin FLAG	CLPYRO pg/L	CLPYRO FLAG	CLPYR pg/L	CLPYR FLAG	HCLR E pg/L	HCLR E FLAG	o-CLDN pg/L	o-CLDN FLAG
Emerald	41	Speedisk	-340		-64		-5		-21		-12	
Emerald	41	Filter	-340		-64		-5		-21		-12	
Emerald	35	Speedisk	-400		-75		-5.9		-24		-14	
Emerald	35	Filter	-400		-75		-5.9		-24		-14	
Emerald	25	Speedisk	-560		-100		-8.2		-34		-20	
Emerald	25	Filter	-560		-100		-8.2		-34		-20	

Pear	49	Speedisk	-290		-53		-4.2		-17		-10	
Pear	49	Filter	-290		-53		-4.2		-17		-10	
Pear	34	Speedisk	-420		-77		-6.1		-25		-14	
Pear	34	Filter	-420		-77		-6.1		-25		-14	
Mills	59	Speedisk	-240		-44		-3.5		-14		-8.3	
Mills	59	Filter	-240		-44		-3.5		-14		-8.3	
Lone Pine	35	Speedisk	-400		-75	d	-5.9	d	-24		-14	
Lone Pine	35	Filter	-400		-75		-5.9		-24	d	-14	d
Lone Pine	35	Speedisk	-400		-75		-5.9		-24		-14	
Lone Pine	35	Filter	-400		-75		72		-24		-14	
Lone Pine	52	Speedisk	-270	d	-50	d	-4	d	-16	d	-9.4	d
Lone Pine	52	Filter	-270		-50	d	-4	d	-16		-9.4	
Lone Pine	48	Speedisk	-12		-2.2	d	-0.17	d	-0.7		-0.41	
Lone Pine	48	Filter	-12		-2.2	d	-0.17	d	-0.7		-0.41	
Burial	50	Speedisk	-86.00		-16.00		-1.30		-5.10		-3.00	
Burial	50	Filter	-86.00		-16.00		-1.30		-5.10		-3.00	
Burial	50	Speedisk	-86.00		-16.00		-1.30		-5.10		-3.00	
Burial	50	Filter	-86.00		-16.00		-1.30		-5.10		-3.00	
Burial	50	Speedisk	-86.00	d	-16.00		-1.30		-5.10		-3.00	
Burial	50	Filter	-86.00		-16.00		-1.30		-5.10		-3.00	
Burial	50	Speedisk	-86.00	d	-16.00		-1.30		-5.10		-3.00	
Burial	50	Filter	-86.00		-16.00		-1.30		-5.10		-3.00	
Matcharak	50	Speedisk	-86		-16		-1.3		-5.1		-3	
Matcharak	50	Filter	-86		-16	d	3.3	d	-5.1		-3	
Matcharak	37	Speedisk	-86	d	-16		-1.3		-5.1		-3	
Matcharak	37	Filter	-86	d	-16	d	4.5	d	-5.1	d	-3	d
Matcharak	50	Speedisk	-86		-16		-1.3		-5.1		-3	
Matcharak	50	Filter	-86		-16	d	3.4	d	-5.1		-3	
Matcharak	50	Speedisk	-86	d	-16		-1.3		-5.1		-3	
Matcharak	50	Filter	-86		-16	d	-1.3	d	-5.1	d	-3	d
McLeod	34	Speedisk	-86.00		-16.00		-1.30		-5.10		-3.00	
McLeod	34	Filter	-86.00		-16.00		-1.30		-5.10		-3.00	

McLeod	21	Speedisk	-86.00		-16.00		-1.30		-5.10		-3.00	
McLeod	21	Filter	-86.00		-16.00		-1.30		-5.10		-3.00	
McLeod	21	Speedisk	-86.00		-16.00		-1.30		-5.10		-3.00	
McLeod	21	Filter	-86.00		-16.00		-1.30		-5.10		-3.00	
McLeod	34	Speedisk	-86.00		-16.00		4.40		-5.10		-3.00	
McLeod	34	Filter	-86.00		-16.00		-1.30		-5.10		-3.00	
McLeod	32	Speedisk	-86.00		-16.00		-1.30		-5.10		-3.00	
McLeod	32	Filter	-86.00		-16.00		-1.30		-5.10		-3.00	
Wonder	50	Speedisk	-86		-16		-1.3		-5.1		-3	
Wonder	50	Filter	-86		-16	d	-1.3	d	-5.1	d	-3	d
Wonder	50	Speedisk	-86		-16		-1.3		-5.1		-3	
Wonder	50	Filter	-86		-16	d	-1.3	d	-5.1		-3	
Wonder	50	Speedisk	-86		-16		-1.3		-5.1		-3	
Wonder	50	Filter	-86		-16	d	-1.3	d	-5.1		-3	
Wonder	50	Speedisk	-86	c	-16		-1.3		-5.1		-3	
Wonder	50	Filter	-86		-16	d	-1.3	d	-5.1		-3	
Wonder	50	Speedisk	-86	c	-16	d	-1.3	d	-5.1		-3	
Wonder	50	Filter	-86		-16	d	-1.3	d	-5.1		-3	
LP19	50	Speedisk	-86.00		-16.00	d	-1.30	d	-5.10	d	-3.00	d
LP19	50	Filter	-86.00		-16.00		-1.30		-5.10		-3.00	
LP19	50	Speedisk	-86.00		-16.00	d		X	-5.10	d	-3.00	d
LP19	50	Filter	-86.00		-16.00	d	-1.30	d	-5.10	d	-3.00	d
LP19	50	Speedisk	-86.00		-16.00	d		X	-5.10	d	-3.00	d
LP19	50	Filter	-86.00		-16.00		-1.30		-5.10		-3.00	
LP19	50	Speedisk	-86.00		-16.00	d		X	-5.10		-3.00	
LP19	50	Filter	-86.00		-16.00		-1.30		-5.10		-3.00	
Golden	32	Speedisk	-86.00		-16.00	d		X	-5.10	d	-3.00	d
Golden	32	Filter	-86.00		-16.00		-1.30		-5.10		-3.00	
Golden	42	Speedisk	-86.00	d	-16.00			X	-5.10		-3.00	
Golden	42	Filter	-86.00		-16.00		-1.30		-5.10		-3.00	
Golden	50	Speedisk	-86.00	d	-16.00	d	-1.30	d	-5.10		-3.00	
Golden	50	Filter	-86.00	d	-16.00	d	-1.30	d	-5.10		-3.00	
Oldman	50	Speedisk	-86.00		-16.00	d	2.90	d,f	-5.10	d	-3.00	d

Oldman	50	Filter	-86.00	d	-16.00		-1.30		-5.10		-3.00	
Oldman	50	Speedisk	-86.00		-16.00	d	3.10	d,f	-5.10	d	-3.00	d
Oldman	50	Filter	-86.00		-16.00		-1.30		-5.10		-3.00	
Oldman	50	Speedisk	-86.00		-16.00		1.80	f	-5.10	d	-3.00	
Oldman	50	Filter	-86.00		-16.00		-1.30		-5.10		-3.00	
Snyder	46	Speedisk	-86.00		-16.00		-1.30		-5.10		-3.00	
Snyder	46	Filter	-86.00		-16.00	d	-1.30	d	-5.10		-3.00	
Snyder	38	Speedisk	-86.00		-16.00	d	2.10	d,f	-5.10	d	-3.00	d
Snyder	38	Filter	-86.00		-16.00	d	-1.30	d	-5.10		-3.00	
Snyder	43	Speedisk	-86.00		-16.00	d	-1.30	d	-5.10	d	-3.00	d
Snyder	43	Filter	-86.00		-16.00	d	-1.30	d	-5.10		-3.00	
Hoh	50	Speedisk	-86.00		-16.00	d	-1.30	d	-5.10	d	-3.00	d
Hoh	50	Filter	-86.00		-16.00		-1.30		-5.10		-3.00	
Hoh	50	Speedisk	-86.00		-16.00	d	-1.30	d	-5.10	d	-3.00	d
Hoh	50	Filter	-86.00		-16.00		-1.30		-5.10		-3.00	
Hoh	50	Speedisk	-86.00		-16.00	d		X	-5.10	d	-3.00	d
Hoh	50	Filter	-86.00		-16.00		-1.30		-5.10		-3.00	
PJ	36	Speedisk	-86.00		-16.00		-1.30		-5.10		-3.00	
PJ	36	Filter	-86.00		-16.00	d	-1.30	d	-5.10		-3.00	
PJ	40	Speedisk	-86.00		-16.00	d	-1.30	d	-5.10	d	-3.00	d
PJ	40	Filter	-86.00		-16.00		-1.30		-5.10		-3.00	

Site	Volume (L)	Speedisk /Filter	t-CLDN pg/L	t-CLDN FLAG	ENDO I pg/L	ENDO I FLAG	c-CLDN pg/L	c-CLDN FLAG	t-NCLR pg/L	t-NCLR FLAG	Dieldrin pg/L	Dieldrin FLAG
Emerald	41	Speedisk	-0.24		24	a	-140		-1.2		-210	
Emerald	41	Filter	-0.24		-2.5		-140		-1.2		-210	
Emerald	35	Speedisk	-0.28		-2.9		-160		1.4	a	-240	
Emerald	35	Filter	-0.28		-2.9		-160		-1.4		190	a
Emerald	25	Speedisk	-0.39		-4.1		-230		-1.9		-340	
Emerald	25	Filter	-0.39		-4.1		-230		-1.9		-340	
Pear	49	Speedisk	-0.2		-2.1		-120		-0.98		-170	
Pear	49	Filter	-0.2		-2.1		-120		-0.98		17	a
Pear	34	Speedisk	-0.28		-3		-170		-1.4	a	-250	
Pear	34	Filter	-0.28		-3		-170		-1.4		-250	

Mills	59	Speedisk	-0.16		17	a	-98		-0.81		-140	
Mills	59	Filter	-0.16		-1.7		-98		-0.81		-140	
Lone Pine	35	Speedisk	-0.28		-2.9		-160		-1.4		-240	
Lone Pine	35	Filter	-0.28	d	-2.9	d	-160	d	-1.4	d	-240	d
Lone Pine	35	Speedisk	-0.28		-2.9		-160		-1.4		-240	
Lone Pine	35	Filter	34		38		-160		30		800	a
Lone Pine	52	Speedisk	-0.19	d	-2	d	-110	d	-0.92	d	-160	d
Lone Pine	52	Filter	-0.19		-2		-110		-0.92		-160	
Lone Pine	48	Speedisk	-0.008		-0.086		-4.8		-0.04		-7.1	
Lone Pine	48	Filter	-0.008		-0.086		-4.8		-0.04		-7.1	
Burial	50	Speedisk	-0.06		-0.63		-35.00		-0.29	c	-52.00	
Burial	50	Filter	-0.06		-0.63		-35.00		-0.29		-52.00	
Burial	50	Speedisk	-0.06		-0.63		-35.00		-0.29	c	-52.00	
Burial	50	Filter	-0.06		-0.63		-35.00		-0.29		-52.00	
Burial	50	Speedisk	-0.06		-0.63		-35.00		-0.29		-52.00	
Burial	50	Filter	-0.06		-0.63		-35.00	c	-0.29	c	-52.00	
Burial	50	Speedisk	-0.06		-0.63		-35.00		-0.29		-52.00	
Burial	50	Filter	-0.06		-0.63		-35.00	c	-0.29	c	-52.00	
Matcharak	50	Speedisk	-0.059		-0.63		-35	c	-0.29	c	-52	
Matcharak	50	Filter	-0.059		-0.63		-35		-0.29		-52	
Matcharak	37	Speedisk	-0.059		-0.63		-35	c	-0.29	c	-52	
Matcharak	37	Filter	-0.059	d	-0.63	d	-35	d	-0.29	d	-52	d
Matcharak	50	Speedisk	-0.059		-0.63		-35	c	-0.29	c	-52	
Matcharak	50	Filter	-0.059		-0.63		-35		-0.29		-52	
Matcharak	50	Speedisk	-0.059		-0.63		-35	c	-0.29	c	-52	
Matcharak	50	Filter	-0.059	d	-0.63	d	-35	d	-0.29	d	-52	d
McLeod	34	Speedisk	-0.06		-0.63		-35.00		-0.29		-52.00	
McLeod	34	Filter	-0.06		-0.63		-35.00		-0.29		-52.00	
McLeod	21	Speedisk	-0.06		-0.63		-35.00		-0.29		-52.00	
McLeod	21	Filter	-0.06		-0.63		-35.00		-0.29		-52.00	
McLeod	21	Speedisk	-0.06		-0.63		-35.00		-0.29		-52.00	
McLeod	21	Filter	-0.06		-0.63		-35.00		-0.29		-52.00	
McLeod	34	Speedisk	-0.06		-0.63		-35.00		-0.29		-52.00	

McLeod	34	Filter	-0.06		-0.63		-35.00		-0.29		-52.00	
McLeod	32	Speedisk	-0.06		-0.63		-35.00		-0.29		-52.00	
McLeod	32	Filter	-0.06		-0.63		-35.00		-0.29		-52.00	
Wonder	50	Speedisk	-0.059		-0.63		-35		-0.29		-52	
Wonder	50	Filter	-0.059	d	-0.63	d	-35	d	-0.29	d	-52	d
Wonder	50	Speedisk	-0.059		-0.63		-35		-0.29		-52	
Wonder	50	Filter	-0.059		-0.63		-35		-0.29		-52	
Wonder	50	Speedisk	-0.059		-0.63		-35		-0.29		-52	
Wonder	50	Filter	-0.059		-0.63		-35		-0.29		-52	
Wonder	50	Speedisk	-0.059		-0.63		-35		-0.29		-52	
Wonder	50	Filter	-0.059		-0.63		-35		-0.29		-52	
Wonder	50	Speedisk	-0.059		-0.63		-35		-0.29		-52	
Wonder	50	Filter	-0.059		-0.63		-35		-0.29		-52	
LP19	50	Speedisk	2.90	d	40.00	d	-35.00	d	3.10	d	-52.00	d
LP19	50	Filter	-0.06		-0.63		-35.00		-0.29		-52.00	
LP19	50	Speedisk	-0.06	d	20.00	d	1400.00	d	-0.29	d	-52.00	d
LP19	50	Filter	-0.06	d	-0.63	d	-35.00	d	-0.29	d	-52.00	d
LP19	50	Speedisk	-0.06	d	42.00	d	-35.00	d	-0.29	d	-52.00	d
LP19	50	Filter	-0.06		-0.63		-35.00		-0.29		-52.00	
LP19	50	Speedisk	-0.06		49.00		-35.00		-0.29		-52.00	
LP19	50	Filter	-0.06		-0.63		-35.00		-0.29		-52.00	
Golden	32	Speedisk	-0.06	d	64.00	d	-35.00	d	-0.29	d	-52.00	d
Golden	32	Filter	-0.06		-0.63		-35.00		-0.29		-52.00	
Golden	42	Speedisk	-0.06		41.00		-35.00		-0.29		-52.00	
Golden	42	Filter	-0.06		-0.63		-35.00		-0.29		-52.00	
Golden	50	Speedisk	-0.06		-0.63		-35.00		-0.29		-52.00	
Golden	50	Filter	-0.06		-0.63		-35.00		-0.29		-52.00	
Oldman	50	Speedisk	-0.06	d	3.80	d	-35.00	d	-0.29	d	-52.00	d
Oldman	50	Filter	-0.06		-0.63		-35.00		-0.29		-52.00	
Oldman	50	Speedisk	-0.06	d	3.70	d	-35.00	d	-0.29	d	-52.00	d
Oldman	50	Filter	-0.06		-0.63		-35.00		-0.29		-52.00	
Oldman	50	Speedisk	-0.06	d	2.20	d	-35.00	d	-0.29	d	-52.00	d
Oldman	50	Filter	-0.06		-0.63		-35.00		-0.29		-52.00	

Snyder	46	Speedisk	-0.06		-0.63		-35.00		-0.29		-52.00	
Snyder	46	Filter	-0.06		-0.63		-35.00		-0.29		-52.00	
Snyder	38	Speedisk	-0.06	d	8.20	d	-35.00	d	-0.29	d	-52.00	d
Snyder	38	Filter	-0.06		-0.63		-35.00		-0.29		-52.00	
Snyder	43	Speedisk	-0.06	d	9.30	d	-35.00	d	-0.29	d	-52.00	d
Snyder	43	Filter	-0.06		-0.63		-35.00		-0.29		-52.00	
Hoh	50	Speedisk	-0.06	d	-0.63	d	-35.00	d	-0.29	d	-52.00	d
Hoh	50	Filter	-0.06		-0.63		-35.00		-0.29		-52.00	
Hoh	50	Speedisk	-0.06	d	-0.63	d	-35.00	d	-0.29	d	-52.00	d
Hoh	50	Filter	-0.06		-0.63		-35.00		-0.29		-52.00	
Hoh	50	Speedisk	-0.06	d	-0.63	d	-35.00	d	-0.29	d	-52.00	d
Hoh	50	Filter	-0.06		-0.63		-35.00		-0.29		-52.00	
PJ	36	Speedisk	-0.06		-0.63		-35.00		-0.29		-52.00	
PJ	36	Filter	-0.06		-0.63		-35.00		-0.29		-52.00	
PJ	40	Speedisk	-0.06	d	-0.63	d	-35.00	d	-0.29	d	-52.00	d
PJ	40	Filter	-0.06		-0.63		-35.00		-0.29		-52.00	

Site	Volume (L)	Speedisk /Filter	PCB 74 pg/L	PCB 74 FLAG	PCB 101 pg/L	PCB 101 FLAG	PCB 118 pg/L	PCB 118 (penta) FLAG	Endrin pg/L	Endrin FLAG	ENDO II pg/L	ENDO II FLAG
Emerald	41	Speedisk	-1500		-89		-4.1		-260		-1.2	
Emerald	41	Filter	-1500		-89		5	a	-260		-1.2	
Emerald	35	Speedisk	-1800		-100		-4.8		-300		26	a
Emerald	35	Filter	-1800		-100		4.1	a	-300		-1.4	
Emerald	25	Speedisk	-2500		-150		-6.7		-420		-2	
Emerald	25	Filter	-2500		-150		-6.7		-420		-2	
Pear	49	Speedisk	-1300		-74		-3.4		-220		-1	
Pear	49	Filter	-1300		-74		3.9	a	-220		-1	
Pear	34	Speedisk	-1900		-110		-4.9		-310		27	a
Pear	34	Filter	-1900		-110		6	a	-310		-1.5	
Mills	59	Speedisk	-1100		-62		-3.7		-180		-0.85	
Mills	59	Filter	-1100		-62		3.5	a	-180		-0.85	
Lone Pine	35	Speedisk	-1800		-100		-4.8		-300		-1.4	
Lone Pine	35	Filter	-1800		-100		3.4	a	-300	d	-1.4	d

Lone Pine	35	Speedisk	-1800		-100		-4.8		-300		-1.4	
Lone Pine	35	Filter	-1800		-100		26	a	-300		61	
Lone Pine	52	Speedisk	-1200	d	-70	d	-3.2	d	-200	d	-0.96	d
Lone Pine	52	Filter	-1200		-70		-3.2		-200		-0.96	
Lone Pine	48	Speedisk	-52	d	-3	d	-0.14	d	-8.8		-0.042	
Lone Pine	48	Filter	-52		-3		-0.14		-8.8		-0.042	
Burial	50	Speedisk	-380.00	d	-22.00	d	-1.00	d	-64.00		-0.30	
Burial	50	Filter	-380.00		-22.00		-1.00		-64.00		-0.30	
Burial	50	Speedisk	-380.00	d	-22.00	d	-1.00	d	-64.00		-0.30	
Burial	50	Filter	-380.00		-22.00		-1.00		-64.00		-0.30	
Burial	50	Speedisk	-380.00	d	-22.00	d	-1.00	d	-64.00	d	-0.30	d
Burial	50	Filter	-380.00		-22.00		-1.00		-64.00		-0.30	
Burial	50	Speedisk	-380.00	d	-22.00	d	-1.00	d	-64.00	d	-0.30	d
Burial	50	Filter	-380.00		-22.00		-1.00		-64.00		-0.30	
Matcharak	50	Speedisk	-380	d	-22	d	-1	d	-64	d	-0.3	d
Matcharak	50	Filter	-380		-22		0.78	a	-64		-0.3	
Matcharak	37	Speedisk	-380	d	-22	d	-1	d	-64		-0.3	
Matcharak	37	Filter	-380		-22		-1		-64	d	-0.3	d
Matcharak	50	Speedisk	-380	d	-22	d	-1	d	-64		-0.3	
Matcharak	50	Filter	-380		-22		-1		-64		-0.3	
Matcharak	50	Speedisk	-380		-22		-1		-64		-0.3	
Matcharak	50	Filter	-380		-22		-1		-64		-0.3	
McLeod	34	Speedisk	-380.00		-22.00		-1.00		-64.00		-0.30	
McLeod	34	Filter	-380.00		-22.00		-1.00		-64.00		-0.30	
McLeod	21	Speedisk	-380.00		-22.00		-1.00		-64.00		-0.30	
McLeod	21	Filter	-380.00		-22.00		-1.00		-64.00		-0.30	
McLeod	21	Speedisk	-380.00		-22.00		-1.00		-64.00		-0.30	
McLeod	21	Filter	-380.00		-22.00		-1.00		-64.00		-0.30	
McLeod	34	Speedisk	-380.00		-22.00		-1.00		-64.00		-0.30	
McLeod	34	Filter	-380.00		-22.00		-1.00		-64.00		-0.30	
McLeod	32	Speedisk	-380.00		-22.00		-1.00		-64.00		-0.30	
McLeod	32	Filter	-380.00		-22.00		-1.00		-64.00		-0.30	

Wonder	50	Speedisk	-380		-22		-1		-64		-0.3	
Wonder	50	Filter	-380		-22			X	-64		-0.3	
Wonder	50	Speedisk	-380	d	-22	d	-1	d	-64	d	-0.3	d
Wonder	50	Filter	-380		-22		-1		-64		-0.3	
Wonder	50	Speedisk	-380		-22		-1		-64		-0.3	
Wonder	50	Filter	-380		-22		-1		-64		-0.3	
Wonder	50	Speedisk	-380		-22		-1		-64		-0.3	
Wonder	50	Filter	-380		-22		-1		-64		-0.3	
Wonder	50	Speedisk	-380		-22		-1		-64		-0.3	
Wonder	50	Filter	-380		-22		-1		-64		-0.3	
LP19	50	Speedisk	-380.00		-22.00		-1.00		-64.00		34.00	
LP19	50	Filter	-380.00		-22.00		-1.00		-64.00		-0.30	
LP19	50	Speedisk	-380.00		-22.00		-1.00		-64.00		19.00	
LP19	50	Filter	-380.00	d	-22.00	d	-1.00	d	-64.00	d	-0.30	d
LP19	50	Speedisk	-380.00		-22.00		-1.00		-64.00		47.00	
LP19	50	Filter	-380.00		-22.00		-1.00		-64.00		-0.30	
LP19	50	Speedisk	-380.00		-22.00		-1.00		-64.00		48.00	
LP19	50	Filter	-380.00		-22.00		-1.00		-64.00		-0.30	
Golden	32	Speedisk	-380.00		-22.00		-1.00		-64.00		78.00	
Golden	32	Filter	-380.00		-22.00		-1.00		-64.00		-0.30	
Golden	42	Speedisk	-380.00		-22.00		-1.00		-64.00		50.00	
Golden	42	Filter	-380.00		-22.00		-1.00		-64.00		-0.30	
Golden	50	Speedisk	-380.00	d	-22.00	d	-1.00	d	-64.00		-0.30	
Golden	50	Filter	-380.00	d	-22.00	d	-1.00	d	-64.00	d	-0.30	d
Oldman	50	Speedisk	-380.00		-22.00		-1.00		-64.00		2.80	
Oldman	50	Filter	-380.00		-22.00		-1.00		-64.00		-0.30	
Oldman	50	Speedisk	-380.00		-22.00		-1.00		-64.00		1.80	
Oldman	50	Filter	-380.00		-22.00		-1.00		-64.00		-0.30	
Oldman	50	Speedisk	-380.00	d	-22.00		-1.00		-64.00		1.10	
Oldman	50	Filter	-380.00		-22.00		-1.00		-64.00		-0.30	
Snyder	46	Speedisk	-380.00		-22.00		-1.00		-64.00		2.80	
Snyder	46	Filter	-380.00		-22.00		-1.00		-64.00		-0.30	
Snyder	38	Speedisk	-380.00		-22.00		-1.00		-64.00		16.00	
Snyder	38	Filter	-380.00		-22.00		-1.00		-64.00		-0.30	

Snyder	43	Speedisk	-380.00		-22.00		-1.00		-64.00		18.00	
Snyder	43	Filter	-380.00		-22.00		-1.00		-64.00		-0.30	
Hoh	50	Speedisk	-380.00		-22.00		-1.00		-64.00		-0.30	
Hoh	50	Filter	-380.00		-22.00		-1.00		-64.00		-0.30	
Hoh	50	Speedisk	-380.00		-22.00		-1.00		-64.00		-0.30	
Hoh	50	Filter	-380.00		-22.00		-1.00		-64.00		-0.30	
Hoh	50	Speedisk	-380.00		-22.00		-1.00		-64.00		-0.30	
Hoh	50	Filter	-380.00		-22.00		-1.00		-64.00		-0.30	
PJ	36	Speedisk	-380.00		-22.00		-1.00		-64.00		-0.30	
PJ	36	Filter	-380.00		-22.00		-1.00		-64.00		-0.30	
PJ	40	Speedisk	-380.00		-22.00		-1.00		-64.00		2.00	
PJ	40	Filter	-380.00		-22.00		-1.00		-64.00		-0.30	

Site	Volume (L)	Speedisk /Filter	c-NCLR pg/L	c-NCLR FLAG	Endrin A pg/L	Endrin A FLAG	ENDO S pg/L	ENDO S FLAG	PCB 153 pg/L	PCB 153 FLAG	PCB 138 pg/L	PCB 138 FLAG
Emerald	41	Speedisk	0.59	a	-15		57		-8.5		-20	
Emerald	41	Filter	-0.37		-15		-1.1			X	-20	
Emerald	35	Speedisk	0.69	a	-18		210		-10		-23	
Emerald	35	Filter	0.69	a	-18		1.4	a		X		X
Emerald	25	Speedisk	1.9	a	-25		450		-14		-33	
Emerald	25	Filter	-0.61		-25		-1.8		-14		-33	
Pear	49	Speedisk	-0.31		-13		170		-7.1		-17	
Pear	49	Filter	0.24	a	-13		1.2	a		X		X
Pear	34	Speedisk	1.1	a	-18		190		-10		-24	
Pear	34	Filter	0.71	a	-18		2.1	a		X	-24	
Mills	59	Speedisk	0.41	a	-10		40		-5.9		-14	
Mills	59	Filter	-0.26		-10		-0.76			X	-14	
Lone Pine	35	Speedisk	-0.43		-18		8.9		-10	d	-23	d
Lone Pine	35	Filter	-0.43	d	-18	d	-1.3	d		X		X
Lone Pine	35	Speedisk	-0.43		-18		15		-10	d	-23	d
Lone Pine	35	Filter	31	a	-18		26	a		X		X
Lone Pine	52	Speedisk	-0.29	d	-12	d	15	d	-6.7	d	-16	d
Lone Pine	52	Filter	0.92		-12		3.2		3.5	d	3.9	d
Lone Pine	48	Speedisk	-0.013	a	-0.51		0.56		-0.29		-0.68	

Lone Pine	48	Filter	0.04		-0.51		-0.037		0.08	ade	-0.68	d
Burial	50	Speedisk	-0.09		-3.80		-0.27	c	-2.10	d	-5.00	d
Burial	50	Filter	-0.09		-3.80		-0.27		-2.10		-5.00	
Burial	50	Speedisk	-0.09		-3.80		-0.27	c	-2.10		-5.00	
Burial	50	Filter	-0.09		-3.80		-0.27		-2.10		-5.00	
Burial	50	Speedisk	-0.09	d	-3.80	d	-0.27	d	-2.10	d	-5.00	d
Burial	50	Filter	-0.09		-3.80		-0.27	c	-2.10		-5.00	c
Burial	50	Speedisk	-0.09	d	-3.80	d	-0.27	d	-2.10	d	-5.00	d
Burial	50	Filter	-0.09		-3.80		-0.27	c	-2.10		-5.00	c
Matcharak	50	Speedisk	-0.092	d	-3.8	d	-0.27	c,d	-2.1	d	-5	c,d
Matcharak	50	Filter	-0.092		-3.8		-0.27		0.66	a	-5	
Matcharak	37	Speedisk	-0.092		-3.8		-0.27	c	-2.1	d	-5	c,d
Matcharak	37	Filter	-0.092	d	-3.8	d	-0.27	d	-2.1		-5	
Matcharak	50	Speedisk	-0.092		-3.8		-0.27	c	-2.1	d	-5	c,d
Matcharak	50	Filter	-0.092		-3.8		-0.27		-2.1		-5	
Matcharak	50	Speedisk	-0.092		-3.8		-0.27	c	-2.1	d	-5	c,d
Matcharak	50	Filter	-0.092		-3.8		-0.27		-2.1		-5	
McLeod	34	Speedisk	-0.09		-3.80		-0.27		-2.10	d	-5.00	d
McLeod	34	Filter	-0.09		-3.80		-0.27		-2.10		-5.00	
McLeod	21	Speedisk	-0.09		-3.80		-0.27		-2.10		-5.00	
McLeod	21	Filter	-0.09		-3.80		-0.27		-2.10		-5.00	
McLeod	21	Speedisk	-0.09		-3.80		-0.27		-2.10		-5.00	
McLeod	21	Filter	-0.09		-3.80		-0.27		-2.10		-5.00	
McLeod	34	Speedisk	-0.09		-3.80		23.00		-2.10		-5.00	
McLeod	34	Filter	-0.09		-3.80		-0.27		-2.10		-5.00	
McLeod	32	Speedisk	-0.09		-3.80		-0.27		-2.10		-5.00	
McLeod	32	Filter	-0.09		-3.80		-0.27		-2.10		-5.00	
Wonder	50	Speedisk	-0.092		-3.8		-0.27		-2.1		-5	
Wonder	50	Filter	-0.092		-3.8		-0.27		-2.1		-5	
Wonder	50	Speedisk	-0.092	d	-3.8	d	-0.27	d	-2.1	d	-5	d
Wonder	50	Filter	-0.092		-3.8		-0.27		-2.1		-5	
Wonder	50	Speedisk	-0.092		-3.8		-0.27		-2.1		-5	

Wonder	50	Filter	-0.092		-3.8		-0.27		-2.1		-5	
Wonder	50	Speedisk	-0.092		-3.8		-0.27		-2.1	d	-5	d
Wonder	50	Filter	-0.092		-3.8		-0.27		-2.1		-5	
Wonder	50	Speedisk	-0.092		-3.8		-0.27		-2.1		-5	
Wonder	50	Filter	-0.092		-3.8		-0.27		-2.1		-5	
LP19	50	Speedisk	3.20		-3.80		20.00		-2.10		-5.00	
LP19	50	Filter	-0.09		-3.80		-0.27		-2.10		-5.00	
LP19	50	Speedisk	-0.09		-3.80		11.00		-2.10		-5.00	
LP19	50	Filter	-0.09	d	-3.80	d	-0.27	d	-2.10	d	-5.00	d
LP19	50	Speedisk	-0.09		-3.80		12.00		-2.10		-5.00	
LP19	50	Filter	-0.09		-3.80		-0.27		-2.10		-5.00	
LP19	50	Speedisk	-0.09		-3.80		12.00		-2.10		-5.00	
LP19	50	Filter	-0.09		-3.80		-0.27		-2.10		-5.00	
Golden	32	Speedisk	-0.09		-3.80		30.00		-2.10		-5.00	
Golden	32	Filter	-0.09		-3.80		-0.27		-2.10		-5.00	
Golden	42	Speedisk	-0.09		-3.80		23.00		-2.10		-5.00	
Golden	42	Filter	-0.09		-3.80		-0.27		-2.10		-5.00	
Golden	50	Speedisk	-0.09		-3.80		-0.27		-2.10		-5.00	
Golden	50	Filter	-0.09	d	-3.80	d	-0.27	d	-2.10		-5.00	
Oldman	50	Speedisk	-0.09		-3.80		19.00		-2.10		-5.00	
Oldman	50	Filter	-0.09		-3.80		-0.27		-2.10		-5.00	
Oldman	50	Speedisk	-0.09		-3.80		12.00		-2.10		-5.00	
Oldman	50	Filter	-0.09		-3.80		-0.27		-2.10		-5.00	
Oldman	50	Speedisk	-0.09		-3.80		14.00		-2.10		-5.00	
Oldman	50	Filter	-0.09		-3.80		-0.27		-2.10		-5.00	
Snyder	46	Speedisk	-0.09		-3.80		6.90		-2.10		-5.00	
Snyder	46	Filter	-0.09		-3.80		-0.27		-2.10		-5.00	
Snyder	38	Speedisk	-0.09		-3.80		21.00		-2.10		-5.00	
Snyder	38	Filter	-0.09		-3.80		-0.27		-2.10		-5.00	
Snyder	43	Speedisk	-0.09		-3.80		10.00		-2.10		-5.00	
Snyder	43	Filter	-0.09		-3.80		-0.27		-2.10		-5.00	
Hoh	50	Speedisk	-0.09		-3.80		8.40		-2.10		-5.00	
Hoh	50	Filter	-0.09		-3.80		-0.27		-2.10		-5.00	

Hoh	50	Speedisk	-0.09		-3.80		4.00		-2.10		-5.00	
Hoh	50	Filter	-0.09		-3.80		-0.27		-2.10		-5.00	
Hoh	50	Speedisk	-0.09		-3.80		4.40		-2.10		-5.00	
Hoh	50	Filter	-0.09		-3.80		-0.27		-2.10		-5.00	
PJ	36	Speedisk	-0.09		-3.80		-0.27		-2.10		-5.00	
PJ	36	Filter	-0.09		-3.80		-0.27		-2.10		-5.00	
PJ	40	Speedisk	-0.09		-3.80		-0.27		-2.10		-5.00	
PJ	40	Filter	-0.09		-3.80		-0.27		-2.10		-5.00	

Site	Volume (L)	Speedisk /Filter	PCB 187 pg/L	PCB 187 FLAG	PCB 183 pg/L	PCB 183 FLAG	Mirex pg/L	Mirex FLAG
Emerald	41	Speedisk		X		X	-15	
Emerald	41	Filter		X		X	-15	
Emerald	35	Speedisk		X		X	-17	
Emerald	35	Filter		X		X	-17	
Emerald	25	Speedisk	2.4	e	-3.2		-24	
Emerald	25	Filter	-2.4		-3.2		-24	
Pear	49	Speedisk		X		X	-12	
Pear	49	Filter		X		X	-12	
Pear	34	Speedisk	-1.8		-2.3		-18	
Pear	34	Filter		X		X	-18	
			0	0	0	0	0	
Mills	59	Speedisk		X		X	-10	
Mills	59	Filter		X		X	-10	
Lone Pine	35	Speedisk	-1.7	d	-2.3	d	-17	d
Lone Pine	35	Filter		X		X	-17	d
Lone Pine	35	Speedisk	-1.7	d	-2.3	d	-17	d
Lone Pine	35	Filter		X		X	-17	
Lone Pine	52	Speedisk	-1.2	d	-1.5	d	-12	d
Lone Pine	52	Filter	2.3	d	2.5	d	-12	d
Lone Pine	48	Speedisk	-0.051	e	-0.066		-0.5	
Lone Pine	48	Filter	0.07	ade	0.06	ade	-0.5	d
			0	0	0	0	0	
Burial	50	Speedisk	-0.37	d	-0.48	d	-3.70	d
Burial	50	Filter	-0.37		-0.48		-3.70	
Burial	50	Speedisk	-0.37		-0.48		-3.70	

Burial	50	Filter	-0.37		-0.48		-3.70	
Burial	50	Speedisk	-0.37	d	-0.48	d	-3.70	d
Burial	50	Filter	-0.37		-0.48		-3.70	
Burial	50	Speedisk	-0.37	d	-0.48	d	-3.70	d
Burial	50	Filter	-0.37		-0.48		-3.70	
Matcharak	50	Speedisk	-0.37	d	-0.48	d	-3.7	d
Matcharak	50	Filter	0.6	a	0.42	a	-3.7	
Matcharak	37	Speedisk	-0.37	d	-0.48	d	-3.7	d
Matcharak	37	Filter	-0.37		-0.48		-3.7	
Matcharak	50	Speedisk	-0.37	d	-0.48	d	-3.7	d
Matcharak	50	Filter	-0.37		-0.48		-3.7	
Matcharak	50	Speedisk	-0.37	d	-0.48	d	-3.7	d
Matcharak	50	Filter	0.36	a	0.24	a	-3.7	
McLeod	34	Speedisk	-0.37	d	-0.48	d	-3.70	d
McLeod	34	Filter	-0.37		-0.48		-3.70	
McLeod	21	Speedisk	-0.37		-0.48		-3.70	
McLeod	21	Filter	-0.37		-0.48		-3.70	
McLeod	21	Speedisk	-0.37		-0.48		-3.70	
McLeod	21	Filter	-0.37		-0.48		-3.70	
McLeod	34	Speedisk	-0.37		-0.48		-3.70	
McLeod	34	Filter	-0.37		-0.48		-3.70	
McLeod	32	Speedisk	-0.37		-0.48		-3.70	
McLeod	32	Filter	-0.37		-0.48		-3.70	
Wonder	50	Speedisk	-0.37		-0.48		-3.7	
Wonder	50	Filter	-0.37		-0.48		-3.7	
Wonder	50	Speedisk	-0.37	d	-0.48	d	-3.7	d
Wonder	50	Filter	-0.37		-0.48		-3.7	
Wonder	50	Speedisk	-0.37		-0.48		-3.7	
Wonder	50	Filter	-0.37		-0.48		-3.7	
Wonder	50	Speedisk	-0.37	d	-0.48	d	-3.7	d
Wonder	50	Filter	-0.37		-0.48		-3.7	
Wonder	50	Speedisk	-0.37		-0.48		-3.7	
Wonder	50	Filter	-0.37		-0.48		-3.7	

LP19	50	Speedisk	-0.37		-0.48		-3.70	
LP19	50	Filter	-0.37		-0.48		-3.70	
LP19	50	Speedisk	-0.37		-0.48		-3.70	
LP19	50	Filter	-0.37	d	-0.48	d	-3.70	d
LP19	50	Speedisk	-0.37		-0.48		-3.70	
LP19	50	Filter	-0.37		-0.48		-3.70	
LP19	50	Speedisk	-0.37		-0.48		-3.70	
LP19	50	Filter	-0.37		-0.48		-3.70	
Golden	32	Speedisk	-0.37		-0.48		-3.70	
Golden	32	Filter	-0.37		-0.48		-3.70	
Golden	42	Speedisk	-0.37		-0.48		-3.70	
Golden	42	Filter	-0.37		-0.48		-3.70	
Golden	50	Speedisk	-0.37		-0.48		-3.70	
Golden	50	Filter	-0.37		-0.48		-3.70	
Oldman	50	Speedisk	-0.37		-0.48		-3.70	
Oldman	50	Filter	-0.37		-0.48		-3.70	
Oldman	50	Speedisk	-0.37		-0.48		-3.70	
Oldman	50	Filter	-0.37		-0.48		-3.70	
Oldman	50	Speedisk	-0.37		-0.48		-3.70	
Oldman	50	Filter	-0.37		-0.48		-3.70	
Snyder	46	Speedisk	-0.37		-0.48		-3.70	
Snyder	46	Filter	-0.37		-0.48		-3.70	
Snyder	38	Speedisk	-0.37		-0.48		-3.70	
Snyder	38	Filter	-0.37		-0.48		-3.70	
Snyder	43	Speedisk	-0.37		-0.48		-3.70	
Snyder	43	Filter	-0.37		-0.48		-3.70	
Hoh	50	Speedisk	-0.37		-0.48		-3.70	
Hoh	50	Filter	-0.37		-0.48		-3.70	
Hoh	50	Speedisk	-0.37		-0.48		-3.70	
Hoh	50	Filter	-0.37		-0.48		-3.70	
Hoh	50	Speedisk	-0.37		-0.48		-3.70	
Hoh	50	Filter	-0.37		-0.48		-3.70	
PJ	36	Speedisk	-0.37		-0.48		-3.70	

PJ	36	Filter	-0.37		-0.48		-3.70
PJ	40	Speedisk	-0.37		-0.48		-3.70
PJ	40	Filter	-0.37		-0.48		-3.70

Site	Volume (L)	Speedisk/ Filter	EPTC pg/L	EPTC FLAG	ETDZL pg/L	ETDZL FLAG	PBLT pg/L	PBLT FLAG	ACY pg/L	ACY FLAG	ACE pg/L	ACE FLAG
Emerald	41	Speedisk	-1.80	d	-0.45	d	-1.40	d	-9.30	d	-0.68	d
Emerald	41	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Emerald	35	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Emerald	35	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Emerald	25	Speedisk	-1.80	d	-0.45	d	-1.40	d	-9.30	d	-0.68	d
Emerald	25	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Pear	49	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Pear	49	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Pear	34	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Pear	34	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Mills	59	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Mills	59	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Lone Pine	35	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Lone Pine	35	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Lone Pine	35	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Lone Pine	35	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Lone Pine	52	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Lone Pine	52	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Lone Pine	48	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Lone Pine	48	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Burial	50	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Burial	50	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Burial	50	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Burial	50	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Burial	50	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Burial	50	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Burial	50	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Burial	50	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	

Matcharak	50	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Matcharak	50	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Matcharak	37	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Matcharak	37	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Matcharak	50	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Matcharak	50	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Matcharak	50	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Matcharak	50	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
McLeod	34	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
McLeod	34	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
McLeod	21	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
McLeod	21	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
McLeod	21	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
McLeod	21	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
McLeod	34	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
McLeod	34	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
McLeod	32	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
McLeod	32	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Wonder	50	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Wonder	50	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Wonder	50	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Wonder	50	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Wonder	50	Speedisk										
Wonder	50	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Wonder	50	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Wonder	50	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Wonder	50	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Wonder	50	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
LP19	50	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
LP19	50	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
LP19	50	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
LP19	50	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	

Site	Volum	Speedisk/	FLO	FLO	PCLR	PCLR	SIMZ	SIMZ	PMTN	PMTN	ATRZ	ATRZ
LP19	50	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
LP19	50	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
LP19	50	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
LP19	50	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Golden	32	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Golden	32	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Golden	42	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Golden	42	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Golden	50	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Golden	50	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Oldman	50	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Oldman	50	Filter	-1.80	d	-0.45	d	-1.40	d	-9.30	d	-0.68	d
Oldman	50	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Oldman	50	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Oldman	50	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Oldman	50	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Snyder	46	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Snyder	46	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Snyder	38	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Snyder	38	Filter	-1.80	c	-0.45		-1.40		-9.30		-0.68	
Snyder	43	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Snyder	43	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Hoh	50	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Hoh	50	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Hoh	50	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Hoh	50	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
Hoh	50	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
Hoh	50	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
PJ	36	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
PJ	36	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	
PJ	40	Speedisk	-1.80		-0.45		-1.40		-9.30		-0.68	
PJ	40	Filter	-1.80		-0.45		-1.40		-9.30		-0.68	

	e (L)	Filter	pg/L	FLAG	pg/L	FLAG	pg/L	FLAG	pg/L	FLAG	pg/L	FLAG
Emerald	41	Speedisk	-6.20	d	-0.53	d	-5.60	d	-9.00	d	-2.50	d
Emerald	41	Filter	-6.20		-0.53	d	-5.60	d	-9.00	d	-2.50	d
Emerald	35	Speedisk	-6.20		-0.53	d	-5.60	d	-9.00	d	-2.50	d
Emerald	35	Filter	-6.20		-0.53	d	-5.60	d	-9.00	d	-2.50	d
Emerald	25	Speedisk	-6.20	d	-0.53	d	-5.60	d	-9.00	d	-2.50	d
Emerald	25	Filter	-6.20		-0.53	d	-5.60	d	-9.00	d	-2.50	d
Pear	49	Speedisk	-6.20		-0.53	d	-5.60	d	-9.00	d	-2.50	d
Pear	49	Filter	-6.20		-0.53	d	-5.60	d	-9.00	d	-2.50	d
Pear	34	Speedisk	-6.20		-0.53	d	-5.60	d	-9.00	d	-2.50	d
Pear	34	Filter	-6.20		-0.53	d	-5.60	d	-9.00	d	-2.50	d
Mills	59	Speedisk	-6.20		-0.53		-5.60		-9.00		-2.50	
Mills	59	Filter	-6.20		-0.53	d	-5.60	d	-9.00	d	-2.50	d
Lone Pine	35	Speedisk	-6.20		-0.53		-5.60		-9.00		-2.50	
Lone Pine	35	Filter	-6.20		-0.53		-5.60		-9.00		-2.50	
Lone Pine	35	Speedisk	-6.20		-0.53		-5.60		-9.00		-2.50	
Lone Pine	35	Filter	-6.20		-0.53		-5.60		-9.00		-2.50	
Lone Pine	52	Speedisk	-6.20		-0.53		-5.60		-9.00		-2.50	
Lone Pine	52	Filter	-6.20		-0.53		-5.60		-9.00		-2.50	
Lone Pine	48	Speedisk	-6.20		-0.53		-5.60		-9.00		-2.50	
Lone Pine	48	Filter	-6.20		-0.53		-5.60		-9.00		-2.50	
Burial	50	Speedisk	-6.20		-0.53		-5.60		-9.00		-2.50	
Burial	50	Filter	-6.20		-0.53		-5.60		-9.00		-2.50	
Burial	50	Speedisk	-6.20		-0.53		-5.60		-9.00		-2.50	
Burial	50	Filter	-6.20		-0.53		-5.60		-9.00		-2.50	
Burial	50	Speedisk	-6.20		-0.53		-5.60		-9.00		-2.50	
Burial	50	Filter	-6.20		-0.53		-5.60		-9.00		-2.50	
Burial	50	Speedisk	-6.20		-0.53		-5.60		-9.00		-2.50	
Burial	50	Filter	-6.20		-0.53		-5.60		-9.00		-2.50	
Matcharak	50	Speedisk	-6.20		-0.53		-5.60		-9.00		-2.50	
Matcharak	50	Filter	-6.20		-0.53		-5.60		-9.00		-2.50	
Matcharak	37	Speedisk	-6.20		-0.53		-5.60		-9.00		-2.50	
Matcharak	37	Filter	-6.20		-0.53		-5.60		-9.00		-2.50	

Matcharak	50	Speedisk	-6.20		-0.53		-5.60		-9.00		-2.50	
Matcharak	50	Filter	-6.20		-0.53		-5.60		-9.00		-2.50	
Matcharak	50	Speedisk	-6.20		-0.53		-5.60		-9.00		-2.50	
Matcharak	50	Filter	-6.20		-0.53		-5.60		-9.00		-2.50	
McLeod	34	Speedisk	-6.20		-0.53		-5.60		-9.00	c	-2.50	
McLeod	34	Filter	-6.20		-0.53		-5.60		-9.00		-2.50	
McLeod	21	Speedisk	-6.20		-0.53		-5.60		-9.00	c	-2.50	
McLeod	21	Filter	-6.20		-0.53		-5.60		-9.00		-2.50	
McLeod	21	Speedisk	-6.20		-0.53		-5.60		-9.00	c	-2.50	
McLeod	21	Filter	-6.20		-0.53		-5.60		-9.00		-2.50	
McLeod	34	Speedisk	-6.20		-0.53		-5.60		-9.00	c	-2.50	
McLeod	34	Filter	-6.20		-0.53		-5.60		-9.00		-2.50	
McLeod	32	Speedisk	-6.20		-0.53		-5.60		-9.00	c	-2.50	
McLeod	32	Filter	-6.20		-0.53		-5.60		-9.00		-2.50	
Wonder	50	Speedisk	-6.20		-0.53		-5.60		-9.00	c	-2.50	
Wonder	50	Filter	-6.20		-0.53		-5.60		-9.00		-2.50	
Wonder	50	Speedisk	-6.20		-0.53		-5.60		-9.00	c	-2.50	
Wonder	50	Filter	-6.20		-0.53		-5.60		-9.00		-2.50	
Wonder	50	Speedisk										
Wonder	50	Filter	-6.20		-0.53		-5.60		-9.00		-2.50	
Wonder	50	Speedisk	-6.20		-0.53		-5.60		-9.00	c	-2.50	
Wonder	50	Filter	-6.20		-0.53		-5.60		-9.00		-2.50	
Wonder	50	Speedisk	-6.20		-0.53		-5.60		-9.00	c	-2.50	
Wonder	50	Filter	-6.20		-0.53		-5.60		-9.00		-2.50	
LP19	50	Speedisk	-6.20		-0.53	d	-5.60	d	-9.00	d	-2.50	d
LP19	50	Filter	-6.20		-0.53		-5.60		-9.00		-2.50	
LP19	50	Speedisk	-6.20		-0.53		-5.60		-9.00		-2.50	
LP19	50	Filter	-6.20		-0.53	d	-5.60	d	-9.00	d	-2.50	d
LP19	50	Speedisk	-6.20		-0.53	c	-5.60		-9.00		-2.50	
LP19	50	Filter	-6.20		-0.53	c	-5.60		-9.00		-2.50	
LP19	50	Speedisk	-6.20		-0.53		-5.60		-9.00		-2.50	
LP19	50	Filter	26.00		-0.53		-5.60		-9.00		-2.50	
Golden	32	Speedisk	-6.20		-0.53		-5.60		-9.00		-2.50	

Golden	32	Filter	39.00		-0.53		-5.60		-9.00		-2.50	
Golden	42	Speedisk	-6.20		-0.53		-5.60		-9.00		-2.50	
Golden	42	Filter	31.00		-0.53		-5.60		-9.00		-2.50	
Golden	50	Speedisk	-6.20		-0.53	c,d	-5.60	d	-9.00	d	-2.50	d
Golden	50	Filter	-6.20		-0.53	c	-5.60		-9.00		-2.50	
Oldman	50	Speedisk	-6.20		-0.53		-5.60		-9.00		-2.50	
Oldman	50	Filter	50.00	d	-0.53		-5.60		-9.00		-2.50	
Oldman	50	Speedisk	-6.20		-0.53	c	-5.60		-9.00		-2.50	
Oldman	50	Filter	-6.20		-0.53	c	-5.60		-9.00		-2.50	
Oldman	50	Speedisk	-6.20		-0.53	c	-5.60		-9.00		-2.50	
Oldman	50	Filter	-6.20		-0.53	c	-5.60		-9.00		-2.50	
Snyder	46	Speedisk	-6.20		-0.53		-5.60		-9.00		-2.50	
Snyder	46	Filter	96.00		-0.53	d	-5.60	d	-9.00	d	-2.50	d
Snyder	38	Speedisk	-6.20		-0.53	c	-5.60		-9.00		-2.50	
Snyder	38	Filter	86.00		-0.53	c	-5.60		-9.00		-2.50	
Snyder	43	Speedisk	-6.20		-0.53	c	-5.60		-9.00		-2.50	
Snyder	43	Filter	-6.20		-0.53	c,d	-5.60	d	-9.00	d	-2.50	d
Hoh	50	Speedisk	-6.20		-0.53	d	-5.60	d	-9.00	d	-2.50	d
Hoh	50	Filter	90.00		-0.53		-5.60		-9.00		-2.50	
Hoh	50	Speedisk	-6.20		-0.53		-5.60		-9.00		-2.50	
Hoh	50	Filter	-6.20		-0.53		-5.60		-9.00		-2.50	
Hoh	50	Speedisk	-6.20		-0.53	c	-5.60		-9.00		-2.50	
Hoh	50	Filter	56.00		-0.53	c	-5.60		-9.00		-2.50	
PJ	36	Speedisk	-6.20		-0.53	c	-5.60		-9.00		-2.50	
PJ	36	Filter	-6.20		-0.53	c	-5.60		-9.00		-2.50	
PJ	40	Speedisk	-6.20		-0.53		-5.60		-9.00		-2.50	
PJ	40	Filter	44.00		-0.53		-5.60		-9.00		-2.50	

Site	Volume (L)	Speedisk/ Filter	CYAZ pg/L	CYAZ FLAG	PHE pg/L	PHE FLAG	ANT pg/L	ANT FLAG	DIAZ pg/L	DIAZ FLAG	ACLR pg/L	ACLR FLAG
Emerald	41	Speedisk	-3.80	d		X	-1.20	d	-0.54	d	-2.20	d
Emerald	41	Filter	-3.80	d		X	-1.20		-0.54	d	-2.20	d
Emerald	35	Speedisk	-3.80	d		X	-1.20		-0.54	d	-2.20	d
Emerald	35	Filter	-3.80	d		X	-1.20		-0.54	d	-2.20	d

Emerald	25	Speedisk	-3.80	d		X	-1.20	d	-0.54	d	-2.20	d
Emerald	25	Filter	-3.80	d	0.48	e	-1.20		-0.54	d	-2.20	d
Pear	49	Speedisk	-3.80	d		X	-1.20		-0.54	d	-2.20	d
Pear	49	Filter	-3.80	d		X	-1.20		-0.54	d	-2.20	d
Pear	34	Speedisk	-3.80	d	-0.73		-1.20		-0.54	d	-2.20	d
Pear	34	Filter	-3.80	d		X	-1.20		-0.54	d	-2.20	d
Mills	59	Speedisk	-3.80		-0.73		-1.20		-0.54		-2.20	
Mills	59	Filter	-3.80	d		X	-1.20		-0.54	d	-2.20	d
Lone Pine	35	Speedisk	-3.80		-0.73		-1.20		-0.54		-2.20	
Lone Pine	35	Filter	-3.80			X	-1.20		-0.54		-2.20	
Lone Pine	35	Speedisk	-3.80			X	-1.20		-0.54		-2.20	
Lone Pine	35	Filter	-3.80			X	-1.20		-0.54		-2.20	
Lone Pine	52	Speedisk	-3.80			X	-1.20		-0.54		-2.20	
Lone Pine	52	Filter	-3.80			X	-1.20		-0.54		-2.20	
Lone Pine	48	Speedisk	-3.80			X	-1.20		-0.54		-2.20	
Lone Pine	48	Filter	-3.80			X	-1.20		-0.54		-2.20	
Burial	50	Speedisk	-3.80	c	-0.73		-1.20		-0.54	d	-2.20	
Burial	50	Filter	-3.80		-0.73		-1.20		-0.54		-2.20	
Burial	50	Speedisk	-3.80	c	-0.73		-1.20		-0.54	d	-2.20	
Burial	50	Filter	-3.80		-0.73		-1.20		-0.54		-2.20	
Burial	50	Speedisk	-3.80	c	-0.73		-1.20		-0.54		-2.20	
Burial	50	Filter	-3.80		-0.73		-1.20		-0.54		-2.20	
Burial	50	Speedisk	-3.80	c	-0.73		-1.20		-0.54		-2.20	
Burial	50	Filter	-3.80		-0.73		-1.20		-0.54		-2.20	
Matcharak	50	Speedisk	-3.80	c	-84.00		-1.20		-0.54	d	-2.20	
Matcharak	50	Filter	-3.80		-84.00		-1.20		-0.54		-2.20	
Matcharak	37	Speedisk	-3.80	c	820.00	e	-1.20		-0.54		-2.20	
Matcharak	37	Filter	-3.80		-84.00		-1.20		-0.54		-2.20	
Matcharak	50	Speedisk	-3.80	c	-84.00		-1.20		-0.54		-2.20	
Matcharak	50	Filter	-3.80		-84.00		-1.20		-0.54		-2.20	
Matcharak	50	Speedisk	-3.80	c	-84.00		-1.20		-0.54		-2.20	
Matcharak	50	Filter	-3.80		-84.00		-1.20		-0.54		-2.20	

McLeod	34	Speedisk	-3.80	c	-0.73		-1.20		-0.54	d	-2.20	d
McLeod	34	Filter	-3.80		-0.73		-1.20		-0.54		-2.20	
McLeod	21	Speedisk	-3.80	c	-0.73		-1.20		-0.54	d	-2.20	
McLeod	21	Filter	-3.80		-0.73		-1.20		-0.54		-2.20	
McLeod	21	Speedisk	-3.80	c	-0.73		-1.20		-0.54	d	-2.20	
McLeod	21	Filter	-3.80		-0.73		-1.20		-0.54		-2.20	
McLeod	34	Speedisk	-3.80	c	-0.73		-1.20		-0.54	d	-2.20	
McLeod	34	Filter	-3.80		-0.73		-1.20		-0.54		-2.20	
McLeod	32	Speedisk	-3.80	c	86		-1.20		-0.54	d	-2.20	
McLeod	32	Filter	-3.80		-0.73		-1.20		-0.54		-2.20	
Wonder	50	Speedisk	-3.80	c	2400.00		-1.20		-0.54	d	-2.20	
Wonder	50	Filter	-3.80		-0.73		-1.20		-0.54		-2.20	
Wonder	50	Speedisk	-3.80	c		X	-1.20		-0.54		-2.20	
Wonder	50	Filter	-3.80		-0.73		-1.20		-0.54		-2.20	
Wonder	50	Speedisk										
Wonder	50	Filter	-3.80		-0.73		-1.20		-0.54		-2.20	
Wonder	50	Speedisk	-3.80	c		X	-1.20		-0.54	d	-2.20	
Wonder	50	Filter	-3.80		-0.73		-1.20		-0.54		-2.20	
Wonder	50	Speedisk	-3.80	c		X	-1.20		-0.54	d	-2.20	
Wonder	50	Filter	-3.80		-0.73		-1.20		-0.54		-2.20	
LP19	50	Speedisk	-3.80	d	-0.73		-1.20		-0.54		-2.20	
LP19	50	Filter	-3.80			X	-1.20		-0.54		-2.20	
LP19	50	Speedisk	-3.80	c	380.00	e	-1.20		-0.54		-2.20	
LP19	50	Filter	-3.80	c,d		X	-1.20	d	-0.54	d	-2.20	d
LP19	50	Speedisk	-3.80	c	-0.73		-1.20		-0.54		-2.20	
LP19	50	Filter	-3.80	c		X	-1.20		-0.54		-2.20	
LP19	50	Speedisk	-3.80	c	430.00	e	-1.20		-0.54		-2.20	
LP19	50	Filter	-3.80	c		X	-1.20		-0.54		-2.20	
Golden	32	Speedisk	-3.80	c	1300.00		-1.20		-0.54		-2.20	
Golden	32	Filter	-3.80	c		X	-1.20		-0.54		-2.20	
Golden	42	Speedisk	-3.80		1600.00		-1.20		-0.54		-2.20	
Golden	42	Filter	-3.80			X	-1.20		-0.54		-2.20	
Golden	50	Speedisk	-3.80	c,d	1600.00		-1.20		-0.54		-2.20	
Golden	50	Filter	-3.80	c		X	-1.20		-0.54		-2.20	

Oldman	50	Speedisk	-3.80		2500.00		-1.20		-0.54		-2.20	
Oldman	50	Filter	-3.80			X	-1.20		-0.54	d	-2.20	
Oldman	50	Speedisk	-3.80	c	570.00		-1.20		-0.54	d	-2.20	
Oldman	50	Filter	-3.80	c		X	-1.20		-0.54		-2.20	
Oldman	50	Speedisk	-3.80	c	3400.00		-1.20		-0.54	d	-2.20	
Oldman	50	Filter	-3.80	c		X	-1.20		-0.54		-2.20	
Snyder	46	Speedisk	-3.80			X	-1.20		-0.54		-2.20	
Snyder	46	Filter	-3.80	d	240.00	e	-1.20		-0.54		-2.20	
Snyder	38	Speedisk	-3.80	c	720.00	e	-1.20		-0.54		-2.20	
Snyder	38	Filter	-3.80	c	170.00	e	-1.20		-0.54		-2.20	
Snyder	43	Speedisk	-3.80	c	1000.00	e	-1.20		-0.54		-2.20	
Snyder	43	Filter	-3.80	c,d	280.00		-1.20		-0.54		-2.20	
Hoh	50	Speedisk	-3.80	c,d	520.00	e	-1.20		-0.54		-2.20	d
Hoh	50	Filter	-3.80	c		X	-1.20		-0.54		-2.20	
Hoh	50	Speedisk	-3.80	c	1300.00		-1.20		-0.54		-2.20	
Hoh	50	Filter	-3.80	c		X	-1.20		-0.54		-2.20	
Hoh	50	Speedisk	-3.80	c	370.00	e	-1.20		-0.54		-2.20	
Hoh	50	Filter	-3.80	c		X	-1.20		-0.54		-2.20	
PJ	36	Speedisk	-3.80	c	1100.00		-1.20		-0.54		-2.20	
PJ	36	Filter	-3.80	c		X	-1.20		-0.54		-2.20	
PJ	40	Speedisk	-3.80	c	4600.00		-1.20		-0.54		-2.20	
PJ	40	Filter	-3.80	c		X	-1.20		-0.54		-2.20	

Site	Volume (L)	Speedisk/ Filter	ALCLR pg/L	ALCLR FLAG	MCLR pg/L	MCLR FLAG	MTHN pg/L	MTHN FLAG	M-PTHN pg/L	M-PTHN FLAG	PTHN pg/L	PTHN FLAG
Emerald	41	Speedisk	-4.10	d	-1.30	d	-1.70	d	-1.60	d	-0.72	d
Emerald	41	Filter	-4.10	d	-1.30	d	-1.70		-1.60	d	-0.72	d
Emerald	35	Speedisk	-4.10	d	-1.30	d	-1.70	d	-1.60	d	-0.72	d
Emerald	35	Filter	-4.10	d	-1.30	d	-1.70	d	-1.60	d	-0.72	d
Emerald	25	Speedisk	-4.10	d	-1.30	d	-1.70	d	-1.60	d	-0.72	d
Emerald	25	Filter	-4.10	d	-1.30	d	-1.70	d	-1.60	d	-0.72	d
Pear	49	Speedisk	-4.10	d	-1.30	d	-1.70	d	-1.60	d	-0.72	d
Pear	49	Filter	-4.10	d	-1.30	d	-1.70	d	-1.60	d	-0.72	d

Pear	34	Speedisk	-4.10	d	-1.30	d	-1.70	d	-1.60	d	-0.72	d
Pear	34	Filter	-4.10	d	-1.30	d	-1.70	d	-1.60	d	-0.72	d
Mills	59	Speedisk	-4.10		-1.30		-1.70		-1.60		-0.72	
Mills	59	Filter	-4.10	d	-1.30	d	-1.70	d	-1.60	d	-0.72	d
Lone Pine	35	Speedisk	-4.10		-1.30		-1.70		-1.60		-0.72	
Lone Pine	35	Filter	-4.10		-1.30		-1.70		-1.60		-0.72	
Lone Pine	35	Speedisk	-4.10		-1.30		-1.70		-1.60		-0.72	
Lone Pine	35	Filter	-4.10		-1.30		-1.70		-1.60		-0.72	
Lone Pine	52	Speedisk	-4.10		-1.30		-1.70		-1.60		-0.72	
Lone Pine	52	Filter	-4.10		-1.30		-1.70		-1.60		-0.72	
Lone Pine	48	Speedisk	-4.10		-1.30		-1.70		-1.60		-0.72	
Lone Pine	48	Filter	-4.10		-1.30		-1.70		-1.60		-0.72	
Burial	50	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Burial	50	Filter	-4.10		-1.30		-1.70		-1.60		-0.72	
Burial	50	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Burial	50	Filter	-4.10		-1.30		-1.70		-1.60		-0.72	
Burial	50	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Burial	50	Filter	-4.10		-1.30		-1.70		-1.60		-0.72	
Burial	50	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Burial	50	Filter	-4.10		-1.30		-1.70		-1.60		-0.72	
Matcharak	50	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Matcharak	50	Filter	-4.10		-1.30		-1.70		-1.60		-0.72	
Matcharak	37	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Matcharak	37	Filter	-4.10		-1.30		-1.70		-1.60		-0.72	
Matcharak	50	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Matcharak	50	Filter	-4.10		-1.30		-1.70		-1.60		-0.72	
Matcharak	50	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Matcharak	50	Filter	-4.10		-1.30		-1.70		-1.60		-0.72	
McLeod	34	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
McLeod	34	Filter	-4.10		-1.30		-1.70		-1.60		-0.72	
McLeod	21	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
McLeod	21	Filter	-4.10		-1.30		-1.70		-1.60		-0.72	

McLeod	21	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
McLeod	21	Filter	-4.10		-1.30		-1.70		-1.60		-0.72	
McLeod	34	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
McLeod	34	Filter	-4.10		-1.30		-1.70		-1.60		-0.72	
McLeod	32	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
McLeod	32	Filter	-4.10		-1.30		-1.70		-1.60		-0.72	
Wonder	50	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Wonder	50	Filter	-4.10		-1.30		-1.70		-1.60		-0.72	
Wonder	50	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Wonder	50	Filter	-4.10		-1.30		-1.70		-1.60		-0.72	
Wonder	50	Speedisk										
Wonder	50	Filter	-4.10		-1.30		-1.70		-1.60		-0.72	
Wonder	50	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Wonder	50	Filter	-4.10		-1.30		-1.70		-1.60		-0.72	
Wonder	50	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Wonder	50	Filter	-4.10		-1.30		-1.70		-1.60		-0.72	
LP19	50	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60	d	-0.72	d
LP19	50	Filter	-4.10	d	-1.30	d	-1.70		-1.60	d	-0.72	d
LP19	50	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
LP19	50	Filter	-4.10	d	-1.30	d	-1.70	d	-1.60	d	-0.72	d
LP19	50	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
LP19	50	Filter	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
LP19	50	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
LP19	50	Filter	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Golden	32	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Golden	32	Filter	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Golden	42	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Golden	42	Filter	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Golden	50	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Golden	50	Filter	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Oldman	50	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60	d	-0.72	d
Oldman	50	Filter	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Oldman	50	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d

Oldman	50	Filter	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Oldman	50	Speedisk	-4.10	d	-1.30	d	-1.70	c	-1.60		-0.72	d
Oldman	50	Filter	-4.10	d	-1.30	d	-1.70	c	-1.60		-0.72	d
Snyder	46	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Snyder	46	Filter	-4.10	d	-1.30	d	-1.70		-1.60	d	-0.72	d
Snyder	38	Speedisk	-4.10	d	-1.30	d	-1.70	c	-1.60		-0.72	d
Snyder	38	Filter	-4.10	d	-1.30	d	-1.70	c	-1.60		-0.72	d
Snyder	43	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Snyder	43	Filter	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Hoh	50	Speedisk	-4.10	d	-1.30	d	-1.70	d	-1.60	d	-0.72	d
Hoh	50	Filter	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Hoh	50	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Hoh	50	Filter	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
Hoh	50	Speedisk	-4.10	d	-1.30	d	-1.70	c	-1.60		-0.72	d
Hoh	50	Filter	-4.10	d	-1.30	d	-1.70	c	-1.60		-0.72	d
PJ	36	Speedisk	-4.10	d	-1.30	d	-1.70	c	-1.60		-0.72	d
PJ	36	Filter	-4.10	d	-1.30	d	-1.70	c	-1.60		-0.72	d
PJ	40	Speedisk	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d
PJ	40	Filter	-4.10	d	-1.30	d	-1.70		-1.60		-0.72	d

Site	Volume (L)	Speedisk/ Filter	ETHN pg/L	ETHN FLAG	FLA pg/L	FLA FLAG	PYR pg/L	PYR FLAG	Retene pg/L	Retene FLAG	op-DDE pg/L	op-DDE FLAG
Emerald	41	Speedisk	-1.80	d	-0.26	d	-0.40	d	0.07	d	-1.30	d
Emerald	41	Filter	-1.80	d	-0.26		-0.40		-3.50		-1.30	
Emerald	35	Speedisk	-1.80	d	-0.26		-0.40		0.09		-1.30	
Emerald	35	Filter	-1.80	d	-0.26		-0.40		-3.50		-1.30	
Emerald	25	Speedisk	-1.80	d	-0.26	d	-0.40	d	0.36	d	-1.30	d
Emerald	25	Filter	-1.80	d	-0.26		-0.40		-3.50		-1.30	
Pear	49	Speedisk	-1.80	d	-0.26		-0.40		-3.50		-1.30	d
Pear	49	Filter	-1.80	d	-0.26		-0.40		-3.50		-1.30	
Pear	34	Speedisk	-1.80	d	-0.26	d	-0.40	d	0.53	d	-1.30	
Pear	34	Filter	-1.80	d	-0.26	d	-0.40	d	0.09	d	-1.30	
Mills	59	Speedisk	-1.80		-0.26		-0.40		0.09		-1.30	
Mills	59	Filter	-1.80	d	-0.26	d	-0.40	d	0.09	d	-1.30	

Lone Pine	35	Speedisk	-1.80		-0.26		-0.40		0.09		-1.30	
Lone Pine	35	Filter	-1.80		-0.26		-0.40		0.09		-1.30	
Lone Pine	35	Speedisk	-1.80		-0.26		-0.40		0.09		-1.30	
Lone Pine	35	Filter	-1.80		-0.26		-0.40		0.09		-1.30	
Lone Pine	52	Speedisk	-1.80		-0.26		-0.40		0.09		-1.30	
Lone Pine	52	Filter	-1.80		-0.26		-0.40		0.09		-1.30	
Lone Pine	48	Speedisk	-1.80		-0.26		-0.40		0.09		-1.30	
Lone Pine	48	Filter	-1.80		-0.26		-0.40		0.09		-1.30	
Burial	50	Speedisk	-1.80	c,d	-0.26		-0.40		-3.50		-1.30	
Burial	50	Filter	-1.80		-0.26		-0.40		-3.50		-1.30	
Burial	50	Speedisk	-1.80	c,d	-0.26		-0.40		-3.50		-1.30	
Burial	50	Filter	-1.80		-0.26		-0.40		-3.50		-1.30	
Burial	50	Speedisk	-1.80	c,d	-0.26		-0.40		-3.50		-1.30	
Burial	50	Filter	-1.80		-0.26		-0.40		-3.50		-1.30	
Burial	50	Speedisk	-1.80	c,d	-0.26		-0.40		-3.50		-1.30	
Burial	50	Filter			-0.26		-0.40		-3.50		-1.30	
Matcharak	50	Speedisk	-1.80	c,d	-0.26		-0.40		-3.50		-1.30	
Matcharak	50	Filter	-1.80		-0.26		-0.40		-3.50		-1.30	
Matcharak	37	Speedisk	-1.80	c,d	-0.26		-0.40		-3.50		-1.30	
Matcharak	37	Filter	-1.80		-0.26		-0.40		-3.50		-1.30	
Matcharak	50	Speedisk	-1.80	c,d	-0.26		-0.40		-3.50		-1.30	
Matcharak	50	Filter	-1.80		-0.26		-0.40		-3.50		-1.30	
Matcharak	50	Speedisk	-1.80	c,d	-0.26		-0.40		-3.50		-1.30	
Matcharak	50	Filter	-1.80		-0.26		-0.40		-3.50		-1.30	
McLeod	34	Speedisk	-1.80	c,d	-0.26		-0.40		-3.50		-1.30	
McLeod	34	Filter	-1.80		-0.26		-0.40		-3.50		-1.30	
McLeod	21	Speedisk	-1.80	c,d	-0.26		-0.40		-3.50		-1.30	
McLeod	21	Filter	-1.80		-0.26		-0.40		-3.50		-1.30	
McLeod	21	Speedisk	-1.80	c,d	-0.26		-0.40		-3.50		-1.30	
McLeod	21	Filter	-1.80		-0.26		-0.40		-3.50		-1.30	
McLeod	34	Speedisk	-1.80	c,d	-0.26		-0.40		-3.50		-1.30	
McLeod	34	Filter	-1.80		-0.26		-0.40		-3.50		-1.30	
McLeod	32	Speedisk	-1.80	c,d	-0.26		-0.40		390.00		-1.30	

McLeod	32	Filter	-1.80		-0.26		-0.40		-3.50		-1.30	
Wonder	50	Speedisk	-1.80	c,d	-0.26		-0.40		-3.50		-1.30	
Wonder	50	Filter	-1.80		-0.26		-0.40		-3.50		-1.30	
Wonder	50	Speedisk	-1.80	c,d	-0.26		-0.40		-3.50		-1.30	
Wonder	50	Filter	-1.80		-0.26		-0.40		-3.50		-1.30	
Wonder	50	Speedisk										
Wonder	50	Filter	-1.80		-0.26		-0.40		-3.50		-1.30	
Wonder	50	Speedisk	-1.80	c,d	-0.26		-0.40		-3.50		-1.30	
Wonder	50	Filter	-1.80		-0.26		-0.40		-3.50		-1.30	
Wonder	50	Speedisk	-1.80	c,d	-0.26		-0.40		110.00		-1.30	
Wonder	50	Filter	-1.80		-0.26		-0.40		-3.50		-1.30	
LP19	50	Speedisk	-1.80	d	-0.26		-0.40		930.00		-1.30	
LP19	50	Filter	-1.80	d	12.00		-0.40			X	-1.30	
LP19	50	Speedisk	-1.80	c,d	-0.26		-0.40		420.00		-1.30	
LP19	50	Filter	-1.80	c,d	-0.26	d	-0.40	d	-38.00	X	-1.30	
LP19	50	Speedisk	-1.80	c,d	-0.26		-0.40		1100.00		-1.30	
LP19	50	Filter	-1.80	c,d	-0.26		-0.40		530.00	e	-1.30	
LP19	50	Speedisk	-1.80	c,d	-0.26		-0.40		1400.00		-1.30	
LP19	50	Filter	-1.80	c,d	-0.26		-0.40		310.00		-1.30	
Golden	32	Speedisk	-1.80	c,d	-0.26		-0.40		920.00		-1.30	
Golden	32	Filter	-1.80	c,d	-0.26		-0.40			X	-1.30	
Golden	42	Speedisk	-1.80	c,d	-0.26		-0.40		600.00		-1.30	
Golden	42	Filter	-1.80	c,d	-0.26		-0.40		-12.00	X	-1.30	
Golden	50	Speedisk	-1.80	c,d	150.00		530.00		1900.00		-1.30	
Golden	50	Filter	-1.80	c,d	-0.26		-0.40		-15.00	X	-1.30	
Oldman	50	Speedisk	-1.80	c,d	110.00		-0.40		390.00		-1.30	
Oldman	50	Filter	-1.80	c,d	5.90	X	-0.40	d	17.00		-1.30	d
Oldman	50	Speedisk	-1.80	c,d	-0.26		-0.40		280.00		-1.30	
Oldman	50	Filter	-1.80	c,d	-0.26		-0.40		20.00	X	-1.30	
Oldman	50	Speedisk	-1.80	c,d	140.00		-0.40		340.00		-1.30	
Oldman	50	Filter	-1.80	c,d	-0.26		-0.40		35.00	X	-1.30	
Snyder	46	Speedisk	-1.80	c,d	76.00	e	-0.40		370.00		-1.30	
Snyder	46	Filter	-1.80	c,d	52.00	e	-0.40		490.00		-1.30	

Snyder	38	Speedisk	-1.80	c,d	170.00	e	-0.40		1100.00		-1.30	
Snyder	38	Filter	-1.80	c,d	-9.90		-0.40		320.00		-1.30	
Snyder	43	Speedisk	-1.80	c,d	210.00		-0.40		1400.00		-1.30	
Snyder	43	Filter	-1.80	c,d	51.00	e	-0.40		340.00		-1.30	
Hoh	50	Speedisk	-1.80	c,d	-0.26		-0.40		650.00		-1.30	
Hoh	50	Filter	-1.80	c,d	22.00		83.00		37.00		-1.30	
Hoh	50	Speedisk	-1.80	c,d	-0.26		-0.40		270.00		-1.30	
Hoh	50	Filter	-1.80	c,d	20.00		53.00		15.00		-1.30	
Hoh	50	Speedisk	-1.80	c,d	-0.26		-0.40		370.00		-1.30	
Hoh	50	Filter	-1.80	c,d	-0.26		45.00		14.00		-1.30	
PJ	36	Speedisk	-1.80	c,d	-0.26		-0.40		700.00		-1.30	
PJ	36	Filter	-1.80	c,d	-0.26		-0.40		670.00		-1.30	
PJ	40	Speedisk	-1.80	c,d	-0.26		-0.40		2400.00		-1.30	
PJ	40	Filter	-1.80	c,d	-0.26		-0.40		700.00		-1.30	

Site	Volume (L)	Speedisk/ Filter	pp-DDE pg/L	pp-DDE FLAG	op-DDD pg/L	op-DDD FLAG	pp-DDD pg/L	pp-DDD FLAG	op-DDT pg/L	op-DDT FLAG	pp-DDT pg/L	pp-DDT FLAG
Emerald	41	Speedisk	-1.10	d	-1.30	d	-2.70	d	-1.50	d	-2.10	d
Emerald	41	Filter	-1.10		-1.30		-2.70		-1.50	d	-2.10	d
Emerald	35	Speedisk	-1.10		-1.30		-2.70		-1.50		-2.10	
Emerald	35	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
Emerald	25	Speedisk	-1.10	d	-1.30	d	-2.70	d	-1.50	d	-2.10	d
Emerald	25	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
Pear	49	Speedisk	-1.10	d	-1.30	d	-2.70	d	-1.50	d	-2.10	d
Pear	49	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
Pear	34	Speedisk	-1.10		-1.30		-2.70		-1.50		-2.10	
Pear	34	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
Mills	59	Speedisk	-1.10		-1.30		-2.70		-1.50		-2.10	
Mills	59	Filter	-1.10		-1.30		-2.70		-1.50	d	-2.10	d
Lone Pine	35	Speedisk	-1.10		-1.30		-2.70		-1.50		-2.10	
Lone Pine	35	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
Lone Pine	35	Speedisk	-1.10		-1.30		-2.70		-1.50		-2.10	
Lone Pine	35	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
Lone Pine	52	Speedisk	-1.10		-1.30		-2.70		-1.50		-2.10	

Lone Pine	52	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
Lone Pine	48	Speedisk	-1.10		-1.30		-2.70		-1.50		-2.10	
Lone Pine	48	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
Burial	50	Speedisk	-1.10		-1.30		-2.70	c	-1.50		-2.10	
Burial	50	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
Burial	50	Speedisk	-1.10		-1.30		-2.70	c	-1.50		-2.10	
Burial	50	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
Burial	50	Speedisk	-1.10		-1.30		-2.70		-1.50		-2.10	
Burial	50	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
Burial	50	Speedisk	-1.10		-1.30		-2.70	c	-1.50		-2.10	
Burial	50	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
Matcharak	50	Speedisk	-1.10		-1.30		-2.70	c	-1.50		-2.10	
Matcharak	50	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
Matcharak	37	Speedisk	-1.10		-1.30		-2.70	c	-1.50		-2.10	
Matcharak	37	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
Matcharak	50	Speedisk	-1.10		-1.30		-2.70	c	-1.50		-2.10	
Matcharak	50	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
Matcharak	50	Speedisk	-1.10		-1.30		-2.70	c	-1.50		-2.10	
Matcharak	50	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
McLeod	34	Speedisk	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
McLeod	34	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
McLeod	21	Speedisk	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
McLeod	21	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
McLeod	21	Speedisk	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
McLeod	21	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
McLeod	34	Speedisk	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
McLeod	34	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
McLeod	32	Speedisk	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
McLeod	32	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
Wonder	50	Speedisk	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
Wonder	50	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
Wonder	50	Speedisk	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	

Wonder	50	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
Wonder	50	Speedisk										
Wonder	50	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
Wonder	50	Speedisk	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
Wonder	50	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
Wonder	50	Speedisk	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
Wonder	50	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
LP19	50	Speedisk	-1.10		-1.30		-2.70		-1.50		-2.10	
LP19	50	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
LP19	50	Speedisk	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
LP19	50	Filter	-1.10		-1.30		-2.70	c	-1.50	c,d	-2.10	d
LP19	50	Speedisk	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
LP19	50	Filter	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
LP19	50	Speedisk	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
LP19	50	Filter	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
Golden	32	Speedisk	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
Golden	32	Filter	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
Golden	42	Speedisk	-1.10		-1.30		-2.70		-1.50	d	-2.10	d
Golden	42	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
Golden	50	Speedisk	-1.10		-1.30		-2.70	c	-1.50	c,d	-2.10	d
Golden	50	Filter	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
Oldman	50	Speedisk	-1.10		-1.30		-2.70		-1.50		-2.10	
Oldman	50	Filter	-1.10	d	-1.30	d	-2.70	d	-1.50		-2.10	
Oldman	50	Speedisk	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
Oldman	50	Filter	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
Oldman	50	Speedisk	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
Oldman	50	Filter	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
Snyder	46	Speedisk	-1.10		-1.30		-2.70		-1.50		-2.10	
Snyder	46	Filter	-1.10		-1.30		-2.70		-1.50		-2.10	
Snyder	38	Speedisk	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
Snyder	38	Filter	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
Snyder	43	Speedisk	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
Snyder	43	Filter	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	

Hoh	50	Speedisk	-1.10		-1.30		-2.70		-1.50	c,d	-2.10	d
Hoh	50	Filter	-1.10		-1.30		-2.70		-1.50	c	-2.10	
Hoh	50	Speedisk	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
Hoh	50	Filter	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
Hoh	50	Speedisk	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
Hoh	50	Filter	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
PJ	36	Speedisk	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
PJ	36	Filter	-1.10		-1.30		-2.70	c	-1.50	c	-2.10	
PJ	40	Speedisk	-1.10		-1.30		-2.70		-1.50	c	-2.10	
PJ	40	Filter	-1.10		-1.30		-2.70		-1.50	c	-2.10	

Site	Volume (L)	Speedisk/ Filter	MXCLR pg/L	MXCLR FLAG	B[a]A pg/L	B[a]A FLAGv	CHR/TRI pg/L	CHR/TRI FLAG	B[b]F pg/L	B[b]F FLAG	B[k]F pg/L	B[k]F FLAG
Emerald	41	Speedisk	-1.10	d	-1.10		-0.35		-0.53	d	-0.38	d
Emerald	41	Filter	-1.10	d	-1.10		-0.35		-0.53		-0.38	
Emerald	35	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
Emerald	35	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
Emerald	25	Speedisk	-1.10	d	-1.10		-0.35		-0.53	d	-0.38	d
Emerald	25	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
Pear	49	Speedisk	-1.10	d	-1.10		-0.35		-0.53		-0.38	
Pear	49	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
Pear	34	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
Pear	34	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
Mills	59	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
Mills	59	Filter	-1.10	d	-1.10		-0.35		-0.53	d	-0.38	d
Lone Pine	35	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
Lone Pine	35	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
Lone Pine	35	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
Lone Pine	35	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
Lone Pine	52	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
Lone Pine	52	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
Lone Pine	48	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
Lone Pine	48	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
Burial	50	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	

Burial	50	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
Burial	50	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
Burial	50	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
Burial	50	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
Burial	50	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
Burial	50	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
Burial	50	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
Matcharak	50	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
Matcharak	50	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
Matcharak	37	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
Matcharak	37	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
Matcharak	50	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
Matcharak	50	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
Matcharak	50	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
Matcharak	50	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
McLeod	34	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
McLeod	34	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
McLeod	21	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
McLeod	21	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
McLeod	21	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
McLeod	21	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
McLeod	34	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
McLeod	34	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
McLeod	32	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
McLeod	32	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
Wonder	50	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
Wonder	50	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
Wonder	50	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
Wonder	50	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
Wonder	50	Speedisk										
Wonder	50	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
Wonder	50	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
Wonder	50	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	

Wonder	50	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
Wonder	50	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
LP19	50	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
LP19	50	Filter	-1.10		-1.10		-0.35		75.00		-0.38	
LP19	50	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
LP19	50	Filter	-1.10	d	-1.10		-0.35		-0.53		-0.38	
LP19	50	Speedisk	-1.10		-1.10	c	-0.35		-0.53		-0.38	
LP19	50	Filter	-1.10		-1.10	c	-0.35		-0.53		-0.38	
LP19	50	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
LP19	50	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
Golden	32	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
Golden	32	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
Golden	42	Speedisk	-1.10	d	-1.10		-0.35		-0.53		-0.38	
Golden	42	Filter	-1.10		17.00		-0.35		-0.53		-0.38	
Golden	50	Speedisk	-1.10	d	-1.10	c	-0.35		-0.53		-0.38	
Golden	50	Filter	-1.10		-1.10	c	-0.35		-0.53		-0.38	
Oldman	50	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
Oldman	50	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
Oldman	50	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
Oldman	50	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
Oldman	50	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
Oldman	50	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
Snyder	46	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
Snyder	46	Filter	-1.10		24.00		25.00		-0.53		-0.38	
Snyder	38	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
Snyder	38	Filter	-1.10		17.00		20.00		-0.53		-0.38	
Snyder	43	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
Snyder	43	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
Hoh	50	Speedisk	-1.10	c,d	-1.10		-0.35		-0.53		-0.38	
Hoh	50	Filter	-1.10	c	-1.10		-0.35		-0.53		-0.38	
Hoh	50	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
Hoh	50	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
Hoh	50	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	

Hoh	50	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
PJ	36	Speedisk	-1.10		-1.10		-0.35		-0.53		-0.38	
PJ	36	Filter	-1.10		-1.10		-0.35		-0.53		-0.38	
PJ	40	Speedisk	-1.10	c	-1.10		-0.35		-0.53		-0.38	
PJ	40	Filter	-1.10	c	-1.10		-0.35		-0.53		-0.38	

Site	Volume (L)	Speedisk/ Filter	B[e]P pg/L	B[e]P FLAG	B[a]P pg/L	B[a]P FLAG	I[1,2,3-cd]p pg/L	I[1,2,3-cd]p FLAG	D[ah]A pg/L	D[ah]A FLAG	B[ghi]P pg/L	B[ghi]P FLAG
Emerald	41	Speedisk	-0.41	d	-0.36	d	-1.00	d	-1.30	d	-0.54	d
Emerald	41	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Emerald	35	Speedisk	-0.41		-0.36		-1.00		-1.30		-0.54	
Emerald	35	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Emerald	25	Speedisk	-0.41	d	-0.36	d	-1.00	d	-1.30	d	-0.54	d
Emerald	25	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Pear	49	Speedisk	-0.41		-0.36		-1.00		-1.30		-0.54	
Pear	49	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Pear	34	Speedisk	-0.41		-0.36		-1.00		-1.30		-0.54	
Pear	34	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Mills	59	Speedisk	-0.41		-0.36		-1.00		-1.30		-0.54	
Mills	59	Filter	-0.41	d	-0.36	d	-1.00	d	-1.30	d	-0.54	d
Lone Pine	35	Speedisk	-0.41		-0.36		-1.00		-1.30		-0.54	
Lone Pine	35	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Lone Pine	35	Speedisk	-0.41		-0.36		-1.00		-1.30		-0.54	
Lone Pine	35	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Lone Pine	52	Speedisk	-0.41		-0.36		-1.00		-1.30		-0.54	
Lone Pine	52	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Lone Pine	48	Speedisk	-0.41		-0.36		-1.00		-1.30		-0.54	
Lone Pine	48	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Burial	50	Speedisk	-0.41		-0.36	d	-1.00		-1.30		-0.54	
Burial	50	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Burial	50	Speedisk	-0.41		-0.36		-1.00		-1.30		-0.54	
Burial	50	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Burial	50	Speedisk	-0.41		-0.36		-1.00		-1.30		-0.54	

Burial	50	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Burial	50	Speedisk	-0.41		-0.36	d	-1.00		-1.30		-0.54	
Burial	50	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Matcharak	50	Speedisk	-0.41		-0.36	d	-1.00		-1.30		-0.54	
Matcharak	50	Filter	-0.41		-0.36		-1.00				-0.54	
Matcharak	37	Speedisk	-0.41		-0.36		-1.00		-1.30		-0.54	
Matcharak	37	Filter	-0.41		-0.36		-1.00				-0.54	
Matcharak	50	Speedisk	-0.41		-0.36		-1.00		-1.30		-0.54	
Matcharak	50	Filter	-0.41		-0.36		-1.00				-0.54	
Matcharak	50	Speedisk	-0.41		-0.36		-1.00		-1.30		-0.54	
Matcharak	50	Filter	-0.41		-0.36		-1.00				-0.54	
McLeod	34	Speedisk	-0.41		-0.36	d	-1.00		-1.30		-0.54	
McLeod	34	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
McLeod	21	Speedisk	-0.41		-0.36	d	-1.00		-1.30		-0.54	
McLeod	21	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
McLeod	21	Speedisk	-0.41		-0.36	d	-1.00		-1.30		-0.54	
McLeod	21	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
McLeod	34	Speedisk	-0.41		-0.36	d	-1.00		-1.30		-0.54	
McLeod	34	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
McLeod	32	Speedisk	-0.41		-0.36	d	-1.00		-1.30		-0.54	
McLeod	32	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Wonder	50	Speedisk	-0.41		-0.36	d	-1.00		-1.30		-0.54	
Wonder	50	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Wonder	50	Speedisk	-0.41		-0.36	d	-1.00		-1.30		-0.54	
Wonder	50	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Wonder	50	Speedisk										
Wonder	50	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Wonder	50	Speedisk	-0.41		-0.36	d	-1.00		-1.30		-0.54	
Wonder	50	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Wonder	50	Speedisk	-0.41		-0.36	d	-1.00		-1.30		-0.54	
Wonder	50	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
LP19	50	Speedisk	-0.41		-0.36		-1.00		-1.30		-0.54	

LP19	50	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
LP19	50	Speedisk	-0.41		-0.36	d	-1.00		-1.30		-0.54	
LP19	50	Filter	-0.41		-0.36		-1.00	d	-1.30	d	-0.54	d
LP19	50	Speedisk	-0.41		-0.36		-1.00		-1.30		-0.54	
LP19	50	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
LP19	50	Speedisk	-0.41		-0.36		-1.00		-1.30		-0.54	
LP19	50	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Golden	32	Speedisk	-0.41		-0.36		-1.00		-1.30		-0.54	
Golden	32	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Golden	42	Speedisk	-0.41		-0.36	d	-1.00		-1.30		-0.54	
Golden	42	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Golden	50	Speedisk	-0.41		-0.36	d	-1.00		-1.30		-0.54	
Golden	50	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Oldman	50	Speedisk	-0.41		-0.36		-1.00		-1.30		-0.54	
Oldman	50	Filter	-0.41		-0.36	d	-1.00		-1.30		-0.54	
Oldman	50	Speedisk	-0.41		-0.36	d	-1.00		-1.30		-0.54	
Oldman	50	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Oldman	50	Speedisk	-0.41		-0.36		-1.00		-1.30		-0.54	
Oldman	50	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Snyder	46	Speedisk	-0.41		-0.36	d	-1.00		-1.30		-0.54	
Snyder	46	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Snyder	38	Speedisk	-0.41		-0.36		-1.00		-1.30		-0.54	
Snyder	38	Filter	-0.41		-0.36		28.00		-1.30		-0.54	
Snyder	43	Speedisk	-0.41		-0.36		-1.00		-1.30		-0.54	
Snyder	43	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Hoh	50	Speedisk	-0.41		-0.36	d	-1.00	d	-1.30	d	-0.54	d
Hoh	50	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Hoh	50	Speedisk	-0.41		-0.36		-1.00		-1.30		-0.54	
Hoh	50	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
Hoh	50	Speedisk	-0.41		-0.36		-1.00		-1.30		-0.54	
Hoh	50	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
PJ	36	Speedisk	-0.41		-0.36		-1.00		-1.30		-0.54	
PJ	36	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	
PJ	40	Speedisk	-0.41		-0.36		-1.00		-1.30		-0.54	
PJ	40	Filter	-0.41		-0.36		-1.00		-1.30		-0.54	

Appendix D: Sediment SOC Database

Site	Average Year (y)	Average Depth (cm)	TFLN pg/g dw	TFLN pg/g TOC	TFLN Flux pg/cm2.y	TFLN Flux (FF) pg/cm2.y	TFLN FLAG	HCB pg/g dw	HCB pg/g TOC	HCB Flux pg/cm2.y	HCB Flux (FF) pg/cm2.y	HCB FLAG
Mills	2002	0.25	40	250	1.2	0.79	e					X
Mills	2000	0.75	85	60000	2.5	1.7						X
Mills	1996	1.75	39	27000	1.1	0.74	e					X
Mills	1991	2.75	53	41000	1.3	0.86						X
Mills	1988	3.25	56	46000	1.1	0.75	e					X
Mills	1974	4.75	31	29000	0.59	0.4						X
Mills	1970	5.25	47	42000	1.1	0.76	e	66	600	1.6	1.1	
Mills	1964	6.25	24	20000	0.78	0.52						X
Mills	1954	7.75					X					X
Mills	1947	8.75					X					X
Mills	1938	9.75	20	18000	0.44	0.29	a					X
Mills	1905	17.5	-0.23	-190	-0.005	-0.003		-0.14	-1.2	-0.003	-0.002	
Lone Pine	2001	0.25	49	350	0.73	0.39						X
Lone Pine	1998	0.75					X					X
Lone Pine	1990	1.75					X					X
Lone Pine	1986	2.25					X					X
Lone Pine	1982	2.75					X					X
Lone Pine	1973	3.75					X					X
Lone Pine	1967	4.25					X					X
Lone Pine	1961	4.75					X					X
Lone Pine	1955	5.25					X					X
Lone Pine	1949	5.75					X					X
Lone Pine	1936	6.75					X					X
Lone Pine	1920	7.75					X					X
Lone Pine	1870	11.5					X					X
Pear	2002	0.25	150	970	1.8	0.81	e	5600	37000	68	31	d
Pear	2000	0.75					X	140	1100	1.7	0.77	e
Pear	1997	1.25					X	190	1300	2.3	1	e
Pear	1991	2.25					X	230	1700	2.7	1.2	e

Pear	1980	3.75					X	210	1400	2.3	1	d
Pear	1969	5.25					X	340	2600	3.7	1.7	
Pear	1961	6.25	110	810	1.6	0.7	de	480	3500	6.8	3.1	e
Pear	1957	6.75					X	88	760	1.2	0.55	e
Pear	1926	10.5					X					X
Pear	1872	14.5					Z					Z
Emerald	2002	0.25					X					X
Emerald	1997	1.75					X					X
Emerald	1989	3.75					X					X
Emerald	1980	5.75					X					X
Emerald	1971.5	7.75					X					X
Emerald	1961.5	9.75	35	340	1.6	0.43	e					X
Emerald	1958	10.5	22	280	1	0.27	e					X
Emerald	1892	21.5					Z					X
Burial	2000	0.25	1.1	1600	0.004	0.001	e	19	28000	0.075	0.024	d,e
Burial	1988	0.75					X	16	27000	0.066	0.021	e
Burial	1974	1.25					X					X
Burial	1957	1.75	0.82	1500	0.003	0.001	e					X
Burial	1933	2.25	0.64	1300	0.002	0.001	a,e					X
Burial	1906	2.75	1	2000	0.003	0.001	e					X
Burial	1879	3.25	0.67	1300	0.002	0.001	e					X
Mcleod	2002	0.25					X,d					X,d
Mcleod	1997	0.75					X					X
Mcleod	1990	1.25					X					X
Mcleod	1982	1.75					X					X
Mcleod	1975	2.25					X					X
Mcleod	1969	2.75	61	680	0.68	0.26	e					X
Mcleod	1962	3.25	42	440	0.34	0.13	e					X
Mcleod	1952	3.75					X					X
Mcleod	1907	6.25					X					X
Matcharak	2001	0.25	120		0.49	0.39	e					X,d
Matcharak	1993	0.75					X					X

Matcharak	1983	1.25					X					X
Matcharak	1971	1.75					X					X
Matcharak	1954	2.25					X					X
Matcharak	1937	2.75					X					X
Matcharak	1910	3.25					X					X
Wonder	2000	0.25	28	390	0.21	0.059	a	380	5300	2.8	0.8	e
Wonder	1992	0.75	33	470	0.25	0.072	a	340	4700	2.5	0.73	e
Wonder	1985	1.25	36	560	0.26	0.075	a	350	5500	2.6	0.73	e
Wonder	1977	1.75	50	850	0.33	0.095		470	7900	3.1	0.89	e
Wonder	1968	2.25	52	870	0.25	0.071		350	5800	1.7	0.47	e
Wonder	1949	2.75	87	1400	0.28	0.08		330	5400	1	0.3	e
Wonder	1919	3.25	-0.68	-13	-0.002	-0.00045						X
Golden	2002.5	0.25					X					X
Golden	1996.5	0.75					X					X
Golden	1989.5	1.25					X	1300	7600	4.8	4.8	e
Golden	1981.5	1.75					X					X
Golden	1972.5	2.25					X	1500	6400	4.6	4.6	e
Golden	1962.5	2.75					X					X
Golden	1951	3.25					X					X
Golden	1924	4.25					X					X
LP 19	2004	0.25					X					X
LP 19	1999	1.25					X					X
LP 19	1994	2.25					X					X
LP 19	1989	3.25					X					X
LP 19	1980	4.25					X					X
LP 19	1969	5.25					X					X
LP 19	1956	6.25					X					X
LP 19	1903	10.5					X					X
Hoh	2004	0.25					X					X
Hoh	1998	1.25					X					X
Hoh	1990.5	2.25					X					X
Hoh	1983	3.25					X					X

Site	Average Year (y)	Average Depth (cm)	a-HCH pg/g dw	a-HCH pg/g TOC	a-HCH Flux pg/cm2.y	a-HCH Flux (FF) pg/cm2.y	a-HCH FLAG	b-HCH pg/g dw	b-HCH pg/g TOC	b-HCH Flux pg/cm2.y	b-HCH Flux (FF) pg/cm2.y	b-HCH FLAG
Hoh	1973.5	4.25					X					X
Hoh	1963	5.25					X					X
Hoh	1952.5	6.25					X					X
Hoh	1901	12.75					X					X
PJ	2004.5	0.25					X					X
PJ	1999	2.75					X					X
PJ	1992	4.75					X					X
PJ	1984	6.75					X					X
PJ	1977.5	8.75					X					X
PJ	1968	11.5					X	-0.23		-0.007	-0.009	e
PJ	1963	12.5					X					X
PJ	1955	15.5					X					X
Oldman	2003.5	0.25	23	440	1.3	0.28	e	120	2300	6.6	1.5	e
Oldman	1997	1.25	40	810	1.7	0.38		130	2700	5.7	1.3	e
Oldman	1987	2.25	15	290	0.4	0.088	a	220	4100	5.7	1.3	e
Oldman	1980.5	2.75	21	410	0.47	0.1	d	140	2800	3.2	0.7	e
Oldman	1973	3.25	12	260	0.26	0.057	a	170	3600	3.5	0.77	e
Oldman	1963.5	3.75	13	290	0.23	0.05	a	110	2400	1.9	0.42	e
Oldman	1952	4.25	12	290	0.19	0.043	a	95	2200	1.5	0.33	e
Oldman	1906.5	6.25	12	350	0.22	0.048						X
Snyder	2004	0.25					X					X
Snyder	2000	1.25					X	180	1400	3.2	2.3	e
Snyder	1991.5	2.75					X					X
Snyder	1985	3.75					X					X
Snyder	1978	4.75					X					X
Snyder	1967.5	5.75					X					X
Snyder	1954.5	6.75					X					X
Snyder	1893	11.75	18	200	0.14	0.1	e					X

Mills	2002	0.25	340	2100	9.7	6.6		-110	-670	-3.1	-2.1	
Mills	2000	0.75	220	1500	6.3	4.3		-140	-980	-4	-2.7	
Mills	1996	1.75	-73	-490	-2	-1.4		-96	-650	-2.7	-1.8	
Mills	1991	2.75	360	2700	8.6	5.8		-92	-700	-2.2	-1.5	
Mills	1988	3.25	300	2500	6	4		-87	-710	-1.7	-1.2	
Mills	1974	4.75	490	4500	9.2	6.2		-86	-790	-1.6	-1.1	
Mills	1970	5.25	290	2600	7	4.7		-68	-620	-1.6	-1.1	
Mills	1964	6.25	230	1900	7.3	4.9		-67	-550	-2.2	-1.5	
Mills	1954	7.75	120	1000	3.6	2.4		-64	-570	-2	-1.3	
Mills	1947	8.75	53	460	1.3	0.89		-66	-580	-1.6	-1.1	
Mills	1938	9.75	-40	-370	-0.88	-0.59		-53	-480	-1.2	-0.78	
Mills	1905	17.5	-18	-150	-0.4	-0.27		-24	-200	-0.53	-0.36	
Lone Pine	2001	0.25	210	1500	3.2	1.7		-84	-610	-1.3	-0.68	
Lone Pine	1998	0.75	150	1100	2.4	1.3		-76	-590	-1.2	-0.65	
Lone Pine	1990	1.75	240	2000	4	2.1		-84	-720	-1.4	-0.77	
Lone Pine	1986	2.25	180	1500	3.1	1.6		-79	-650	-1.3	-0.72	
Lone Pine	1982	2.75	220	1600	3.7	2		-85	-610	-1.5	-0.78	
Lone Pine	1973	3.75	180	1300	2.7	1.4		-94	-680	-1.4	-0.75	
Lone Pine	1967	4.25	210	1500	3.2	1.7		-110	-760	-1.6	-0.84	
Lone Pine	1961	4.75	200	1700	2.8	1.5		-74	-650	-1	-0.56	
Lone Pine	1955	5.25	140	1300	1.9	1		-76	-670	-0.99	-0.53	
Lone Pine	1949	5.75	150	1300	1.9	1		-70	-620	-0.91	-0.49	
Lone Pine	1936	6.75	140	1200	1.6	0.87		-84	-750	-1	-0.54	
Lone Pine	1920	7.75	-50	-460	-0.6	-0.32		-65	-610	-0.79	-0.42	
Lone Pine	1870	11.5	-21	-180	-0.25	-0.13		-27	-240	-0.33	-0.18	
Pear	2002	0.25	-180	-1200	-2.1	-0.95		-230	-1500	-2.8	-1.3	
Pear	2000	0.75	-130	-980	-1.6	-0.72		-180	-1300	-2.1	-0.95	
Pear	1997	1.25	-140	-910	-1.6	-0.74		-180	-1200	-2.2	-0.98	
Pear	1991	2.25	-150	-1200	-1.9	-0.84	d	-200	-1500	-2.5	-1.1	d
Pear	1980	3.75	-120	-820	-1.3	-0.6	d	-160	-1100	-1.8	-0.79	d
Pear	1969	5.25	-110	-840	-1.2	-0.55	d	-150	-1100	-1.6	-0.73	d
Pear	1961	6.25	-120	-850	-1.6	-0.73		-150	-1100	-2.2	-0.97	
Pear	1957	6.75	-85	-730	-1.2	-0.54	d	-110	-970	-1.6	-0.71	d
Pear	1926	10.5	-78	-690	-0.62	-0.28		-100	-910	-0.82	-0.37	

Pear	1872	14.5	-37	-330	-0.22	-0.099		-48	-430	-0.29	-0.13	
Emerald	2002	0.25	-68	-770	-3.1	-0.83		-89	-1000	-4.1	-1.1	
Emerald	1997	1.75	-43	-470	-2	-0.52		-56	-630	-2.6	-0.69	
Emerald	1989	3.75	-39	-410	-1.8	-0.48		-52	-540	-2.4	-0.64	
Emerald	1980	5.75	-44	-480	-2	-0.55		-59	-630	-2.7	-0.72	
Emerald	1971.5	7.75	92	1100	4.2	1.1		-62	-720	-2.8	-0.76	
Emerald	1961.5	9.75	89	860	4.1	1.1		-43	-420	-2	-0.53	
Emerald	1958	10.5	130	1600	5.9	1.6	d	-20	-250	-0.92	-0.25	d
Emerald	1892	21.5	-9.3	-110	-0.53	-0.14		-12	-150	-0.7	-0.19	
Burial	2000	0.25	-2.1	-3200	-0.008	-0.003		-2.8	-4200	-0.011	-0.004	
Burial	1988	0.75	-1.5	-2600	-0.006	-0.002		-2	-3400	-0.008	-0.003	
Burial	1974	1.25	-2.1	-3700	-0.01	-0.003		-2.8	-4800	-0.013	-0.004	
Burial	1957	1.75	3.9	7200	0.013	0.004		-2.2	-4100	-0.007	-0.002	
Burial	1933	2.25	-1.7	-3400	-0.005	-0.002		-2.3	-4500	-0.007	-0.002	
Burial	1906	2.75	-1.7	-3400	-0.005	-0.002		-2.3	-4500	-0.007	-0.002	
Burial	1879	3.25	-1.5	-2800	-0.005	-0.001		-2	-3700	-0.006	-0.002	
Mcleod	2002	0.25	-330	-2700	-1.7	-0.64		-430	-3600	-2.2	-0.85	
Mcleod	1997	0.75	-150	-1300	-0.82	-0.32		-190	-1700	-1.1	-0.42	
Mcleod	1990	1.25	-93	-940	-0.6	-0.23		-120	-1200	-0.79	-0.3	
Mcleod	1982	1.75	-83	-900	-0.67	-0.26		-110	-1200	-0.89	-0.34	
Mcleod	1975	2.25	-85	-940	-0.88	-0.34		-110	-1200	-1.2	-0.45	
Mcleod	1969	2.75	-75	-840	-0.84	-0.32		-99	-1100	-1.1	-0.43	
Mcleod	1962	3.25	-72	-760	-0.58	-0.22		-95	-1000	-0.77	-0.3	
Mcleod	1952	3.75	-76	-840	-0.48	-0.18		-100	-1100	-0.63	-0.24	
Mcleod	1907	6.25	-97	-890	-0.55	-0.21		-130	-1200	-0.73	-0.28	
Matcharak	2001	0.25	-260		-1.1	-0.86		-350		-1.4	-1.1	
Matcharak	1993	0.75	-170	-1300	-0.75	-0.6		-220	-1700	-0.99	-0.79	
Matcharak	1983	1.25	-140	-1100	-0.58	-0.47		-180	-1500	-0.77	-0.62	
Matcharak	1971	1.75	-130	-1100	-0.44	-0.35		-180	-1500	-0.58	-0.47	
Matcharak	1954	2.25	-120	-1100	-0.31	-0.25		-160	-1500	-0.41	-0.33	
Matcharak	1937	2.75	-120	-1100	-0.25	-0.2		-150	-1500	-0.33	-0.26	
Matcharak	1910	3.25	-100	-1000	-0.21	-0.17		-140	-1300	-0.27	-0.22	

Wonder	2000	0.25	-80	-1100	-0.59	-0.17		-110	-1500	-0.78	-0.22	
Wonder	1992	0.75	-95	-1300	-0.71	-0.2		-130	-1700	-0.94	-0.27	
Wonder	1985	1.25	-73	-1100	-0.53	-0.15		-96	-1500	-0.69	-0.2	
Wonder	1977	1.75	-68	-1100	-0.45	-0.13		-89	-1500	-0.59	-0.17	
Wonder	1968	2.25	-77	-1300	-0.36	-0.1		-100	-1700	-0.48	-0.14	
Wonder	1949	2.75	-94	-1600	-0.3	-0.086		-120	-2000	-0.4	-0.11	
Wonder	1919	3.25	-53	-1000	-0.12	-0.035		-70	-1300	-0.16	-0.046	
Golden	2002.5	0.25	-420		-0.57	-0.57		-560		-0.75	-0.75	
Golden	1996.5	0.75	-290		-0.89	-0.89		-380		-1.2	-1.2	
Golden	1989.5	1.25	410	2400	1.5	1.5		-220	-1300	-0.81	-0.81	
Golden	1981.5	1.75	800	4800	2.9	2.9		-260	-1500	-0.93	-0.93	
Golden	1972.5	2.25	870	3600	2.6	2.6		-250	-1000	-0.73	-0.73	
Golden	1962.5	2.75	630	2600	1.5	1.5		-270	-1100	-0.67	-0.67	
Golden	1951	3.25	-200	-770	-0.42	-0.42		-260	-1000	-0.56	-0.56	
Golden	1924	4.25	-190	-730	-0.32	-0.32		-250	-960	-0.42	-0.42	
LP 19	2004	0.25	-340	-1900	-3.8	-2.5		-450	-2500	-5	-3.3	
LP 19	1999	1.25	-180		-1.8	-1.2		-240		-2.3	-1.5	
LP 19	1994	2.25	320	1700	3.5	2.3		-190	-1000	-2.1	-1.4	
LP 19	1989	3.25	340	1900	2.9	1.9		-220	-1200	-1.9	-1.3	
LP 19	1980	4.25	310	1700	1.9	1.3		-220	-1200	-1.3	-0.89	
LP 19	1969	5.25	290	1600	1.5	1		-200	-1100	-1	-0.7	
LP 19	1956	6.25	280	1500	1.2	0.78		-190	-1000	-0.81	-0.54	
LP 19	1903	10.5	-82	-480	-0.51	-0.34		-110	-630	-0.67	-0.45	
Hoh	2004	0.25	-110	-550	-1.5	-0.47		-150	-730	-1.9	-0.62	
Hoh	1998	1.25	-180	-1000	-1.6	-0.53	d	-240	-1300	-2.2	-0.7	d
Hoh	1990.5	2.25	-130	-940	-1.5	-0.47	d	-180	-1200	-1.9	-0.62	d
Hoh	1983	3.25	-85	-810	-1.2	-0.4	d	-110	-1100	-1.6	-0.52	d
Hoh	1973.5	4.25	170	1800	2.5	0.8		-98	-1100	-1.5	-0.47	
Hoh	1963	5.25	170	1600	2.3	0.73		-99	-970	-1.3	-0.43	
Hoh	1952.5	6.25	120	1400	2.4	0.76		-75	-860	-1.5	-0.47	
Hoh	1901	12.75	92	1100	1.9	0.62		-22	-260	-0.45	-0.15	

PJ	2004.5	0.25	-270	-1700	-7.4	-9.5		-350	-2200	-9.8	-13	
PJ	1999	2.75					X	-200	-1200	-5.4	-7	
PJ	1992	4.75					X	-190	-1200	-4.7	-6	
PJ	1984	6.75					X	-100	-650	-3.3	-4.2	
PJ	1977.5	8.75					X	-100	-690	-5.7	-7.3	
PJ	1968	11.5					X	-39		-1.1	-1.5	
PJ	1963	12.5					X	-38	-260	-1.6	-2	
PJ	1955	15.5					X	-31	-210	-3	-3.9	
Oldman	2003.5	0.25	96	1800	5.3	1.2		-45	-850	-2.5	-0.55	
Oldman	1997	1.25	83	1700	3.6	0.78		-49	-970	-2.1	-0.46	
Oldman	1987	2.25	240	4500	6.3	1.4		-45	-830	-1.2	-0.26	
Oldman	1980.5	2.75	170	3300	3.8	0.83		-40	-790	-0.91	-0.2	
Oldman	1973	3.25	120	2600	2.5	0.56		-36	-760	-0.75	-0.17	
Oldman	1963.5	3.75	140	3200	2.5	0.56		-39	-870	-0.7	-0.15	
Oldman	1952	4.25	100	2400	1.6	0.36		-34	-800	-0.54	-0.12	
Oldman	1906.5	6.25	-22	-650	-0.41	-0.09		-29	-850	-0.54	-0.12	
Snyder	2004	0.25	-190	-1500	-4	-2.9		-250	-1900	-5.3	-3.9	
Snyder	2000	1.25	-120	-1000	-2.2	-1.6		-160	-1300	-2.9	-2.1	
Snyder	1991.5	2.75	-110	-990	-1.7	-1.2		-150	-1300	-2.3	-1.6	
Snyder	1985	3.75	-110	-1000	-1.6	-1.2		-140	-1400	-2.1	-1.5	
Snyder	1978	4.75	-97	-990	-1.4	-0.99		-130	-1300	-1.8	-1.3	
Snyder	1967.5	5.75	-84	-900	-1.1	-0.8		-110	-1200	-1.4	-1.1	
Snyder	1954.5	6.75	170	1700	1.9	1.4		-110	-1100	-1.2	-0.9	
Snyder	1893	11.75	-36	-410	-0.29	-0.21		-47	-540	-0.38	-0.28	

Site	Average Year (y)	Average Depth (cm)	g-HCH pg/g dw	g-HCH pg/g TOC	g-HCH Flux pg/cm2.y	g-HCH Flux (FF) pg/cm2.y	g-HCH FLAG	d-HCH pg/g dw	d-HCH pg/g TOC	d-HCH Flux pg/cm2.y	d-HCH Flux (FF) pg/cm2.y	d-HCH FLAG
Mills	2002	0.25	-72	-450	-2.1	-1.4		-36	-230	-1.1	-0.71	
Mills	2000	0.75	-93	-660	-2.7	-1.8		-47	-330	-1.4	-0.92	
Mills	1996	1.75	-64	-440	-1.8	-1.2		-33	-220	-0.91	-0.62	
Mills	1991	2.75	-61	-470	-1.5	-0.99		-31	-240	-0.74	-0.5	
Mills	1988	3.25	-58	-480	-1.2	-0.78		-29	-240	-0.59	-0.4	

Mills	1974	4.75	-58	-530	-1.1	-0.74		-29	-270	-0.56	-0.38	
Mills	1970	5.25	-45	-410	-1.1	-0.73		-23	-210	-0.55	-0.37	
Mills	1964	6.25	-45	-370	-1.4	-0.97		-23	-190	-0.73	-0.49	
Mills	1954	7.75	-43	-380	-1.3	-0.89		-22	-190	-0.66	-0.45	
Mills	1947	8.75	-44	-390	-1.1	-0.74		-22	-200	-0.56	-0.38	
Mills	1938	9.75	-35	-320	-0.78	-0.52		-18	-160	-0.39	-0.27	
Mills	1905	17.5	-16	-130	-0.35	-0.24		-8.1	-67	-0.18	-0.12	
Lone Pine	2001	0.25	-56	-410	-0.85	-0.45		-29	-210	-0.43	-0.23	
Lone Pine	1998	0.75	-51	-390	-0.81	-0.44		-26	-200	-0.41	-0.22	
Lone Pine	1990	1.75	-56	-480	-0.96	-0.51		-29	-250	-0.49	-0.26	
Lone Pine	1986	2.25	-53	-430	-0.9	-0.48		-27	-220	-0.45	-0.24	
Lone Pine	1982	2.75	-57	-410	-0.97	-0.52		-29	-210	-0.49	-0.26	
Lone Pine	1973	3.75	-63	-450	-0.94	-0.5		-32	-230	-0.48	-0.25	
Lone Pine	1967	4.25	-70	-510	-1.1	-0.56		-36	-260	-0.53	-0.29	
Lone Pine	1961	4.75	-50	-440	-0.69	-0.37		-25	-220	-0.35	-0.19	
Lone Pine	1955	5.25	-51	-450	-0.66	-0.35		-26	-230	-0.34	-0.18	
Lone Pine	1949	5.75	-47	-410	-0.61	-0.33		-24	-210	-0.31	-0.16	
Lone Pine	1936	6.75	-56	-500	-0.67	-0.36		-28	-250	-0.34	-0.18	
Lone Pine	1920	7.75	-44	-410	-0.53	-0.28		-22	-210	-0.27	-0.14	
Lone Pine	1870	11.5	-18	-160	-0.22	-0.12		-9.3	-82	-0.11	-0.06	
Pear	2002	0.25	-160	-1000	-1.9	-0.84		-79	-510	-0.94	-0.43	
Pear	2000	0.75	-120	-870	-1.4	-0.64		-60	-440	-0.71	-0.32	
Pear	1997	1.25	-120	-800	-1.4	-0.65		-61	-410	-0.73	-0.33	
Pear	1991	2.25	-140	-1000	-1.6	-0.74	d	-69	-510	-0.83	-0.37	d
Pear	1980	3.75	-110	-720	-1.2	-0.53	d	-54	-360	-0.6	-0.27	d
Pear	1969	5.25	-98	-740	-1.1	-0.49	d	-50	-380	-0.55	-0.25	d
Pear	1961	6.25	-100	-750	-1.4	-0.65		-52	-380	-0.73	-0.33	
Pear	1957	6.75	-75	-650	-1	-0.47	d	-38	-330	-0.53	-0.24	d
Pear	1926	10.5	-69	-610	-0.55	-0.25		-35	-310	-0.28	-0.13	
Pear	1872	14.5	-32	-290	-0.19	-0.087		-16	-150	-0.098	-0.044	
Emerald	2002	0.25	-60	-680	-2.7	-0.73		-30	-340	-1.4	-0.37	
Emerald	1997	1.75	-38	-420	-1.7	-0.46		-19	-210	-0.87	-0.23	c
Emerald	1989	3.75	-35	-360	-1.6	-0.43		-17	-180	-0.8	-0.22	c

Emerald	1980	5.75	-39	-420	-1.8	-0.48		-20	-210	-0.91	-0.25	c
Emerald	1971.5	7.75	-41	-480	-1.9	-0.51		-21	-240	-0.96	-0.26	
Emerald	1961.5	9.75	-29	-280	-1.3	-0.36		-15	-140	-0.67	-0.18	
Emerald	1958	10.5	-13	-170	-0.61	-0.16	d	-6.7	-85	-0.31	-0.083	c,d
Emerald	1892	21.5	-8.2	-98	-0.47	-0.13		-4.2	-50	-0.24	-0.064	
Burial	2000	0.25	-1.8	-2800	-0.007	-0.002		-0.93	-1400	-0.004	-0.001	
Burial	1988	0.75	-1.4	-2300	-0.006	-0.002		-0.68	-1200	-0.003	-0.001	
Burial	1974	1.25	-1.9	-3200	-0.009	-0.003		-0.95	-1600	-0.004	-0.001	
Burial	1957	1.75	-1.5	-2700	-0.005	-0.002		-0.74	-1400	-0.002	-0.001	
Burial	1933	2.25	-1.5	-3000	-0.005	-0.002		-0.77	-1500	-0.002	-0.001	
Burial	1906	2.75	-1.5	-3000	-0.005	-0.002		-0.78	-1500	-0.002	-0.001	
Burial	1879	3.25	-1.3	-2500	-0.004	-0.001		-0.66	-1300	-0.002	-0.001	
Mcleod	2002	0.25	-290	-2400	-1.5	-0.57		-150	-1200	-0.74	-0.29	
Mcleod	1997	0.75	-130	-1100	-0.73	-0.28		-66	-570	-0.37	-0.14	
Mcleod	1990	1.25	-82	-830	-0.53	-0.2		-42	-420	-0.27	-0.1	
Mcleod	1982	1.75	-73	-790	-0.59	-0.23		-37	-400	-0.3	-0.12	
Mcleod	1975	2.25	-75	-830	-0.78	-0.3		-38	-420	-0.39	-0.15	
Mcleod	1969	2.75	-66	-740	-0.74	-0.29		-34	-380	-0.38	-0.14	
Mcleod	1962	3.25	-63	-670	-0.51	-0.2		-32	-340	-0.26	-0.1	
Mcleod	1952	3.75	-67	-740	-0.42	-0.16		-34	-370	-0.21	-0.082	
Mcleod	1907	6.25	-86	-790	-0.49	-0.19		-43	-400	-0.25	-0.095	
Matcharak	2001	0.25	-230		-0.95	-0.76		-120		-0.48	-0.39	c
Matcharak	1993	0.75	-150	-1200	-0.66	-0.53		-75	-590	-0.34	-0.27	c
Matcharak	1983	1.25	-120	-980	-0.52	-0.41		-61	-500	-0.26	-0.21	c
Matcharak	1971	1.75	-120	-1000	-0.39	-0.31		-60	-510	-0.2	-0.16	c
Matcharak	1954	2.25	-110	-970	-0.27	-0.22		-55	-490	-0.14	-0.11	c
Matcharak	1937	2.75	-100	-980	-0.22	-0.17		-52	-500	-0.11	-0.088	c
Matcharak	1910	3.25	-91	-890	-0.18	-0.15		-46	-450	-0.092	-0.074	c
Wonder	2000	0.25	-70	-980	-0.52	-0.15		-36	-500	-0.26	-0.075	
Wonder	1992	0.75	-84	-1200	-0.63	-0.18		-43	-590	-0.32	-0.091	
Wonder	1985	1.25	-64	-1000	-0.46	-0.13		-33	-510	-0.23	-0.067	
Wonder	1977	1.75	-60	-1000	-0.39	-0.11		-30	-510	-0.2	-0.057	

Wonder	1968	2.25	-68	-1100	-0.32	-0.091		-34	-570	-0.16	-0.046	
Wonder	1949	2.75	-83	-1400	-0.26	-0.076		-42	-690	-0.13	-0.038	
Wonder	1919	3.25	-47	-880	-0.11	-0.031		-24	-450	-0.054	-0.016	
Golden	2002.5	0.25	1300		1.8	1.8		-190		-0.25	-0.25	
Golden	1996.5	0.75	-250		-0.78	-0.78		-130		-0.4	-0.4	
Golden	1989.5	1.25	-140	-850	-0.54	-0.54		-73	-430	-0.27	-0.27	
Golden	1981.5	1.75	-170	-1000	-0.62	-0.62		-88	-520	-0.32	-0.32	
Golden	1972.5	2.25	-170	-690	-0.49	-0.49		-84	-350	-0.25	-0.25	
Golden	1962.5	2.75	-180	-770	-0.45	-0.45		-93	-390	-0.23	-0.23	
Golden	1951	3.25	-170	-680	-0.37	-0.37		-88	-340	-0.19	-0.19	
Golden	1924	4.25	-160	-640	-0.28	-0.28		-83	-330	-0.14	-0.14	
LP 19	2004	0.25	-300	-1600	-3.3	-2.2		-150	-830	-1.7	-1.1	
LP 19	1999	1.25	-160		-1.5	-1		-82		-0.78	-0.52	
LP 19	1994	2.25	-130	-700	-1.4	-0.94		-65	-350	-0.72	-0.48	
LP 19	1989	3.25	-150	-810	-1.3	-0.84		-75	-410	-0.64	-0.42	
LP 19	1980	4.25	-150	-800	-0.89	-0.59		-75	-410	-0.45	-0.3	
LP 19	1969	5.25	-130	-740	-0.7	-0.47		-68	-380	-0.36	-0.24	
LP 19	1956	6.25	-130	-690	-0.54	-0.36		-66	-350	-0.27	-0.18	
LP 19	1903	10.5	-72	-420	-0.45	-0.3		-37	-210	-0.23	-0.15	
Hoh	2004	0.25	-99	-490	-1.3	-0.42		-50	-250	-0.65	-0.21	
Hoh	1998	1.25	-160	-880	-1.5	-0.47	d	-82	-440	-0.74	-0.24	d
Hoh	1990.5	2.25	-120	-820	-1.3	-0.42	d	-60	-420	-0.65	-0.21	d
Hoh	1983	3.25	-75	-710	-1.1	-0.35	d	-38	-360	-0.55	-0.18	d
Hoh	1973.5	4.25	-65	-720	-0.98	-0.32		-33	-370	-0.5	-0.16	
Hoh	1963	5.25	-66	-650	-0.89	-0.29		-33	-330	-0.45	-0.15	
Hoh	1952.5	6.25	-50	-580	-0.97	-0.31		-25	-290	-0.49	-0.16	
Hoh	1901	12.75	-14	-170	-0.3	-0.098		-7.3	-88	-0.15	-0.05	
PJ	2004.5	0.25	-230	-1500	-6.6	-8.4		-120	-740	-3.3	-4.3	
PJ	1999	2.75	-130	-820	-3.6	-4.7		-68	-420	-1.8	-2.4	
PJ	1992	4.75	-130	-780	-3.1	-4		-64	-400	-1.6	-2	
PJ	1984	6.75	-67	-440	-2.2	-2.8		-34	-220	-1.1	-1.4	
PJ	1977.5	8.75	-70	-460	-3.8	-4.9		-35	-230	-1.9	-2.5	

PJ	1968	11.5	-26		-0.77	-0.98		-13		-0.39	-0.5	
PJ	1963	12.5	-26	-180	-1.1	-1.4		-13	-89	-0.53	-0.69	
PJ	1955	15.5	-21	-140	-2	-2.6		-11	-72	-1	-1.3	
Oldman	2003.5	0.25	-30	-570	-1.7	-0.37		-15	-290	-0.84	-0.19	
Oldman	1997	1.25	-32	-650	-1.4	-0.31		-16	-330	-0.71	-0.16	
Oldman	1987	2.25	-30	-560	-0.78	-0.17		-15	-280	-0.39	-0.087	
Oldman	1980.5	2.75	-27	-530	-0.61	-0.13		-14	-270	-0.31	-0.068	
Oldman	1973	3.25	-24	-510	-0.5	-0.11		-12	-260	-0.26	-0.056	
Oldman	1963.5	3.75	-26	-580	-0.47	-0.1		-13	-290	-0.24	-0.052	
Oldman	1952	4.25	-23	-540	-0.36	-0.079		-11	-270	-0.18	-0.04	
Oldman	1906.5	6.25	-19	-570	-0.36	-0.079		-9.9	-290	-0.18	-0.04	
Snyder	2004	0.25	-170	-1300	-3.6	-2.6		-86	-650	-1.8	-1.3	
Snyder	2000	1.25	-110	-880	-1.9	-1.4		-55	-450	-0.99	-0.72	
Snyder	1991.5	2.75	-97	-880	-1.5	-1.1		-49	-440	-0.76	-0.56	
Snyder	1985	3.75	-94	-900	-1.4	-1		-48	-460	-0.71	-0.52	
Snyder	1978	4.75	-86	-880	-1.2	-0.88		-43	-440	-0.61	-0.44	
Snyder	1967.5	5.75	-74	-800	-0.97	-0.71		-38	-400	-0.49	-0.36	
Snyder	1954.5	6.75	-75	-750	-0.83	-0.6		-38	-380	-0.42	-0.31	
Snyder	1893	11.75	-32	-360	-0.25	-0.18		-16	-180	-0.13	-0.093	

Site	Average Year (y)	Average Depth (cm)	TRLTE pg/g dw	TRLTE pg/g TOC	TRLTE Flux pg/cm2.y	TRLTE Flux (FF) pg/cm2.y	TRLTE FLAG	MBZN pg/g dw	MBZN pg/g TOC	MBZN Flux pg/cm2.y	MBZN Flux (FF) pg/cm2.y	MBZN FLAG
Mills	2002	0.25	-15	-93	-0.43	-0.29	c	-18	-120	-0.53	-0.36	
Mills	2000	0.75	-19	-130	-0.56	-0.38	c	-24	-170	-0.69	-0.47	
Mills	1996	1.75	-13	-89	-0.37	-0.25		-16	-110	-0.46	-0.31	
Mills	1991	2.75	-13	-96	-0.3	-0.2		-16	-120	-0.38	-0.25	
Mills	1988	3.25	-12	-98	-0.24	-0.16		-15	-120	-0.3	-0.2	
Mills	1974	4.75	-12	-110	-0.23	-0.15		-15	-140	-0.28	-0.19	
Mills	1970	5.25	-9.3	-85	-0.22	-0.15		-12	-110	-0.28	-0.19	
Mills	1964	6.25	-9.3	-76	-0.3	-0.2		-12	-95	-0.37	-0.25	
Mills	1954	7.75	-8.8	-78	-0.27	-0.18		-11	-97	-0.34	-0.23	
Mills	1947	8.75	-9	-80	-0.23	-0.15		-11	-99	-0.28	-0.19	

Mills	1938	9.75	-7.2	-66	-0.16	-0.11		-9	-83	-0.2	-0.13	
Mills	1905	17.5	-3.3	-27	-0.073	-0.049		-4.1	-34	-0.09	-0.061	
Lone Pine	2001	0.25	-12	-83	-0.17	-0.093		-14	-100	-0.22	-0.12	
Lone Pine	1998	0.75	-10	-81	-0.17	-0.09		-13	-100	-0.21	-0.11	
Lone Pine	1990	1.75	-12	-100	-0.2	-0.11		-14	-120	-0.24	-0.13	
Lone Pine	1986	2.25	-11	-89	-0.18	-0.099		-13	-110	-0.23	-0.12	
Lone Pine	1982	2.75	-12	-85	-0.2	-0.11		-15	-110	-0.25	-0.13	
Lone Pine	1973	3.75	-13	-93	-0.19	-0.1		-16	-120	-0.24	-0.13	
Lone Pine	1967	4.25	-14	-100	-0.22	-0.12		-18	-130	-0.27	-0.14	
Lone Pine	1961	4.75	-10	-90	-0.14	-0.076		-13	-110	-0.18	-0.095	
Lone Pine	1955	5.25	-10	-92	-0.14	-0.073		-13	-110	-0.17	-0.09	
Lone Pine	1949	5.75	-9.6	-85	-0.13	-0.067		-12	-110	-0.16	-0.083	
Lone Pine	1936	6.75	-12	-100	-0.14	-0.074		-14	-130	-0.17	-0.092	
Lone Pine	1920	7.75	-9	-83	-0.11	-0.058		-11	-100	-0.13	-0.072	
Lone Pine	1870	11.5	-3.8	-33	-0.045	-0.024		-4.7	-42	-0.056	-0.03	
Pear	2002	0.25	-32	-210	-0.38	-0.17		-40	-260	-0.48	-0.21	
Pear	2000	0.75	-24	-180	-0.29	-0.13		-30	-220	-0.36	-0.16	
Pear	1997	1.25	-25	-170	-0.3	-0.13		-31	-210	-0.37	-0.17	
Pear	1991	2.25	-28	-210	-0.34	-0.15	d	-35	-260	-0.42	-0.19	d
Pear	1980	3.75	-22	-150	-0.24	-0.11	d	-27	-180	-0.3	-0.14	d
Pear	1969	5.25	-20	-150	-0.22	-0.1	d	-25	-190	-0.28	-0.12	d
Pear	1961	6.25	-21	-150	-0.3	-0.13		-26	-190	-0.37	-0.17	
Pear	1957	6.75	-15	-130	-0.22	-0.097	d	-19	-170	-0.27	-0.12	d
Pear	1926	10.5	-14	-120	-0.11	-0.051		-18	-160	-0.14	-0.063	
Pear	1872	14.5	-6.7	-60	-0.04	-0.018		-8.3	-74	-0.05	-0.022	
Emerald	2002	0.25	-12	-140	-0.56	-0.15		-15	-170	-0.7	-0.19	
Emerald	1997	1.75	-7.7	-86	-0.35	-0.095		-9.6	-110	-0.44	-0.12	
Emerald	1989	3.75	-7.1	-74	-0.33	-0.088		-8.8	-93	-0.41	-0.11	
Emerald	1980	5.75	-8.1	-86	-0.37	-0.099		-10	-110	-0.46	-0.12	
Emerald	1971.5	7.75	-8.5	-99	-0.39	-0.1		-11	-120	-0.49	-0.13	
Emerald	1961.5	9.75	-5.9	-57	-0.27	-0.073		-7.4	-71	-0.34	-0.091	
Emerald	1958	10.5	-2.7	-35	-0.13	-0.034	d	-3.4	-43	-0.16	-0.042	d
Emerald	1892	21.5	-1.7	-20	-0.096	-0.026		-2.1	-25	-0.12	-0.032	

Burial	2000	0.25	-0.38	-570	-0.002	-0.00049		-0.47	-710	-0.002	-0.001	
Burial	1988	0.75	-0.28	-470	-0.001	-0.00037		-0.35	-580	-0.001	-0.00046	
Burial	1974	1.25	-0.39	-670	-0.002	-0.001		-0.48	-830	-0.002	-0.001	
Burial	1957	1.75	-0.3	-560	-0.001	-0.00032		-0.37	-690	-0.001	-0.0004	
Burial	1933	2.25	-0.31	-620	-0.001	-0.00031		-0.39	-770	-0.001	-0.00039	
Burial	1906	2.75	-0.32	-620	-0.001	-0.00032		-0.39	-770	-0.001	-0.00039	
Burial	1879	3.25	-0.27	-510	-0.001	-0.00027		-0.33	-630	-0.001	-0.00033	
Mcleod	2002	0.25	-59	-490	-0.3	-0.12		-74	-610	-0.38	-0.14	c
Mcleod	1997	0.75	-27	-230	-0.15	-0.057		-33	-290	-0.19	-0.071	c
Mcleod	1990	1.25	-17	-170	-0.11	-0.042		-21	-210	-0.13	-0.052	c
Mcleod	1982	1.75	-15	-160	-0.12	-0.047		-19	-200	-0.15	-0.058	c
Mcleod	1975	2.25	-15	-170	-0.16	-0.061		-19	-210	-0.2	-0.076	c
Mcleod	1969	2.75	-14	-150	-0.15	-0.059		-17	-190	-0.19	-0.073	c
Mcleod	1962	3.25	-13	-140	-0.11	-0.041		-16	-170	-0.13	-0.051	c
Mcleod	1952	3.75	-14	-150	-0.087	-0.033		-17	-190	-0.11	-0.042	c
Mcleod	1907	6.25	-18	-160	-0.1	-0.039		-22	-200	-0.12	-0.048	c
Matcharak	2001	0.25	-48		-0.2	-0.16		-59		-0.24	-0.19	c
Matcharak	1993	0.75	-30	-240	-0.14	-0.11		-38	-300	-0.17	-0.14	c
Matcharak	1983	1.25	-25	-200	-0.11	-0.085		-31	-250	-0.13	-0.11	c
Matcharak	1971	1.75	-24	-210	-0.08	-0.064		-30	-260	-0.1	-0.08	c
Matcharak	1954	2.25	-22	-200	-0.056	-0.045		-28	-250	-0.07	-0.056	c
Matcharak	1937	2.75	-21	-200	-0.045	-0.036		-26	-250	-0.056	-0.045	c
Matcharak	1910	3.25	-19	-180	-0.037	-0.03		-23	-230	-0.046	-0.037	c
Wonder	2000	0.25	-14	-200	-0.11	-0.031		-18	-250	-0.13	-0.038	
Wonder	1992	0.75	-17	-240	-0.13	-0.037		-21	-300	-0.16	-0.046	
Wonder	1985	1.25	-13	-210	-0.095	-0.027		-16	-260	-0.12	-0.034	
Wonder	1977	1.75	-12	-210	-0.081	-0.023		-15	-260	-0.1	-0.029	
Wonder	1968	2.25	-14	-230	-0.066	-0.019		-17	-290	-0.081	-0.023	
Wonder	1949	2.75	-17	-280	-0.054	-0.016		-21	-350	-0.068	-0.019	
Wonder	1919	3.25	-9.6	-180	-0.022	-0.006		-12	-230	-0.027	-0.008	
Golden	2002.5	0.25	-76		-0.1	-0.1		-95		-0.13	-0.13	

Golden	1996.5	0.75	-52		-0.16	-0.16		-64		-0.2	-0.2	
Golden	1989.5	1.25	-30	-180	-0.11	-0.11	c	-37	-220	-0.14	-0.14	c
Golden	1981.5	1.75	-36	-210	-0.13	-0.13	c	-44	-260	-0.16	-0.16	c
Golden	1972.5	2.25	-34	-140	-0.1	-0.1	c	-42	-180	-0.12	-0.12	c
Golden	1962.5	2.75	-38	-160	-0.093	-0.093	c	-47	-200	-0.12	-0.12	c
Golden	1951	3.25	-36	-140	-0.077	-0.077	c	-44	-170	-0.095	-0.095	c
Golden	1924	4.25	-34	-130	-0.058	-0.058	c	-42	-160	-0.072	-0.072	c
LP 19	2004	0.25	-62	-340	-0.68	-0.45		-77	-420	-0.85	-0.57	
LP 19	1999	1.25	-33		-0.32	-0.21		-42		-0.4	-0.26	
LP 19	1994	2.25	-26	-140	-0.29	-0.19		-33	-180	-0.36	-0.24	
LP 19	1989	3.25	-31	-170	-0.26	-0.17		-38	-210	-0.32	-0.21	
LP 19	1980	4.25	-30	-160	-0.18	-0.12		-38	-210	-0.23	-0.15	
LP 19	1969	5.25	-28	-150	-0.14	-0.096		-35	-190	-0.18	-0.12	
LP 19	1956	6.25	-27	-140	-0.11	-0.074		-33	-180	-0.14	-0.092	
LP 19	1903	10.5	-15	-87	-0.092	-0.061		-18	-110	-0.11	-0.076	
Hoh	2004	0.25	-20	-100	-0.27	-0.086	c	-25	-120	-0.33	-0.11	c
Hoh	1998	1.25	-33	-180	-0.3	-0.096	c,d	-41	-220	-0.37	-0.12	c
Hoh	1990.5	2.25	-24	-170	-0.27	-0.086	c,d	-30	-210	-0.33	-0.11	c
Hoh	1983	3.25	-15	-150	-0.22	-0.072	c,d	-19	-180	-0.28	-0.09	c,d
Hoh	1973.5	4.25	-13	-150	-0.2	-0.065	c	-17	-180	-0.25	-0.081	c
Hoh	1963	5.25	-14	-130	-0.18	-0.059	c	-17	-170	-0.23	-0.074	c
Hoh	1952.5	6.25	-10	-120	-0.2	-0.065	c	-13	-150	-0.25	-0.08	c
Hoh	1901	12.75	-3	-36	-0.062	-0.02	c	-3.7	-44	-0.078	-0.025	c
PJ	2004.5	0.25	-48	-300	-1.3	-1.7	c	-60	-370	-1.7	-2.1	c
PJ	1999	2.75	-28	-170	-0.75	-0.96	c	-34	-210	-0.93	-1.2	c
PJ	1992	4.75	-26	-160	-0.64	-0.82	c	-32	-200	-0.8	-1	c
PJ	1984	6.75	-14	-90	-0.45	-0.57	c	-17	-110	-0.56	-0.71	c
PJ	1977.5	8.75	-14	-95	-0.78	-1	c	-18	-120	-0.97	-1.2	c
PJ	1968	11.5	-5.4		-0.16	-0.2	c	-6.8		-0.2	-0.25	c
PJ	1963	12.5	-5.3	-36	-0.22	-0.28	c	-6.6	-45	-0.27	-0.35	c
PJ	1955	15.5	-4.3	-29	-0.42	-0.54	c	-5.4	-36	-0.52	-0.67	c
Oldman	2003.5	0.25	-6.2	-120	-0.34	-0.075		-7.7	-150	-0.43	-0.093	

Oldman	1997	1.25	-6.7	-130	-0.29	-0.063		-8.3	-170	-0.36	-0.079	
Oldman	1987	2.25	-6.2	-110	-0.16	-0.035		-7.7	-140	-0.2	-0.044	
Oldman	1980.5	2.75	-5.6	-110	-0.13	-0.027		-6.9	-140	-0.16	-0.034	
Oldman	1973	3.25	-4.9	-100	-0.1	-0.023		-6.1	-130	-0.13	-0.028	
Oldman	1963.5	3.75	-5.3	-120	-0.096	-0.021		-6.6	-150	-0.12	-0.026	
Oldman	1952	4.25	-4.6	-110	-0.074	-0.016		-5.8	-140	-0.092	-0.02	
Oldman	1906.5	6.25	-4	-120	-0.074	-0.016		-5	-150	-0.092	-0.02	
Snyder	2004	0.25	-35	-260	-0.73	-0.53		-43	-330	-0.91	-0.66	
Snyder	2000	1.25	-22	-180	-0.4	-0.29		-28	-230	-0.5	-0.36	
Snyder	1991.5	2.75	-20	-180	-0.31	-0.23		-25	-220	-0.39	-0.28	
Snyder	1985	3.75	-19	-190	-0.29	-0.21		-24	-230	-0.36	-0.26	
Snyder	1978	4.75	-18	-180	-0.25	-0.18		-22	-220	-0.31	-0.22	
Snyder	1967.5	5.75	-15	-160	-0.2	-0.15		-19	-200	-0.25	-0.18	
Snyder	1954.5	6.75	-15	-150	-0.17	-0.12		-19	-190	-0.21	-0.15	
Snyder	1893	11.75	-6.5	-74	-0.052	-0.038		-8.1	-92	-0.065	-0.047	

Site	Average Year (y)	Average Depth (cm)	HCLR pg/g dw	HCLR pg/g TOC	HCLR Flux pg/cm2.y	HCLR Flux (FF) pg/cm2.y	HCLR FLAG	DCPA pg/g dw	DCPA pg/g TOC	DCPA Flux pg/cm2.y	DCPA Flux (FF) pg/cm2.y	DCPA FLAG
Mills	2002	0.25	-69	-430	-2	-1.3		100	620	2.9	2	
Mills	2000	0.75	-89	-620	-2.6	-1.7		96	680	2.8	1.9	
Mills	1996	1.75	-61	-410	-1.7	-1.2		45	310	1.3	0.86	e
Mills	1991	2.75	-58	-450	-1.4	-0.94		62	470	1.5	1	
Mills	1988	3.25	-55	-450	-1.1	-0.75		60	490	1.2	0.81	
Mills	1974	4.75	-55	-500	-1	-0.7		69	630	1.3	0.88	
Mills	1970	5.25	-43	-390	-1	-0.7		52	470	1.2	0.84	e
Mills	1964	6.25	-43	-350	-1.4	-0.93		27	230	0.88	0.59	
Mills	1954	7.75	-41	-360	-1.2	-0.84						X
Mills	1947	8.75	-42	-370	-1	-0.71		-2.4	-21	-0.06	-0.04	
Mills	1938	9.75	-34	-310	-0.74	-0.5		-1.9	-18	-0.042	-0.028	
Mills	1905	17.5	-15	-130	-0.34	-0.23		15	130	0.34	0.23	
Lone Pine	2001	0.25	-54	-390	-0.81	-0.43		63	460	0.95	0.51	
Lone Pine	1998	0.75	-48	-370	-0.77	-0.41		44	340	0.71	0.38	

Lone Pine	1990	1.75	-54	-460	-0.91	-0.49		54	470	0.92	0.49	
Lone Pine	1986	2.25	-50	-410	-0.85	-0.46		47	390	0.8	0.43	
Lone Pine	1982	2.75	-54	-390	-0.92	-0.49		40	290	0.68	0.36	
Lone Pine	1973	3.75	-60	-430	-0.89	-0.48		46	330	0.68	0.37	
Lone Pine	1967	4.25	-67	-480	-1	-0.54		54	390	0.82	0.44	
Lone Pine	1961	4.75	-47	-410	-0.66	-0.35		42	370	0.59	0.31	
Lone Pine	1955	5.25	-48	-420	-0.63	-0.34		57	500	0.74	0.4	e
Lone Pine	1949	5.75	-45	-390	-0.58	-0.31		29	250	0.37	0.2	e
Lone Pine	1936	6.75	-53	-470	-0.64	-0.34		33	290	0.39	0.21	
Lone Pine	1920	7.75	-42	-390	-0.5	-0.27						X
Lone Pine	1870	11.5	-17	-150	-0.21	-0.11						X
Pear	2002	0.25	-150	-970	-1.8	-0.8		980	6400	12	5.3	
Pear	2000	0.75	-110	-820	-1.3	-0.6		440	3200	5.2	2.4	e
Pear	1997	1.25	-110	-770	-1.4	-0.62		560	3700	6.7	3	
Pear	1991	2.25	-130	-970	-1.6	-0.7	d	2000	15000	24	11	d
Pear	1980	3.75	-100	-680	-1.1	-0.51	d	1200	8000	13	5.9	d
Pear	1969	5.25	-93	-710	-1	-0.46	d	370	2800	4.1	1.8	d
Pear	1961	6.25	-98	-710	-1.4	-0.62		260	1900	3.7	1.7	e
Pear	1957	6.75	-71	-620	-1	-0.45	d	54	470	0.76	0.34	de
Pear	1926	10.5	-65	-580	-0.52	-0.24						X
Pear	1872	14.5	-31	-280	-0.18	-0.083		-1.8	-16	-0.011	-0.005	
Emerald	2002	0.25	-57	-650	-2.6	-0.7		86	990	4	1.1	
Emerald	1997	1.75	-36	-400	-1.6	-0.44		-2	-23	-0.094	-0.025	
Emerald	1989	3.75	-33	-340	-1.5	-0.41		-1.9	-20	-0.086	-0.023	
Emerald	1980	5.75	-37	-400	-1.7	-0.46		180	1900	8.2	2.2	e
Emerald	1971.5	7.75	-39	-460	-1.8	-0.49		52	610	2.4	0.65	
Emerald	1961.5	9.75	-27	-270	-1.3	-0.34						X
Emerald	1958	10.5	-13	-160	-0.58	-0.16	d	80	1000	3.7	0.98	d,e
Emerald	1892	21.5	-7.8	-93	-0.45	-0.12						X
Burial	2000	0.25	-1.8	-2600	-0.007	-0.002	c	-0.1	-150	-0.0004	-0.00013	
Burial	1988	0.75	-1.3	-2200	-0.005	-0.002	c	-0.073	-120	-0.0003	-9.7E-05	
Burial	1974	1.25	-1.8	-3100	-0.008	-0.003	c	-0.1	-180	-0.00047	-0.00015	
Burial	1957	1.75	-1.4	-2600	-0.005	-0.001	c	-0.08	-150	-0.00026	-8.5E-05	

Burial	1933	2.25	-1.5	-2900	-0.005	-0.001	c	0.47	920	0.001	0.00047	a
Burial	1906	2.75	-1.5	-2900	-0.005	-0.001	c	0.11	210	0.00034	0.00011	a
Burial	1879	3.25	-1.2	-2400	-0.004	-0.001	c	0.21	410	0.001	0.00021	a
Mcleod	2002	0.25	-270	-2300	-1.4	-0.54		-16	-130	-0.08	-0.031	
Mcleod	1997	0.75	-120	-1100	-0.69	-0.27		-7	-62	-0.039	-0.015	
Mcleod	1990	1.25	-78	-790	-0.5	-0.19		-4.5	-45	-0.029	-0.011	
Mcleod	1982	1.75	-70	-750	-0.57	-0.22		8.6	93	0.07	0.027	a
Mcleod	1975	2.25	-71	-790	-0.74	-0.28		-4.1	-45	-0.042	-0.016	
Mcleod	1969	2.75	-63	-710	-0.71	-0.27		6.2	70	0.07	0.027	a
Mcleod	1962	3.25	-60	-640	-0.49	-0.19		7.4	79	0.06	0.023	a
Mcleod	1952	3.75	-64	-700	-0.4	-0.15		7.9	87	0.05	0.019	a
Mcleod	1907	6.25	-82	-750	-0.47	-0.18		74	680	0.42	0.16	a
Matcharak	2001	0.25	-220		-0.9	-0.72		-13		-0.052	-0.041	
Matcharak	1993	0.75	-140	-1100	-0.63	-0.51		-8	-63	-0.036	-0.029	
Matcharak	1983	1.25	-110	-930	-0.49	-0.39		-6.5	-53	-0.028	-0.022	a
Matcharak	1971	1.75	-110	-960	-0.37	-0.3		-6.4	-55	-0.021	-0.017	a
Matcharak	1954	2.25	-100	-920	-0.26	-0.21		-5.9	-53	-0.015	-0.012	
Matcharak	1937	2.75	-99	-930	-0.21	-0.17		-5.6	-53	-0.012	-0.009	
Matcharak	1910	3.25	-87	-850	-0.17	-0.14		-4.9	-48	-0.01	-0.008	a
Wonder	2000	0.25	-67	-930	-0.49	-0.14		-3.8	-53	-0.028	-0.008	
Wonder	1992	0.75	-80	-1100	-0.6	-0.17		-4.6	-64	-0.034	-0.01	
Wonder	1985	1.25	-61	-950	-0.44	-0.13		-3.5	-54	-0.025	-0.007	
Wonder	1977	1.75	-57	-950	-0.38	-0.11		-3.2	-54	-0.021	-0.006	
Wonder	1968	2.25	-65	-1100	-0.3	-0.087		-3.7	-61	-0.017	-0.005	
Wonder	1949	2.75	-79	-1300	-0.25	-0.072		-4.5	-74	-0.014	-0.004	
Wonder	1919	3.25	-44	-840	-0.1	-0.029		-2.5	-48	-0.006	-0.002	
Golden	2002.5	0.25	-350		-0.48	-0.48						X
Golden	1996.5	0.75	-240		-0.74	-0.74						X
Golden	1989.5	1.25	-140	-810	-0.52	-0.52	c					X
Golden	1981.5	1.75	-160	-970	-0.59	-0.59	c					X
Golden	1972.5	2.25	-160	-660	-0.46	-0.46	c					X
Golden	1962.5	2.75	-170	-730	-0.43	-0.43	c					X

Golden	1951	3.25	-170	-650	-0.36	-0.36	c					X
Golden	1924	4.25	-160	-610	-0.27	-0.27	c					X
LP 19	2004	0.25	-290	-1600	-3.2	-2.1						X
LP 19	1999	1.25	-150		-1.5	-0.98						X
LP 19	1994	2.25	-120	-670	-1.3	-0.9						X
LP 19	1989	3.25	-140	-770	-1.2	-0.8						X
LP 19	1980	4.25	-140	-760	-0.85	-0.57						X
LP 19	1969	5.25	-130	-710	-0.67	-0.45						X
LP 19	1956	6.25	-120	-660	-0.51	-0.34						X
LP 19	1903	10.5	-69	-400	-0.43	-0.28						X
Hoh	2004	0.25	-95	-460	-1.2	-0.4	c					X
Hoh	1998	1.25	-150	-840	-1.4	-0.45	c,d	-8.8	-48	-0.079	-0.025	c,d
Hoh	1990.5	2.25	-110	-780	-1.2	-0.4	c,d					X
Hoh	1983	3.25	-71	-680	-1	-0.33	c,d					X
Hoh	1973.5	4.25	-62	-690	-0.93	-0.3	c					X
Hoh	1963	5.25	-63	-620	-0.85	-0.27	c					X
Hoh	1952.5	6.25	-48	-550	-0.93	-0.3	d					X
Hoh	1901	12.75	-14	-170	-0.29	-0.093	d					X
PJ	2004.5	0.25	-220	-1400	-6.2	-8		-13	-80	-0.36	-0.46	a,c
PJ	1999	2.75	-130	-790	-3.5	-4.4		-54	-330	-1.4	-1.9	a,c
PJ	1992	4.75	-120	-740	-3	-3.8		-6.9	-42	-0.17	-0.22	a,c
PJ	1984	6.75	-64	-420	-2.1	-2.7		-3.6	-24	-0.12	-0.15	a,c
PJ	1977.5	8.75	-66	-440	-3.6	-4.6		-3.8	-25	-0.21	-0.26	a,c
PJ	1968	11.5	-25		-0.73	-0.93		-1.4		-0.042	-0.053	c
PJ	1963	12.5	-24	-170	-1	-1.3		-1.4	-9.6	-0.057	-0.073	c
PJ	1955	15.5	-20	-130	-1.9	-2.5		-1.1	-7.7	-0.11	-0.14	c
Oldman	2003.5	0.25	-29	-540	-1.6	-0.35		91	1700	5	1.1	
Oldman	1997	1.25	-31	-620	-1.3	-0.29		76	1500	3.3	0.72	
Oldman	1987	2.25	-29	-530	-0.74	-0.16		210	4000	5.5	1.2	
Oldman	1980.5	2.75	-26	-500	-0.58	-0.13		140	2600	3	0.67	
Oldman	1973	3.25	-23	-480	-0.48	-0.11		100	2200	2.1	0.47	
Oldman	1963.5	3.75	-25	-550	-0.44	-0.097		87	1900	1.6	0.34	

Oldman	1952	4.25	-21	-510	-0.34	-0.075		81	1900	1.3	0.29	
Oldman	1906.5	6.25	-19	-540	-0.34	-0.075		5.9	170	0.11	0.024	a
Snyder	2004	0.25	-160	-1200	-3.4	-2.5		99	750	2.1	1.5	e
Snyder	2000	1.25	-100	-840	-1.9	-1.4		68	560	1.2	0.9	e
Snyder	1991.5	2.75	-92	-830	-1.4	-1		66	590	1	0.75	e
Snyder	1985	3.75	-89	-860	-1.3	-0.98		62	590	0.93	0.68	e
Snyder	1978	4.75	-82	-830	-1.1	-0.83		54	550	0.76	0.55	e
Snyder	1967.5	5.75	-71	-760	-0.92	-0.67		47	500	0.61	0.45	e
Snyder	1954.5	6.75	-72	-710	-0.79	-0.57		67	670	0.74	0.54	a
Snyder	1893	11.75	-30	-340	-0.24	-0.18		9.6	110	0.077	0.056	a

Site	Average Year (y)	Average Depth (cm)	Aldrin pg/g dw	Aldrin pg/g TOC	Aldrin Flux pg/cm2.y	Aldrin Flux (FF) pg/cm2.y	Aldrin FLAG	CLPYRO pg/g dw	CLPYRO pg/g TOC	CLPYRO Flux pg/cm2.y	CLPYRO Flux (FF) pg/cm2.y	CLPYRO FLAG
Mills	2002	0.25	-51	-320	-1.5	-1		-100	-640	-3	-2	
Mills	2000	0.75	-66	-460	-1.9	-1.3		-130	-930	-3.9	-2.6	
Mills	1996	1.75	-46	-310	-1.3	-0.86		-92	-620	-2.6	-1.7	
Mills	1991	2.75	-43	-330	-1	-0.7		-87	-670	-2.1	-1.4	
Mills	1988	3.25	-41	-340	-0.82	-0.56		-83	-680	-1.7	-1.1	d
Mills	1974	4.75	-41	-370	-0.78	-0.52		-82	-750	-1.6	-1.1	
Mills	1970	5.25	-32	-290	-0.77	-0.52		-65	-590	-1.5	-1	d
Mills	1964	6.25	-32	-260	-1	-0.69		-64	-530	-2.1	-1.4	
Mills	1954	7.75	-30	-270	-0.93	-0.63		-61	-540	-1.9	-1.3	
Mills	1947	8.75	-31	-270	-0.78	-0.53		-63	-550	-1.6	-1.1	
Mills	1938	9.75	-25	-230	-0.55	-0.37		-50	-460	-1.1	-0.75	
Mills	1905	17.5	-11	-94	-0.25	-0.17		-23	-190	-0.5	-0.34	
Lone Pine	2001	0.25	-40	-290	-0.6	-0.32		-80	-580	-1.2	-0.65	
Lone Pine	1998	0.75	-36	-280	-0.58	-0.31		-73	-560	-1.2	-0.62	
Lone Pine	1990	1.75	-40	-340	-0.68	-0.36		-80	-690	-1.4	-0.73	
Lone Pine	1986	2.25	-37	-310	-0.64	-0.34		-75	-620	-1.3	-0.68	d
Lone Pine	1982	2.75	-40	-290	-0.69	-0.37		-81	-590	-1.4	-0.74	
Lone Pine	1973	3.75	-44	-320	-0.67	-0.36		-89	-640	-1.3	-0.72	d
Lone Pine	1967	4.25	-50	-360	-0.75	-0.4		-100	-720	-1.5	-0.8	

Lone Pine	1961	4.75	-35	-310	-0.49	-0.26		-71	-620	-0.99	-0.53	
Lone Pine	1955	5.25	-36	-320	-0.47	-0.25		-73	-640	-0.94	-0.5	
Lone Pine	1949	5.75	-33	-290	-0.43	-0.23		-67	-590	-0.87	-0.46	
Lone Pine	1936	6.75	-40	-350	-0.48	-0.25		-80	-710	-0.96	-0.51	
Lone Pine	1920	7.75	-31	-290	-0.37	-0.2		-62	-580	-0.75	-0.4	
Lone Pine	1870	11.5	-13	-120	-0.16	-0.083		-26	-230	-0.31	-0.17	d
Pear	2002	0.25	-110	-720	-1.3	-0.59		-220	-1400	-2.7	-1.2	
Pear	2000	0.75	-83	-610	-1	-0.45		-170	-1200	-2	-0.91	
Pear	1997	1.25	-85	-570	-1	-0.46		-170	-1100	-2.1	-0.93	d
Pear	1991	2.25	-97	-720	-1.2	-0.52	d	-190	-1400	-2.3	-1.1	
Pear	1980	3.75	-76	-510	-0.83	-0.38	d	-150	-1000	-1.7	-0.76	
Pear	1969	5.25	-69	-530	-0.76	-0.34	d	-140	-1100	-1.5	-0.69	
Pear	1961	6.25	-73	-530	-1	-0.46		-150	-1100	-2.1	-0.92	
Pear	1957	6.75	-53	-460	-0.74	-0.33		-110	-920	-1.5	-0.67	
Pear	1926	10.5	-49	-430	-0.39	-0.18		-98	-870	-0.78	-0.35	
Pear	1872	14.5	-23	-200	-0.14	-0.062		-46	-410	-0.28	-0.12	d
Emerald	2002	0.25	-42	-480	-1.9	-0.52		-85	-970	-3.9	-1	
Emerald	1997	1.75	-27	-300	-1.2	-0.33		-53	-600	-2.5	-0.66	d
Emerald	1989	3.75	-24	-260	-1.1	-0.3		-49	-520	-2.3	-0.61	d
Emerald	1980	5.75	-28	-300	-1.3	-0.34		-56	-600	-2.6	-0.69	
Emerald	1971.5	7.75	-29	-340	-1.3	-0.36		-59	-680	-2.7	-0.73	
Emerald	1961.5	9.75	-20	-200	-0.94	-0.25		-41	-400	-1.9	-0.51	
Emerald	1958	10.5	-9.4	-120	-0.43	-0.12	d	-19	-240	-0.87	-0.23	
Emerald	1892	21.5	-5.8	-70	-0.33	-0.089		-12	-140	-0.67	-0.18	
Burial	2000	0.25	-1.3	-2000	-0.005	-0.002		-2.6	-4000	-0.011	-0.003	
Burial	1988	0.75	-0.96	-1600	-0.004	-0.001		-1.9	-3300	-0.008	-0.003	
Burial	1974	1.25	-1.3	-2300	-0.006	-0.002		-2.7	-4600	-0.012	-0.004	
Burial	1957	1.75	-1	-1900	-0.003	-0.001		-2.1	-3900	-0.007	-0.002	
Burial	1933	2.25	-1.1	-2100	-0.003	-0.001		-2.2	-4300	-0.007	-0.002	
Burial	1906	2.75	-1.1	-2100	-0.003	-0.001		-2.2	-4300	-0.007	-0.002	
Burial	1879	3.25	-0.92	-1800	-0.003	-0.001		-1.9	-3500	-0.006	-0.002	
Mcleod	2002	0.25	-200	-1700	-1	-0.4		-410	-3400	-2.1	-0.81	

Mcleod	1997	0.75	-92	-800	-0.51	-0.2		-180	-1600	-1	-0.4	d
Mcleod	1990	1.25	-58	-590	-0.37	-0.14		-120	-1200	-0.75	-0.29	
Mcleod	1982	1.75	-52	-560	-0.42	-0.16		-100	-1100	-0.85	-0.33	
Mcleod	1975	2.25	-53	-590	-0.55	-0.21		-110	-1200	-1.1	-0.43	
Mcleod	1969	2.75	-47	-530	-0.53	-0.2		-95	-1100	-1.1	-0.41	
Mcleod	1962	3.25	-45	-480	-0.36	-0.14		-90	-960	-0.73	-0.28	d
Mcleod	1952	3.75	-47	-520	-0.3	-0.12		-96	-1100	-0.6	-0.23	d
Mcleod	1907	6.25	-61	-560	-0.35	-0.13		-120	-1100	-0.7	-0.27	d
Matcharak	2001	0.25	-160		-0.67	-0.54		-330		-1.4	-1.1	
Matcharak	1993	0.75	-100	-820	-0.47	-0.38		-210	-1700	-0.95	-0.76	d
Matcharak	1983	1.25	-85	-690	-0.36	-0.29		-170	-1400	-0.74	-0.59	d
Matcharak	1971	1.75	-84	-710	-0.28	-0.22		-170	-1400	-0.56	-0.44	d
Matcharak	1954	2.25	-77	-690	-0.19	-0.15		-160	-1400	-0.39	-0.31	d
Matcharak	1937	2.75	-73	-690	-0.15	-0.12		-150	-1400	-0.31	-0.25	d
Matcharak	1910	3.25	-64	-630	-0.13	-0.1		-130	-1300	-0.26	-0.21	d
Wonder	2000	0.25	-50	-690	-0.37	-0.11		-100	-1400	-0.74	-0.21	
Wonder	1992	0.75	-59	-830	-0.45	-0.13		-120	-1700	-0.9	-0.26	
Wonder	1985	1.25	-46	-710	-0.33	-0.094		-92	-1400	-0.66	-0.19	
Wonder	1977	1.75	-42	-710	-0.28	-0.08		-85	-1400	-0.56	-0.16	d
Wonder	1968	2.25	-48	-800	-0.23	-0.065		-97	-1600	-0.45	-0.13	
Wonder	1949	2.75	-58	-970	-0.19	-0.054		-120	-2000	-0.38	-0.11	
Wonder	1919	3.25	-33	-630	-0.076	-0.022		-67	-1300	-0.15	-0.044	
Golden	2002.5	0.25	-260		-0.36	-0.36		-530		-0.72	-0.72	d
Golden	1996.5	0.75	-180		-0.55	-0.55		-360		-1.1	-1.1	d
Golden	1989.5	1.25	-100	-600	-0.38	-0.38		-210	-1200	-0.77	-0.77	d
Golden	1981.5	1.75	-120	-720	-0.44	-0.44		-250	-1500	-0.89	-0.89	d
Golden	1972.5	2.25	-120	-490	-0.35	-0.35		-240	-980	-0.7	-0.7	d
Golden	1962.5	2.75	-130	-540	-0.32	-0.32		-260	-1100	-0.64	-0.64	
Golden	1951	3.25	-120	-480	-0.26	-0.26		-250	-970	-0.53	-0.53	d
Golden	1924	4.25	-120	-450	-0.2	-0.2		-230	-920	-0.4	-0.4	d
LP 19	2004	0.25	-210	-1200	-2.3	-1.6		-430	-2300	-4.7	-3.2	d
LP 19	1999	1.25	-120		-1.1	-0.73		-230		-2.2	-1.5	d

LP 19	1994	2.25	-91	-500	-1	-0.67		-180	-1000	-2	-1.3	d
LP 19	1989	3.25	-110	-570	-0.89	-0.59		-210	-1200	-1.8	-1.2	d
LP 19	1980	4.25	-100	-570	-0.63	-0.42		-210	-1100	-1.3	-0.85	d
LP 19	1969	5.25	-96	-530	-0.5	-0.33		-190	-1100	-1	-0.67	d
LP 19	1956	6.25	-92	-490	-0.38	-0.25		-190	-990	-0.77	-0.51	d
LP 19	1903	10.5	-51	-300	-0.32	-0.21		-100	-600	-0.64	-0.43	d
Hoh	2004	0.25	-70	-350	-0.91	-0.29		-140	-700	-1.8	-0.59	d
Hoh	1998	1.25	-110	-620	-1	-0.33	d	-230	-1300	-2.1	-0.67	d
Hoh	1990.5	2.25	-83	-580	-0.92	-0.3	d	-170	-1200	-1.8	-0.59	d
Hoh	1983	3.25	-53	-500	-0.77	-0.25	d	-110	-1000	-1.5	-0.5	
Hoh	1973.5	4.25	-46	-510	-0.69	-0.22		-93	-1000	-1.4	-0.45	d
Hoh	1963	5.25	-47	-460	-0.63	-0.2		-94	-930	-1.3	-0.41	d
Hoh	1952.5	6.25	-35	-410	-0.69	-0.22		-71	-820	-1.4	-0.45	d
Hoh	1901	12.75	-10	-120	-0.21	-0.069		-21	-250	-0.43	-0.14	d
PJ	2004.5	0.25	-170	-1000	-4.6	-6		-330	-2100	-9.4	-12	
PJ	1999	2.75	-95	-580	-2.6	-3.3		-190	-1200	-5.2	-6.6	d
PJ	1992	4.75	-90	-550	-2.2	-2.8		-180	-1100	-4.4	-5.7	d
PJ	1984	6.75	-47	-310	-1.5	-2		-96	-620	-3.1	-4	d
PJ	1977.5	8.75	-49	-330	-2.7	-3.5		-100	-660	-5.4	-7	d
PJ	1968	11.5	-19		-0.54	-0.7		-38		-1.1	-1.4	d
PJ	1963	12.5	-18	-120	-0.75	-0.96		-37	-250	-1.5	-1.9	d
PJ	1955	15.5	-15	-100	-1.4	-1.8		-30	-200	-2.9	-3.7	d
Oldman	2003.5	0.25	-21	-400	-1.2	-0.26		-43	-810	-2.4	-0.52	
Oldman	1997	1.25	-23	-460	-0.99	-0.22		-46	-930	-2	-0.44	
Oldman	1987	2.25	-21	-390	-0.55	-0.12		-43	-790	-1.1	-0.24	d
Oldman	1980.5	2.75	-19	-370	-0.43	-0.095		-39	-750	-0.87	-0.19	d
Oldman	1973	3.25	-17	-360	-0.36	-0.078		-34	-730	-0.72	-0.16	d
Oldman	1963.5	3.75	-18	-410	-0.33	-0.072		-37	-830	-0.66	-0.15	d
Oldman	1952	4.25	-16	-380	-0.26	-0.056		-32	-760	-0.51	-0.11	d
Oldman	1906.5	6.25	-14	-400	-0.26	-0.056		-28	-810	-0.51	-0.11	d
Snyder	2004	0.25	-120	-910	-2.5	-1.8		-240	-1800	-5.1	-3.7	d
Snyder	2000	1.25	-77	-620	-1.4	-1		-150	-1300	-2.8	-2	d

Snyder	1991.5	2.75	-69	-620	-1.1	-0.78		-140	-1200	-2.1	-1.6	d
Snyder	1985	3.75	-67	-640	-1	-0.73		-130	-1300	-2	-1.5	d
Snyder	1978	4.75	-61	-620	-0.85	-0.62		-120	-1200	-1.7	-1.3	
Snyder	1967.5	5.75	-53	-560	-0.68	-0.5		-110	-1100	-1.4	-1	
Snyder	1954.5	6.75	-53	-530	-0.59	-0.43		-110	-1100	-1.2	-0.86	d
Snyder	1893	11.75	-22	-260	-0.18	-0.13		-45	-510	-0.36	-0.26	d

Site	Average Year (y)	Average Depth (cm)	CLPYR pg/g dw	CLPYR pg/g TOC	CLPYR Flux pg/cm2.y	CLPYR Flux (FF) pg/cm2.y	CLPYR FLAG	HCLR E pg/g dw	HCLR E pg/g TOC	HCLR E Flux pg/cm2.y	HCLR E Flux (FF) pg/cm2.y	HCLR E FLAG
Mills	2002	0.25	150	940	4.4	2.9		-55	-340	-1.6	-1.1	
Mills	2000	0.75	200	1400	5.8	3.9		-71	-500	-2.1	-1.4	
Mills	1996	1.75					X	-49	-330	-1.4	-0.93	
Mills	1991	2.75	69	530	1.7	1.1		-47	-360	-1.1	-0.75	
Mills	1988	3.25					X	-44	-360	-0.88	-0.6	
Mills	1974	4.75	72	660	1.4	0.92		-44	-400	-0.83	-0.56	
Mills	1970	5.25	69	630	1.7	1.1	d	-34	-310	-0.83	-0.56	
Mills	1964	6.25	36	290	1.1	0.78		-34	-280	-1.1	-0.74	
Mills	1954	7.75	56	500	1.7	1.2		-33	-290	-1	-0.67	
Mills	1947	8.75	30	260	0.75	0.5		-33	-290	-0.84	-0.56	
Mills	1938	9.75	30	270	0.65	0.44		-27	-250	-0.59	-0.4	
Mills	1905	17.5	30	240	0.66	0.44		-12	-100	-0.27	-0.18	
Lone Pine	2001	0.25	77	550	1.2	0.62		-43	-310	-0.64	-0.34	
Lone Pine	1998	0.75	67	520	1.1	0.57		-39	-300	-0.62	-0.33	
Lone Pine	1990	1.75	55	480	0.94	0.5		-43	-370	-0.73	-0.39	
Lone Pine	1986	2.25					X	-40	-330	-0.68	-0.36	
Lone Pine	1982	2.75	57	410	0.98	0.52		-43	-310	-0.74	-0.39	
Lone Pine	1973	3.75					X	-48	-340	-0.72	-0.38	
Lone Pine	1967	4.25					X	-53	-390	-0.8	-0.43	
Lone Pine	1961	4.75	89	790	1.3	0.67		-38	-330	-0.53	-0.28	
Lone Pine	1955	5.25	-0.53	-4.7	-0.007	-0.004		-39	-340	-0.5	-0.27	
Lone Pine	1949	5.75	-0.49	-4.3	-0.006	-0.003		-36	-310	-0.46	-0.25	
Lone Pine	1936	6.75	94	840	1.1	0.61		-43	-380	-0.51	-0.27	
Lone Pine	1920	7.75	43	400	0.52	0.28		-33	-310	-0.4	-0.21	

Lone Pine	1870	11.5	30	260	0.36	0.19	d	-14	-120	-0.17	-0.09	
Pear	2002	0.25					X	-120	-770	-1.4	-0.64	
Pear	2000	0.75					X	-89	-660	-1.1	-0.48	
Pear	1997	1.25					X	-92	-610	-1.1	-0.5	d
Pear	1991	2.25	77	570	0.92	0.42	a	-100	-770	-1.2	-0.56	
Pear	1980	3.75	2.5	17	0.028	0.012	a	-82	-550	-0.9	-0.4	
Pear	1969	5.25	48	370	0.53	0.24	a	-75	-560	-0.82	-0.37	
Pear	1961	6.25	14	110	0.2	0.091		-78	-570	-1.1	-0.49	d
Pear	1957	6.75					X	-57	-490	-0.8	-0.36	d
Pear	1926	10.5	6.4	57	0.052	0.023	a	-52	-460	-0.42	-0.19	
Pear	1872	14.5	-0.34	-3	-0.002	-0.001	d	-25	-220	-0.15	-0.067	d
Emerald	2002	0.25					X	-45	-520	-2.1	-0.56	
Emerald	1997	1.75	140	1600	6.4	1.7	d,e	-29	-320	-1.3	-0.35	d
Emerald	1989	3.75	130	1300	5.8	1.5	d,e	-26	-280	-1.2	-0.32	d
Emerald	1980	5.75					X	-30	-320	-1.4	-0.37	
Emerald	1971.5	7.75					X	-31	-360	-1.4	-0.39	
Emerald	1961.5	9.75	54	520	2.5	0.67	e	-22	-210	-1	-0.27	
Emerald	1958	10.5					Z	-10	-130	-0.47	-0.12	
Emerald	1892	21.5					Z	-6.3	-75	-0.36	-0.096	
Burial	2000	0.25					X	-1.4	-2100	-0.006	-0.002	
Burial	1988	0.75					X	-1	-1700	-0.004	-0.001	
Burial	1974	1.25					X	-1.4	-2500	-0.007	-0.002	
Burial	1957	1.75					X	-1.1	-2100	-0.004	-0.001	
Burial	1933	2.25					X	-1.2	-2300	-0.004	-0.001	
Burial	1906	2.75	8.4	16000	0.026	0.008	e	-1.2	-2300	-0.004	-0.001	
Burial	1879	3.25	8.3	16000	0.026	0.008		-0.99	-1900	-0.003	-0.001	
Mcleod	2002	0.25					X	-220	-1800	-1.1	-0.43	
Mcleod	1997	0.75	260	2200	1.4	0.55	d	-99	-860	-0.55	-0.21	
Mcleod	1990	1.25	27	270	0.17	0.066	a	-63	-630	-0.4	-0.15	
Mcleod	1982	1.75	170	1800	1.4	0.52		-56	-600	-0.45	-0.17	
Mcleod	1975	2.25	53	580	0.55	0.21		-57	-630	-0.59	-0.23	
Mcleod	1969	2.75	160	1800	1.8	0.69		-50	-560	-0.56	-0.22	

Mcleod	1962	3.25	170	1800	1.4	0.53	d	-48	-510	-0.39	-0.15	
Mcleod	1952	3.75	140	1600	0.91	0.35	d	-51	-560	-0.32	-0.12	
Mcleod	1907	6.25	220	2000	1.2	0.48	d	-65	-600	-0.37	-0.14	
Matcharak	2001	0.25	480		2	1.6		-180		-0.72	-0.58	
Matcharak	1993	0.75	320	2500	1.4	1.1	d	-110	-880	-0.51	-0.4	
Matcharak	1983	1.25	240	2000	1	0.82	d	-91	-740	-0.39	-0.31	
Matcharak	1971	1.75	220	1800	0.71	0.57	d	-90	-760	-0.3	-0.24	
Matcharak	1954	2.25	320	2800	0.79	0.64	d	-83	-740	-0.21	-0.17	
Matcharak	1937	2.75	230	2200	0.48	0.38	d	-79	-740	-0.17	-0.13	
Matcharak	1910	3.25	230	2200	0.46	0.37	d	-69	-680	-0.14	-0.11	
Wonder	2000	0.25	-0.73	-10	-0.005	-0.002		-53	-740	-0.4	-0.11	
Wonder	1992	0.75	-0.88	-12	-0.007	-0.002		-64	-890	-0.48	-0.14	
Wonder	1985	1.25	-0.67	-10	-0.005	-0.001		-49	-760	-0.35	-0.1	
Wonder	1977	1.75	-0.62	-10	-0.004	-0.001	d	-45	-760	-0.3	-0.086	
Wonder	1968	2.25	-0.71	-12	-0.003	-0.001		-52	-860	-0.24	-0.069	
Wonder	1949	2.75	-0.86	-14	-0.003	-0.001		-63	-1000	-0.2	-0.058	
Wonder	1919	3.25	-0.49	-9.2	-0.001	-0.00032		-36	-670	-0.082	-0.023	
Golden	2002.5	0.25	-3.9		-0.005	-0.005	d	-280		-0.38	-0.38	d
Golden	1996.5	0.75	-2.6		-0.008	-0.008	d	-190		-0.59	-0.59	d
Golden	1989.5	1.25	-1.5	-8.9	-0.006	-0.006	d	-110	-650	-0.41	-0.41	d
Golden	1981.5	1.75	-1.8	-11	-0.007	-0.007	d	-130	-780	-0.47	-0.47	d
Golden	1972.5	2.25	-1.7	-7.2	-0.005	-0.005	d	-130	-520	-0.37	-0.37	d
Golden	1962.5	2.75	-1.9	-8	-0.005	-0.005		-140	-580	-0.34	-0.34	
Golden	1951	3.25	-1.8	-7.1	-0.004	-0.004	d	-130	-520	-0.28	-0.28	d
Golden	1924	4.25	-1.7	-6.7	-0.003	-0.003	d	-130	-490	-0.21	-0.21	
LP 19	2004	0.25	-3.1	-17	-0.035	-0.023	d	-230	-1200	-2.5	-1.7	d
LP 19	1999	1.25	-1.7		-0.016	-0.011	d	-120		-1.2	-0.78	d
LP 19	1994	2.25	-1.3	-7.3	-0.015	-0.01	d	-98	-530	-1.1	-0.72	d
LP 19	1989	3.25	-1.6	-8.5	-0.013	-0.009	d	-110	-620	-0.96	-0.64	d
LP 19	1980	4.25	-1.5	-8.4	-0.009	-0.006	d	-110	-610	-0.68	-0.45	d
LP 19	1969	5.25	-1.4	-7.7	-0.007	-0.005	d	-100	-560	-0.53	-0.36	d
LP 19	1956	6.25	-1.4	-7.2	-0.006	-0.004	d	-99	-530	-0.41	-0.27	d

LP 19	1903	10.5	-0.75	-4.4	-0.005	-0.003	d	-55	-320	-0.34	-0.23	d
Hoh	2004	0.25					X	-76	-370	-0.98	-0.32	d
Hoh	1998	1.25					X	-120	-670	-1.1	-0.36	d
Hoh	1990.5	2.25					X	-89	-630	-0.98	-0.32	d
Hoh	1983	3.25					X	-57	-540	-0.83	-0.27	
Hoh	1973.5	4.25					X	-50	-550	-0.74	-0.24	d
Hoh	1963	5.25					X	-50	-500	-0.68	-0.22	d
Hoh	1952.5	6.25					X	-38	-440	-0.74	-0.24	d
Hoh	1901	12.75					X	-11	-130	-0.23	-0.074	d
PJ	2004.5	0.25	-2.4	-15	-0.068	-0.088	a	-180	-1100	-5	-6.4	d
PJ	1999	2.75	-1.4	-8.6	-0.038	-0.049	d	-100	-630	-2.8	-3.5	d
PJ	1992	4.75	-1.3	-8.2	-0.032	-0.042	a,d	-97	-600	-2.4	-3	d
PJ	1984	6.75	-0.7	-4.6	-0.023	-0.029	a,d	-51	-330	-1.7	-2.1	d
PJ	1977.5	8.75	-0.73	-4.8	-0.04	-0.051	d	-53	-350	-2.9	-3.7	d
PJ	1968	11.5	-0.28		-0.008	-0.01	d	-20		-0.58	-0.75	d
PJ	1963	12.5	-0.27	-1.8	-0.011	-0.014	d	-20	-130	-0.8	-1	d
PJ	1955	15.5	-0.22	-1.5	-0.021	-0.027	d	-16	-110	-1.5	-2	d
Oldman	2003.5	0.25	43	810	2.4	0.52		-23	-430	-1.3	-0.28	
Oldman	1997	1.25	-0.34	-6.8	-0.015	-0.003		-25	-500	-1.1	-0.23	d
Oldman	1987	2.25	31	570	0.8	0.18	d	-23	-420	-0.59	-0.13	
Oldman	1980.5	2.75	30	580	0.67	0.15	d	-21	-400	-0.46	-0.1	d
Oldman	1973	3.25	12	250	0.25	0.054	a,d	-18	-390	-0.38	-0.084	d
Oldman	1963.5	3.75	19	440	0.35	0.077	d	-20	-440	-0.35	-0.078	d
Oldman	1952	4.25	14	340	0.23	0.05	d	-17	-410	-0.27	-0.06	d
Oldman	1906.5	6.25	10	290	0.19	0.041	a,d	-15	-430	-0.27	-0.06	d
Snyder	2004	0.25	130	960	2.7	1.9	d	-130	-980	-2.7	-2	
Snyder	2000	1.25	89	720	1.6	1.2	d	-82	-670	-1.5	-1.1	d
Snyder	1991.5	2.75	73	660	1.1	0.82	d	-74	-670	-1.1	-0.84	d
Snyder	1985	3.75	42	400	0.63	0.46	d	-71	-690	-1.1	-0.78	d
Snyder	1978	4.75	50	510	0.7	0.51		-65	-670	-0.91	-0.67	d
Snyder	1967.5	5.75	44	470	0.57	0.41	a	-57	-610	-0.74	-0.54	d
Snyder	1954.5	6.75	42	420	0.47	0.34	d	-57	-570	-0.63	-0.46	d

Snyder	1893	11.75	21	240	0.17	0.12	d	-24	-270	-0.19	-0.14	

Site	Average Year (y)	Average Depth (cm)	o-CLDN pg/g dw	o-CLDN pg/g TOC	o-CLDN Flux pg/cm2.y	o-CLDN Flux (FF) pg/cm2.y	o-CLDN FLAG	t-CLDN pg/g dw	t-CLDN pg/g TOC	t-CLDN Flux pg/cm2.y	t-CLDN Flux (FF) pg/cm2.y	t-CLDN FLAG
Mills	2002	0.25	-7.5	-47	-0.22	-0.15		180	1100	5.2	3.5	
Mills	2000	0.75	-9.7	-68	-0.28	-0.19		160	1100	4.6	3.1	
Mills	1996	1.75	-6.7	-45	-0.19	-0.13		220	1500	6.2	4.2	
Mills	1991	2.75	-6.4	-49	-0.15	-0.1		240	1800	5.7	3.9	
Mills	1988	3.25	-6	-50	-0.12	-0.082		200	1600	3.9	2.6	
Mills	1974	4.75	-6	-55	-0.11	-0.077		200	1900	3.9	2.6	
Mills	1970	5.25	-4.7	-43	-0.11	-0.076		170	1500	4	2.7	
Mills	1964	6.25	-4.7	-39	-0.15	-0.1		170	1400	5.5	3.7	
Mills	1954	7.75	-4.5	-39	-0.14	-0.092		95	830	2.9	2	
Mills	1947	8.75	-4.6	-40	-0.11	-0.077		34	300	0.85	0.57	
Mills	1938	9.75	-3.7	-34	-0.081	-0.055		21	190	0.45	0.31	
Mills	1905	17.5	-1.7	-14	-0.037	-0.025		-0.28	-2.3	-0.006	-0.004	
Lone Pine	2001	0.25	-5.9	-42	-0.088	-0.047		74	530	1.1	0.59	
Lone Pine	1998	0.75	-5.3	-41	-0.085	-0.045		85	650	1.4	0.72	
Lone Pine	1990	1.75	-5.9	-50	-0.1	-0.053		130	1100	2.3	1.2	
Lone Pine	1986	2.25	-5.5	-45	-0.093	-0.05		120	1000	2.1	1.1	
Lone Pine	1982	2.75	-5.9	-43	-0.1	-0.054		160	1100	2.7	1.4	
Lone Pine	1973	3.75	-6.5	-47	-0.098	-0.052		140	970	2	1.1	
Lone Pine	1967	4.25	-7.3	-53	-0.11	-0.059		150	1100	2.3	1.2	
Lone Pine	1961	4.75	-5.2	-45	-0.072	-0.039		110	1000	1.6	0.85	
Lone Pine	1955	5.25	-5.3	-46	-0.069	-0.037		100	900	1.3	0.71	
Lone Pine	1949	5.75	-4.9	-43	-0.063	-0.034		87	760	1.1	0.6	
Lone Pine	1936	6.75	-5.8	-52	-0.07	-0.037		83	740	0.99	0.53	
Lone Pine	1920	7.75	-4.6	-42	-0.055	-0.029		30	280	0.36	0.19	
Lone Pine	1870	11.5	-1.9	-17	-0.023	-0.012		-0.32	-2.8	-0.004	-0.002	
Pear	2002	0.25	-16	-110	-0.19	-0.087		540	3500	6.5	2.9	
Pear	2000	0.75	-12	-90	-0.15	-0.066		760	5600	9.1	4.1	
Pear	1997	1.25	-13	-84	-0.15	-0.068	d	560	3700	6.7	3	de

Pear	1991	2.25	-14	-110	-0.17	-0.077		1300	10000	16	7.3	
Pear	1980	3.75	-11	-75	-0.12	-0.055		2300	16000	26	12	
Pear	1969	5.25	-10	-77	-0.11	-0.051		1300	10000	15	6.6	
Pear	1961	6.25	-11	-78	-0.15	-0.068	d	800	5800	11	5	d
Pear	1957	6.75	-7.8	-67	-0.11	-0.049	d	430	3700	6.1	2.7	d
Pear	1926	10.5	-7.2	-63	-0.057	-0.026		84	740	0.67	0.3	
Pear	1872	14.5	-3.4	-30	-0.02	-0.009	d	22	200	0.13	0.059	d
Emerald	2002	0.25	-6.2	-71	-0.29	-0.076		360	4100	16	4.4	
Emerald	1997	1.75	-3.9	-44	-0.18	-0.048	d	250	2800	12	3.1	d
Emerald	1989	3.75	-3.6	-38	-0.17	-0.044	d	220	2400	10	2.8	d
Emerald	1980	5.75	-4.1	-44	-0.19	-0.05		470	5100	22	5.8	
Emerald	1971.5	7.75	-4.3	-50	-0.2	-0.053		510	5900	24	6.3	
Emerald	1961.5	9.75	-3	-29	-0.14	-0.037		360	3500	17	4.4	
Emerald	1958	10.5	-1.4	-18	-0.064	-0.017		200	2500	9.1	2.4	
Emerald	1892	21.5	-0.86	-10	-0.049	-0.013		2.1	25	0.12	0.032	a
Burial	2000	0.25	-0.19	-290	-0.001	-0.00025		0.6	910	0.002	0.001	a
Burial	1988	0.75	-0.14	-240	-0.001	-0.00019		0.6	1000	0.002	0.001	a
Burial	1974	1.25	-0.2	-340	-0.001	-0.00029		0.83	1400	0.004	0.001	a
Burial	1957	1.75	-0.15	-280	-0.001	-0.00016		0.55	1000	0.002	0.001	a
Burial	1933	2.25	-0.16	-310	-0.00049	-0.00016		0.54	1100	0.002	0.001	a
Burial	1906	2.75	-0.16	-310	-0.0005	-0.00016		0.36	700	0.001	0.00036	a
Burial	1879	3.25	-0.14	-260	-0.00042	-0.00014		0.31	580	0.001	0.00031	a
Mcleod	2002	0.25	-30	-250	-0.15	-0.059		68	560	0.34	0.13	a
Mcleod	1997	0.75	-13	-120	-0.076	-0.029		30	270	0.17	0.065	a
Mcleod	1990	1.25	-8.6	-87	-0.055	-0.021		21	210	0.14	0.052	a
Mcleod	1982	1.75	-7.6	-82	-0.062	-0.024		19	200	0.15	0.059	a
Mcleod	1975	2.25	-7.8	-86	-0.081	-0.031		25	270	0.25	0.098	a
Mcleod	1969	2.75	-6.9	-77	-0.077	-0.03		19	210	0.21	0.08	a
Mcleod	1962	3.25	-6.6	-70	-0.054	-0.021		16	170	0.13	0.051	a
Mcleod	1952	3.75	-7	-77	-0.044	-0.017		17	190	0.11	0.042	a
Mcleod	1907	6.25	-8.9	-82	-0.051	-0.02		68	630	0.39	0.15	a
Matcharak	2001	0.25	-24		-0.099	-0.079		60		0.25	0.2	a

Matcharak	1993	0.75	-15	-120	-0.069	-0.055		35	270	0.16	0.12	a
Matcharak	1983	1.25	-12	-100	-0.054	-0.043		25	210	0.11	0.087	a
Matcharak	1971	1.75	-12	-100	-0.041	-0.032		30	260	0.1	0.08	a
Matcharak	1954	2.25	-11	-100	-0.028	-0.023		33	300	0.083	0.067	a
Matcharak	1937	2.75	-11	-100	-0.023	-0.018		27	250	0.056	0.045	a
Matcharak	1910	3.25	-9.5	-93	-0.019	-0.015		21	210	0.043	0.034	a
Wonder	2000	0.25	-7.3	-100	-0.054	-0.016		-1.2	-17	-0.009	-0.003	
Wonder	1992	0.75	-8.8	-120	-0.066	-0.019		-1.5	-20	-0.011	-0.003	
Wonder	1985	1.25	-6.7	-100	-0.048	-0.014		-1.1	-17	-0.008	-0.002	
Wonder	1977	1.75	-6.2	-100	-0.041	-0.012		-1	-17	-0.007	-0.002	
Wonder	1968	2.25	-7.1	-120	-0.033	-0.01		-1.2	-19	-0.006	-0.002	
Wonder	1949	2.75	-8.6	-140	-0.028	-0.008		-1.4	-24	-0.005	-0.001	
Wonder	1919	3.25	-4.9	-92	-0.011	-0.003		-0.81	-15	-0.002	-0.001	
Golden	2002.5	0.25	-39		-0.052	-0.052	d	300		0.4	0.4	d
Golden	1996.5	0.75	-26		-0.081	-0.081	d	510		1.6	1.6	d
Golden	1989.5	1.25	-15	-89	-0.056	-0.056	d	310	1800	1.2	1.2	d
Golden	1981.5	1.75	-18	-110	-0.065	-0.065	d	370	2200	1.3	1.3	d
Golden	1972.5	2.25	-17	-72	-0.051	-0.051	d	390	1600	1.1	1.1	d
Golden	1962.5	2.75	-19	-80	-0.047	-0.047		310	1300	0.77	0.77	
Golden	1951	3.25	-18	-71	-0.039	-0.039	d	150	570	0.32	0.32	d
Golden	1924	4.25	-17	-67	-0.029	-0.029		27	110	0.046	0.046	a
LP 19	2004	0.25	-31	-170	-0.35	-0.23	d	71	380	0.78	0.52	d,a
LP 19	1999	1.25	-17		-0.16	-0.11	d	92		0.87	0.58	d,a
LP 19	1994	2.25	-13	-73	-0.15	-0.098	d	84	460	0.93	0.62	d
LP 19	1989	3.25	-15	-84	-0.13	-0.087	d	70	380	0.59	0.39	a,d
LP 19	1980	4.25	-15	-84	-0.093	-0.062	d	69	380	0.42	0.28	d,a
LP 19	1969	5.25	-14	-77	-0.073	-0.049	d	47	260	0.25	0.16	a,d
LP 19	1956	6.25	-14	-72	-0.056	-0.037	d	46	240	0.19	0.13	a,d
LP 19	1903	10.5	-7.5	-44	-0.047	-0.031	d	14	79	0.084	0.056	a,d
Hoh	2004	0.25	-10	-51	-0.13	-0.043	d					X
Hoh	1998	1.25	-17	-91	-0.15	-0.049	d					X
Hoh	1990.5	2.25	-12	-86	-0.13	-0.043	d					X

Site	Average Year (y)	Average Depth (cm)	ENDO I pg/g dw	ENDO I pg/g TOC	ENDO I Flux pg/cm2.y	ENDO I Flux (FF)	ENDO I FLAG	c-CLDN pg/g dw	c-CLDN pg/g TOC	c-CLDN Flux pg/cm2.y	c-CLDN Flux (FF)	c-CLDN FLAG
Hoh	1983	3.25	-7.8	-74	-0.11	-0.037						X
Hoh	1973.5	4.25	-6.8	-75	-0.1	-0.033	d					X
Hoh	1963	5.25	-6.9	-68	-0.093	-0.03	d	-1.1	-11	-0.015	-0.005	a,d,e
Hoh	1952.5	6.25	-5.2	-60	-0.1	-0.033	d	18	200	0.34	0.11	a,d,e
Hoh	1901	12.75	-1.5	-18	-0.032	-0.01	d					X
PJ	2004.5	0.25	-24	-150	-0.68	-0.88	d	-4	-25	-0.11	-0.15	a,d
PJ	1999	2.75	-14	-86	-0.38	-0.49	d	-2.3	-14	-0.063	-0.08	a,d
PJ	1992	4.75	-13	-82	-0.32	-0.42	d	-2.2	-14	-0.054	-0.069	a,d
PJ	1984	6.75	-7	-46	-0.23	-0.29	d	-1.2	-7.5	-0.038	-0.048	a,d
PJ	1977.5	8.75	-7.3	-48	-0.4	-0.51	d	-1.2	-8	-0.066	-0.084	d
PJ	1968	11.5	-2.8		-0.08	-0.1	d	-0.46		-0.013	-0.017	d
PJ	1963	12.5	-2.7	-18	-0.11	-0.14	d	9	62	0.37	0.48	d
PJ	1955	15.5	-2.2	-15	-0.21	-0.27	d	-0.36	-2.4	-0.035	-0.045	d
Oldman	2003.5	0.25	-3.1	-59	-0.17	-0.038		18	350	1	0.22	
Oldman	1997	1.25	-3.4	-68	-0.15	-0.032	d	21	410	0.88	0.19	d
Oldman	1987	2.25	-3.1	-58	-0.081	-0.018		41	760	1.1	0.23	
Oldman	1980.5	2.75	-2.8	-55	-0.063	-0.014	d	27	520	0.6	0.13	d
Oldman	1973	3.25	-2.5	-53	-0.052	-0.012	d	34	720	0.71	0.16	d
Oldman	1963.5	3.75	-2.7	-61	-0.048	-0.011	d	26	590	0.47	0.1	d
Oldman	1952	4.25	-2.3	-56	-0.038	-0.008	d	23	550	0.37	0.082	d
Oldman	1906.5	6.25	-2	-59	-0.038	-0.008	d	-0.34	-9.8	-0.006	-0.001	d
Snyder	2004	0.25	-18	-130	-0.37	-0.27		7.9	60	0.17	0.12	a
Snyder	2000	1.25	-11	-92	-0.2	-0.15	d	5.1	41	0.091	0.067	a,d
Snyder	1991.5	2.75	-10	-91	-0.16	-0.11	d	6.8	62	0.11	0.077	a,d
Snyder	1985	3.75	-9.8	-94	-0.15	-0.11	d	8.8	85	0.13	0.096	a,d
Snyder	1978	4.75	-8.9	-91	-0.13	-0.091	d	14	140	0.2	0.14	a,d
Snyder	1967.5	5.75	-7.7	-83	-0.1	-0.074	d	12	130	0.16	0.12	a,d
Snyder	1954.5	6.75	-7.8	-78	-0.086	-0.063	d	18	180	0.19	0.14	a,d
Snyder	1893	11.75	-3.3	-38	-0.026	-0.019		3	34	0.024	0.017	a

						pg/cm2.y					pg/cm2.y	
Mills	2002	0.25	49	310	1.4	0.96		-11	-70	-0.33	-0.22	
Mills	2000	0.75	66	460	1.9	1.3		-15	-100	-0.42	-0.29	
Mills	1996	1.75	27	180	0.76	0.51	a	-10	-68	-0.28	-0.19	
Mills	1991	2.75	82	630	2	1.3		-9.6	-73	-0.23	-0.16	
Mills	1988	3.25	31	260	0.63	0.42	a	-9.1	-75	-0.18	-0.12	
Mills	1974	4.75	41	370	0.77	0.52		-9	-83	-0.17	-0.12	
Mills	1970	5.25	20	180	0.48	0.33	a	-7.1	-64	-0.17	-0.11	
Mills	1964	6.25	32	260	1	0.68		-7	-58	-0.23	-0.15	
Mills	1954	7.75	22	200	0.68	0.46	a	-6.7	-59	-0.21	-0.14	
Mills	1947	8.75	18	150	0.44	0.3	a	-6.9	-61	-0.17	-0.12	
Mills	1938	9.75	-2.4	-22	-0.053	-0.036		-5.5	-50	-0.12	-0.082	
Mills	1905	17.5	-1.1	-9.1	-0.024	-0.016		-2.5	-21	-0.055	-0.037	
Lone Pine	2001	0.25	49	350	0.73	0.39		-8.8	-63	-0.13	-0.071	
Lone Pine	1998	0.75	66	510	1	0.56		-8	-61	-0.13	-0.068	c
Lone Pine	1990	1.75	38	330	0.65	0.35		-8.8	-76	-0.15	-0.08	
Lone Pine	1986	2.25	-3.6	-30	-0.062	-0.033		-8.2	-68	-0.14	-0.075	
Lone Pine	1982	2.75	70	500	1.2	0.63		-8.9	-64	-0.15	-0.081	c
Lone Pine	1973	3.75	-4.3	-31	-0.065	-0.035		-9.8	-71	-0.15	-0.079	
Lone Pine	1967	4.25	-4.8	-35	-0.073	-0.039		-11	-79	-0.16	-0.088	
Lone Pine	1961	4.75	31	280	0.44	0.23		-7.7	-68	-0.11	-0.058	
Lone Pine	1955	5.25	-3.5	-31	-0.046	-0.024		-8	-70	-0.1	-0.055	
Lone Pine	1949	5.75	13	120	0.17	0.091	a	-7.3	-64	-0.095	-0.051	
Lone Pine	1936	6.75	-3.9	-34	-0.046	-0.025		-8.7	-78	-0.1	-0.056	
Lone Pine	1920	7.75	14	130	0.17	0.092	a	-6.8	-63	-0.082	-0.044	
Lone Pine	1870	11.5	17	150	0.21	0.11		-2.9	-25	-0.034	-0.018	
Pear	2002	0.25	860	5600	10	4.6		-24	-160	-0.29	-0.13	c
Pear	2000	0.75	640	4800	7.7	3.5		630	4600	7.5	3.4	c
Pear	1997	1.25	630	4200	7.6	3.4	d	570	3800	6.9	3.1	c,d
Pear	1991	2.25	570	4200	6.8	3.1		1200	8700	14	6.3	c
Pear	1980	3.75	390	2600	4.3	1.9		1600	11000	17	7.8	c
Pear	1969	5.25	620	4700	6.8	3.1		1200	9200	13	6	c
Pear	1961	6.25	220	1600	3	1.4	d	560	4100	7.9	3.6	c,d
Pear	1957	6.75	-5.2	-45	-0.072	-0.033	d	310	2700	4.3	1.9	c,d

Pear	1926	10.5	-4.7	-42	-0.038	-0.017		-11	-95	-0.086	-0.039	c
Pear	1872	14.5	-2.2	-20	-0.013	-0.006	d	-5.1	-45	-0.03	-0.014	c,d
Emerald	2002	0.25	170	1900	7.6	2		280	3200	13	3.4	
Emerald	1997	1.75	150	1700	7	1.9	d	970	11000	45	12	d
Emerald	1989	3.75	100	1100	4.8	1.3	d	800	8400	37	9.9	d
Emerald	1980	5.75	140	1500	6.4	1.7	e	1600	17000	73	20	
Emerald	1971.5	7.75	82	960	3.8	1		340	3900	16	4.2	
Emerald	1961.5	9.75	69	670	3.2	0.85		750	7200	34	9.2	
Emerald	1958	10.5	58	730	2.7	0.71	e	790	10000	37	9.8	
Emerald	1892	21.5	0.39	4.6	0.022	0.006	a	-1.3	-15	-0.073	-0.02	
Burial	2000	0.25	-0.13	-190	-0.001	-0.00016		-0.29	-430	-0.001	-0.00037	
Burial	1988	0.75	-0.093	-160	-0.00038	-0.00012		-0.21	-360	-0.001	-0.00028	
Burial	1974	1.25	-0.13	-220	-0.001	-0.00019		-0.29	-510	-0.001	-0.00043	
Burial	1957	1.75	-0.1	-190	-0.00033	-0.00011		-0.23	-420	-0.001	-0.00024	
Burial	1933	2.25	-0.11	-210	-0.00033	-0.00011		-0.24	-470	-0.001	-0.00024	
Burial	1906	2.75	-0.11	-210	-0.00033	-0.00011		-0.24	-470	-0.001	-0.00024	
Burial	1879	3.25	-0.09	-170	-0.00028	-9E-05		-0.2	-390	-0.001	-0.0002	
Mcleod	2002	0.25	-20	-160	-0.1	-0.039		-45	-370	-0.23	-0.088	
Mcleod	1997	0.75	-8.9	-78	-0.05	-0.019		-20	-180	-0.11	-0.044	
Mcleod	1990	1.25	-5.7	-57	-0.036	-0.014		-13	-130	-0.082	-0.032	
Mcleod	1982	1.75	-5.1	-55	-0.041	-0.016		-11	-120	-0.093	-0.036	
Mcleod	1975	2.25	-5.1	-57	-0.054	-0.021		-12	-130	-0.12	-0.047	
Mcleod	1969	2.75	-4.6	-51	-0.051	-0.02		-10	-120	-0.12	-0.045	
Mcleod	1962	3.25	-4.4	-46	-0.035	-0.014		-9.9	-110	-0.08	-0.031	
Mcleod	1952	3.75	-4.6	-51	-0.029	-0.011		-10	-120	-0.066	-0.025	
Mcleod	1907	6.25	-5.9	-54	-0.034	-0.013		-13	-120	-0.076	-0.029	
Matcharak	2001	0.25	-16		-0.066	-0.052		-36		-0.15	-0.12	
Matcharak	1993	0.75	-10	-80	-0.046	-0.037		-23	-180	-0.1	-0.083	
Matcharak	1983	1.25	-8.3	-68	-0.036	-0.028		-19	-150	-0.081	-0.064	
Matcharak	1971	1.75	-8.1	-69	-0.027	-0.021		-18	-160	-0.061	-0.049	
Matcharak	1954	2.25	-7.5	-67	-0.019	-0.015		-17	-150	-0.043	-0.034	
Matcharak	1937	2.75	-7.1	-67	-0.015	-0.012		-16	-150	-0.034	-0.027	

Matcharak	1910	3.25	-6.3	-61	-0.013	-0.01		-14	-140	-0.028	-0.023	
Wonder	2000	0.25	-4.8	-67	-0.036	-0.01		-11	-150	-0.081	-0.023	
Wonder	1992	0.75	-5.8	-81	-0.043	-0.012		-13	-180	-0.098	-0.028	
Wonder	1985	1.25	-4.4	-69	-0.032	-0.009		-10	-160	-0.072	-0.021	
Wonder	1977	1.75	-4.1	-69	-0.027	-0.008		-9.3	-160	-0.062	-0.018	
Wonder	1968	2.25	-4.7	-78	-0.022	-0.006		-11	-180	-0.05	-0.014	
Wonder	1949	2.75	-5.7	-95	-0.018	-0.005		-13	-210	-0.041	-0.012	
Wonder	1919	3.25	-3.2	-61	-0.007	-0.002		-7.3	-140	-0.017	-0.005	
Golden	2002.5	0.25	370		0.49	0.49	d	-58		-0.078	-0.078	d
Golden	1996.5	0.75	360		1.1	1.1	d	-39		-0.12	-0.12	d
Golden	1989.5	1.25	120	700	0.44	0.44	d	-23	-130	-0.085	-0.085	d
Golden	1981.5	1.75	93	550	0.34	0.34	a,d	-27	-160	-0.097	-0.097	d
Golden	1972.5	2.25	93	390	0.27	0.27	a,d	-26	-110	-0.076	-0.076	d
Golden	1962.5	2.75	110	470	0.27	0.27		-29	-120	-0.07	-0.07	
Golden	1951	3.25	-12	-47	-0.026	-0.026	d	-27	-110	-0.058	-0.058	d
Golden	1924	4.25	89	350	0.15	0.15	a	-26	-100	-0.044	-0.044	
LP 19	2004	0.25	400	2200	4.4	3	d,a	-47	-260	-0.52	-0.35	d
LP 19	1999	1.25	230		2.1	1.4	d,a	-25		-0.24	-0.16	d
LP 19	1994	2.25	200	1100	2.2	1.5	a,d	-20	-110	-0.22	-0.15	d
LP 19	1989	3.25	140	740	1.1	0.77	a,d	-23	-130	-0.2	-0.13	d
LP 19	1980	4.25	97	530	0.59	0.39	d,a	-23	-130	-0.14	-0.093	d
LP 19	1969	5.25	98	540	0.51	0.34	a,d	-21	-120	-0.11	-0.073	d
LP 19	1956	6.25	94	500	0.39	0.26	a,d	-20	-110	-0.084	-0.056	d
LP 19	1903	10.5	44	260	0.27	0.18	a,d	-11	-66	-0.07	-0.047	d
Hoh	2004	0.25	21	100	0.27	0.088	a,d	-16	-76	-0.2	-0.065	d
Hoh	1998	1.25	38	210	0.34	0.11	a,d	-25	-140	-0.23	-0.073	d
Hoh	1990.5	2.25	-8.1	-57	-0.089	-0.029	d	-18	-130	-0.2	-0.065	d
Hoh	1983	3.25	-5.2	-49	-0.075	-0.024		-12	-110	-0.17	-0.055	
Hoh	1973.5	4.25	-4.5	-50	-0.067	-0.022		-10	-110	-0.15	-0.049	d
Hoh	1963	5.25	-4.6	-45	-0.062	-0.02	d	-10	-100	-0.14	-0.045	d
Hoh	1952.5	6.25	-3.4	-40	-0.067	-0.022	d	-7.8	-90	-0.15	-0.049	d
Hoh	1901	12.75	-1	-12	-0.021	-0.007	d	-2.3	-27	-0.047	-0.015	d

PJ	2004.5	0.25	49	310	1.4	1.8	a,d	-37	-230	-1	-1.3	d
PJ	1999	2.75	32	190	0.85	1.1	d	-21	-130	-0.57	-0.73	d
PJ	1992	4.75	21	130	0.51	0.65	a,d	-20	-120	-0.49	-0.62	d
PJ	1984	6.75	22	140	0.71	0.92	a,d	-10	-68	-0.34	-0.44	d
PJ	1977.5	8.75	18	120	0.98	1.3	d	-11	-72	-0.59	-0.76	d
PJ	1968	11.5	6.8		0.2	0.25	d	-4.1		-0.12	-0.15	d
PJ	1963	12.5	3	21	0.12	0.16	d	-4	-28	-0.16	-0.21	d
PJ	1955	15.5	4.9	33	0.48	0.61	d	-3.3	-22	-0.32	-0.41	d
Oldman	2003.5	0.25	16	290	0.86	0.19	a	-4.7	-89	-0.26	-0.057	
Oldman	1997	1.25	17	340	0.72	0.16	a,d	-5.1	-100	-0.22	-0.048	d
Oldman	1987	2.25	32	600	0.84	0.18		-4.7	-87	-0.12	-0.027	
Oldman	1980.5	2.75	19	370	0.43	0.094	a,d	-4.2	-83	-0.095	-0.021	d
Oldman	1973	3.25	20	420	0.41	0.091	a,d	-3.7	-80	-0.079	-0.017	d
Oldman	1963.5	3.75	11	250	0.2	0.043	a,d	-4	-91	-0.073	-0.016	d
Oldman	1952	4.25	14	330	0.22	0.048	a,d	-3.5	-84	-0.056	-0.012	d
Oldman	1906.5	6.25	-1.3	-39	-0.025	-0.005	d	-3	-89	-0.056	-0.012	d
Snyder	2004	0.25	56	420	1.2	0.85	a	-26	-200	-0.56	-0.41	
Snyder	2000	1.25	30	250	0.55	0.4	a,d	-17	-140	-0.3	-0.22	d
Snyder	1991.5	2.75	23	210	0.35	0.26	a,d	-15	-140	-0.24	-0.17	d
Snyder	1985	3.75	24	230	0.36	0.27	a,d	-15	-140	-0.22	-0.16	d
Snyder	1978	4.75	20	210	0.28	0.21	a,d	-13	-140	-0.19	-0.14	d
Snyder	1967.5	5.75	17	190	0.23	0.17	a,d	-12	-120	-0.15	-0.11	d
Snyder	1954.5	6.75	18	180	0.19	0.14	a,d	-12	-120	-0.13	-0.094	d
Snyder	1893	11.75	16	180	0.12	0.091	a	-4.9	-56	-0.039	-0.029	

Site	Average Year (y)	Average Depth (cm)	t-NCLR pg/g dw	t-NCLR pg/g TOC	t-NCLR Flux pg/cm2.y	t-NCLR Flux (FF) pg/cm2.y	t-NCLR FLAG	Dieldrin pg/g dw	Dieldrin pg/g TOC	Dieldrin Flux pg/cm2.y	Dieldrin Flux (FF) pg/cm2.y	Dieldrin FLAG
Mills	2002	0.25	200	1200	5.7	3.9		340	2100	9.7	6.6	
Mills	2000	0.75	170	1200	5	3.4		150	1100	4.4	3	
Mills	1996	1.75	210	1400	6	4.1		87	590	2.4	1.7	
Mills	1991	2.75	200	1500	4.8	3.3		260	2000	6.3	4.3	

Mills	1988	3.25	170	1400	3.5	2.4		130	1100	2.6	1.8	
Mills	1974	4.75	160	1400	3	2		140	1200	2.6	1.7	
Mills	1970	5.25	120	1100	2.9	1.9		90	820	2.2	1.5	
Mills	1964	6.25	82	680	2.6	1.8		-44	-360	-1.4	-0.95	
Mills	1954	7.75	37	330	1.1	0.77		-42	-370	-1.3	-0.87	
Mills	1947	8.75	12	110	0.31	0.21	a	-43	-380	-1.1	-0.73	
Mills	1938	9.75	4.1	38	0.091	0.061	a	-34	-320	-0.76	-0.51	
Mills	1905	17.5	-0.5	-4.1	-0.011	-0.007		-16	-130	-0.35	-0.23	
Lone Pine	2001	0.25	70	500	1.1	0.56		230	1700	3.5	1.9	
Lone Pine	1998	0.75	62	480	0.99	0.53		120	900	1.9	1	
Lone Pine	1990	1.75	63	550	1.1	0.58		140	1200	2.3	1.2	
Lone Pine	1986	2.25	61	500	1	0.55		98	800	1.7	0.89	
Lone Pine	1982	2.75	56	400	0.95	0.51		130	950	2.3	1.2	
Lone Pine	1973	3.75	56	400	0.84	0.45		94	680	1.4	0.75	
Lone Pine	1967	4.25	61	440	0.91	0.49		160	1100	2.3	1.3	
Lone Pine	1961	4.75	34	300	0.47	0.25		-48	-430	-0.68	-0.36	
Lone Pine	1955	5.25	39	340	0.51	0.27		-50	-440	-0.65	-0.35	
Lone Pine	1949	5.75	31	270	0.4	0.21		-46	-400	-0.59	-0.32	
Lone Pine	1936	6.75	-1.7	-16	-0.021	-0.011	a	-55	-490	-0.66	-0.35	
Lone Pine	1920	7.75	-1.4	-13	-0.016	-0.009		-43	-400	-0.51	-0.27	
Lone Pine	1870	11.5	-0.57	-5.1	-0.007	-0.004		-18	-160	-0.22	-0.12	
Pear	2002	0.25	560	3700	6.7	3		3100	20000	37	17	
Pear	2000	0.75	860	6400	10	4.7		1000	7400	12	5.4	
Pear	1997	1.25	620	4200	7.5	3.4	d	620	4100	7.4	3.3	d
Pear	1991	2.25	1000	7800	13	5.7		1700	12000	20	8.9	
Pear	1980	3.75	1600	11000	18	7.9		2300	15000	25	11	
Pear	1969	5.25	620	4700	6.8	3.1		3900	30000	43	20	
Pear	1961	6.25	250	1800	3.5	1.6	d	4800	35000	68	30	d
Pear	1957	6.75	140	1200	2	0.91	d	3500	30000	49	22	d
Pear	1926	10.5	61	540	0.49	0.22		-67	-590	-0.54	-0.24	
Pear	1872	14.5	-1	-9	-0.006	-0.003	d	-32	-280	-0.19	-0.085	d
Emerald	2002	0.25	510	5800	23	6.2		-58	-660	-2.7	-0.72	
Emerald	1997	1.75	350	3900	16	4.3	d	-37	-410	-1.7	-0.45	d

Emerald	1989	3.75	320	3300	15	3.9	d	-34	-350	-1.6	-0.42	d
Emerald	1980	5.75	570	6100	26	7		-38	-410	-1.8	-0.47	
Emerald	1971.5	7.75	540	6300	25	6.7		130	1600	6.2	1.7	
Emerald	1961.5	9.75	320	3100	15	3.9		220	2200	10	2.8	
Emerald	1958	10.5	150	1900	6.8	1.8		-13	-160	-0.6	-0.16	
Emerald	1892	21.5	0.96	12	0.055	0.015	a	-8	-96	-0.46	-0.12	
Burial	2000	0.25	0.52	780	0.002	0.001	a,c	-1.8	-2700	-0.007	-0.002	
Burial	1988	0.75	0.82	1400	0.003	0.001	c	-1.3	-2200	-0.005	-0.002	
Burial	1974	1.25	0.92	1600	0.004	0.001	a,c	-1.8	-3200	-0.008	-0.003	
Burial	1957	1.75	0.45	830	0.001	0.00048	a,c	-1.4	-2700	-0.005	-0.002	
Burial	1933	2.25	0.29	560	0.001	0.00029	a,c	-1.5	-2900	-0.005	-0.001	
Burial	1906	2.75	-0.048	-93	-0.00015	-4.8E-05	c	-1.5	-2900	-0.005	-0.002	
Burial	1879	3.25	0.061	120	0.00019	6.1E-05	a,c	-1.3	-2400	-0.004	-0.001	
Mcleod	2002	0.25	74	610	0.38	0.15	a	-280	-2300	-1.4	-0.55	
Mcleod	1997	0.75	39	350	0.22	0.085	a	-130	-1100	-0.71	-0.27	
Mcleod	1990	1.25	25	250	0.16	0.062	a	-80	-810	-0.51	-0.2	
Mcleod	1982	1.75	21	220	0.17	0.064	a	-72	-770	-0.58	-0.22	
Mcleod	1975	2.25	21	230	0.22	0.084	a	-73	-810	-0.76	-0.29	
Mcleod	1969	2.75	16	170	0.17	0.067	a	-65	-730	-0.73	-0.28	
Mcleod	1962	3.25	16	170	0.13	0.051	a	-62	-660	-0.5	-0.19	
Mcleod	1952	3.75	19	210	0.12	0.046	a	-65	-720	-0.41	-0.16	
Mcleod	1907	6.25	76	700	0.44	0.17	a	-84	-770	-0.48	-0.18	
Matcharak	2001	0.25	100		0.42	0.34	a	-230		-0.93	-0.74	
Matcharak	1993	0.75	62	490	0.28	0.22	a	-140	-1100	-0.65	-0.52	
Matcharak	1983	1.25	42	340	0.18	0.14	a	-120	-960	-0.5	-0.4	
Matcharak	1971	1.75	44	380	0.15	0.12	a	-120	-980	-0.38	-0.3	
Matcharak	1954	2.25	38	340	0.096	0.077	a	-110	-950	-0.27	-0.21	
Matcharak	1937	2.75	32	300	0.066	0.053	a	-100	-950	-0.21	-0.17	
Matcharak	1910	3.25	19	190	0.038	0.031	a	-89	-870	-0.18	-0.14	
Wonder	2000	0.25	63	870	0.46	0.13		-69	-960	-0.51	-0.15	
Wonder	1992	0.75	55	770	0.41	0.12		-82	-1100	-0.62	-0.18	
Wonder	1985	1.25	63	990	0.46	0.13		-63	-980	-0.45	-0.13	

Wonder	1977	1.75	110	1800	0.71	0.2		-58	-980	-0.39	-0.11	
Wonder	1968	2.25	91	1500	0.43	0.12		-66	-1100	-0.31	-0.089	
Wonder	1949	2.75	74	1200	0.24	0.067		-81	-1300	-0.26	-0.074	
Wonder	1919	3.25	-1.5	-28	-0.003	-0.001		-46	-860	-0.1	-0.03	
Golden	2002.5	0.25	250		0.34	0.34	d	-360		-0.49	-0.49	d
Golden	1996.5	0.75	360		1.1	1.1	d	-250		-0.76	-0.76	d
Golden	1989.5	1.25	190	1100	0.72	0.72	d	-140	-830	-0.53	-0.53	d
Golden	1981.5	1.75	190	1200	0.7	0.7	d	-170	-1000	-0.61	-0.61	d
Golden	1972.5	2.25	160	660	0.47	0.47	d	-160	-670	-0.48	-0.48	d
Golden	1962.5	2.75	110	470	0.27	0.27		-180	-750	-0.44	-0.44	
Golden	1951	3.25	41	160	0.088	0.088	a,d	-170	-660	-0.36	-0.36	d
Golden	1924	4.25	-5.1	-20	-0.009	-0.009		-160	-630	-0.27	-0.27	
LP 19	2004	0.25	57	310	0.62	0.41	d,a	-290	-1600	-3.2	-2.2	d
LP 19	1999	1.25	88		0.83	0.56	d,a	-160		-1.5	-1	d
LP 19	1994	2.25	75	410	0.83	0.55	a,d	-130	-680	-1.4	-0.92	d
LP 19	1989	3.25	42	230	0.35	0.24	a,d	-150	-790	-1.2	-0.82	d
LP 19	1980	4.25	45	240	0.27	0.18	d,a	-140	-780	-0.87	-0.58	d
LP 19	1969	5.25	35	190	0.18	0.12	a,d	-130	-720	-0.69	-0.46	d
LP 19	1956	6.25	33	180	0.14	0.093	a,d	-130	-680	-0.53	-0.35	d
LP 19	1903	10.5	5.1	30	0.032	0.021	a,d	-71	-410	-0.44	-0.29	d
Hoh	2004	0.25	12	57	0.15	0.049	a,d	-97	-480	-1.3	-0.41	d
Hoh	1998	1.25	30	160	0.27	0.088	a,d	-160	-860	-1.4	-0.46	d
Hoh	1990.5	2.25	36	250	0.39	0.13	a,d	-110	-810	-1.3	-0.41	d
Hoh	1983	3.25	33	320	0.48	0.16	a	-73	-700	-1.1	-0.34	
Hoh	1973.5	4.25	43	470	0.64	0.21	d	-64	-700	-0.96	-0.31	d
Hoh	1963	5.25	43	430	0.59	0.19	a,d	-65	-640	-0.87	-0.28	d
Hoh	1952.5	6.25	25	280	0.48	0.15	a,d	-49	-560	-0.95	-0.31	d
Hoh	1901	12.75	-0.45	-5.4	-0.009	-0.003	d	-14	-170	-0.3	-0.096	d
PJ	2004.5	0.25	27	170	0.77	0.99	a,d	-230	-1400	-6.4	-8.2	d
PJ	1999	2.75	25	150	0.68	0.87	a,d	-130	-810	-3.5	-4.5	d
PJ	1992	4.75	39	240	0.95	1.2	a,d	-120	-760	-3	-3.9	d
PJ	1984	6.75	30	190	0.97	1.2	d	-65	-430	-2.1	-2.7	d

PJ	1977.5	8.75	46	300	2.5	3.2	d	-68	-450	-3.7	-4.8	d
PJ	1968	11.5	17		0.5	0.64	a,d	-26		-0.75	-0.96	d
PJ	1963	12.5	13	87	0.52	0.67	a,d	-25	-170	-1	-1.3	d
PJ	1955	15.5	-0.65	-4.4	-0.063	-0.081	a,d	-20	-140	-2	-2.5	d
Oldman	2003.5	0.25	31	590	1.7	0.38		-30	-560	-1.6	-0.36	
Oldman	1997	1.25	30	600	1.3	0.28	d	-32	-640	-1.4	-0.3	d
Oldman	1987	2.25	58	1100	1.5	0.33		-29	-540	-0.76	-0.17	
Oldman	1980.5	2.75	34	670	0.77	0.17	d	-26	-520	-0.59	-0.13	d
Oldman	1973	3.25	39	840	0.83	0.18	d	-23	-500	-0.49	-0.11	d
Oldman	1963.5	3.75	30	670	0.53	0.12	d	-25	-570	-0.45	-0.1	d
Oldman	1952	4.25	23	550	0.37	0.082	d	-22	-520	-0.35	-0.077	d
Oldman	1906.5	6.25	1.8	53	0.034	0.007	a,d	-19	-560	-0.35	-0.077	d
Snyder	2004	0.25	24	180	0.5	0.36	a	-170	-1300	-3.5	-2.5	
Snyder	2000	1.25	20	170	0.37	0.27	a,d	-110	-860	-1.9	-1.4	d
Snyder	1991.5	2.75	18	160	0.28	0.21	a,d	-95	-850	-1.5	-1.1	d
Snyder	1985	3.75	20	190	0.3	0.22	a,d	-92	-880	-1.4	-1	d
Snyder	1978	4.75	26	270	0.37	0.27	a,d	-84	-850	-1.2	-0.86	d
Snyder	1967.5	5.75	23	240	0.29	0.22	a,d	-73	-780	-0.94	-0.69	d
Snyder	1954.5	6.75	25	250	0.27	0.2	a,d	-73	-730	-0.81	-0.59	d
Snyder	1893	11.75	2.2	25	0.018	0.013	a	-31	-350	-0.25	-0.18	

Site	Average Year (y)	Average Depth (cm)	PCB 74 pg/g dw	PCB 74 pg/g TOC	PCB 74 Flux pg/cm2.y	PCB 74 Flux (FF) pg/cm2.y	PCB 74 FLAG	PCB 101 pg/g dw	PCB 101 pg/g TOC	PCB 101 Flux pg/cm2.y	PCB 101 Flux (FF) pg/cm2.y	PCB 101 FLAG
Mills	2002	0.25	-440	-2700	-13	-8.6		-79	-500	-2.3	-1.5	
Mills	2000	0.75	-570	-4000	-16	-11		-100	-720	-3	-2	
Mills	1996	1.75	-390	-2600	-11	-7.4		-71	-480	-2	-1.3	
Mills	1991	2.75	-370	-2800	-8.9	-6		-67	-510	-1.6	-1.1	
Mills	1988	3.25	-350	-2900	-7	-4.8		-64	-520	-1.3	-0.86	
Mills	1974	4.75	-350	-3200	-6.7	-4.5		-63	-580	-1.2	-0.81	
Mills	1970	5.25	-270	-2500	-6.6	-4.5		-50	-450	-1.2	-0.81	
Mills	1964	6.25	-270	-2200	-8.7	-5.9		-49	-410	-1.6	-1.1	
Mills	1954	7.75	-260	-2300	-8	-5.4	c	-47	-420	-1.4	-0.97	

Mills	1947	8.75	-270	-2400	-6.7	-4.5	c	-48	-430	-1.2	-0.82	
Mills	1938	9.75	-210	-2000	-4.7	-3.2		-39	-350	-0.85	-0.58	
Mills	1905	17.5	-98	-800	-2.1	-1.5		38	310	0.83	0.56	
Lone Pine	2001	0.25	-340	-2500	-5.1	-2.7		-62	-450	-0.93	-0.5	
Lone Pine	1998	0.75	-310	-2400	-4.9	-2.6		-56	-430	-0.89	-0.48	
Lone Pine	1990	1.75	-340	-2900	-5.8	-3.1		-62	-530	-1.1	-0.56	
Lone Pine	1986	2.25	-320	-2600	-5.4	-2.9		-58	-480	-0.99	-0.53	
Lone Pine	1982	2.75	-350	-2500	-5.9	-3.1		-63	-450	-1.1	-0.57	
Lone Pine	1973	3.75	-380	-2700	-5.7	-3.1		-69	-500	-1	-0.55	
Lone Pine	1967	4.25	-430	-3100	-6.4	-3.4		-77	-560	-1.2	-0.62	
Lone Pine	1961	4.75	-300	-2600	-4.2	-2.3		-54	-480	-0.76	-0.41	
Lone Pine	1955	5.25	-310	-2700	-4	-2.1	c	-56	-490	-0.73	-0.39	
Lone Pine	1949	5.75	-280	-2500	-3.7	-2	c	-51	-450	-0.67	-0.36	
Lone Pine	1936	6.75	-340	-3000	-4.1	-2.2		-61	-550	-0.74	-0.39	
Lone Pine	1920	7.75	-270	-2500	-3.2	-1.7		-48	-440	-0.58	-0.31	
Lone Pine	1870	11.5	-110	-990	-1.3	-0.72		-20	-180	-0.24	-0.13	
Pear	2002	0.25	-940	-6200	-11	-5.1	d	-170	-1100	-2	-0.92	d
Pear	2000	0.75	-710	-5300	-8.6	-3.9		820	6000	9.8	4.4	
Pear	1997	1.25	-730	-4900	-8.8	-4		-130	-880	-1.6	-0.72	
Pear	1991	2.25	-830	-6200	-10	-4.5		-150	-1100	-1.8	-0.81	
Pear	1980	3.75	-650	-4400	-7.2	-3.2		-120	-790	-1.3	-0.58	
Pear	1969	5.25	-600	-4500	-6.5	-3		-110	-820	-1.2	-0.53	
Pear	1961	6.25	-620	-4500	-8.7	-3.9		-110	-820	-1.6	-0.71	
Pear	1957	6.75	-450	-3900	-6.4	-2.9		-82	-710	-1.2	-0.52	
Pear	1926	10.5	-420	-3700	-3.3	-1.5		-76	-670	-0.6	-0.27	
Pear	1872	14.5	-200	-1800	-1.2	-0.53	d	-36	-320	-0.21	-0.096	d
Emerald	2002	0.25	-360	-4100	-17	-4.5		-65	-750	-3	-0.81	
Emerald	1997	1.75	-230	-2500	-10	-2.8		-41	-460	-1.9	-0.51	
Emerald	1989	3.75	-210	-2200	-9.6	-2.6		-38	-400	-1.7	-0.47	
Emerald	1980	5.75	-240	-2500	-11	-2.9		-43	-460	-2	-0.53	
Emerald	1971.5	7.75	-250	-2900	-12	-3.1		-45	-530	-2.1	-0.56	
Emerald	1961.5	9.75	-180	-1700	-8.1	-2.2	d	-32	-310	-1.5	-0.39	d
Emerald	1958	10.5	-81	-1000	-3.7	-1		-15	-190	-0.67	-0.18	

Emerald	1892	21.5	-50	-600	-2.8	-0.76		-9	-110	-0.51	-0.14	
Burial	2000	0.25	-11	-17000	-0.045	-0.014		-2	-3100	-0.008	-0.003	
Burial	1988	0.75	-8.2	-14000	-0.034	-0.011		-1.5	-2500	-0.006	-0.002	
Burial	1974	1.25	-11	-20000	-0.052	-0.017		-2.1	-3600	-0.009	-0.003	
Burial	1957	1.75	-8.9	-17000	-0.029	-0.009		-1.6	-3000	-0.005	-0.002	
Burial	1933	2.25	-9.3	-18000	-0.029	-0.009		-1.7	-3300	-0.005	-0.002	
Burial	1906	2.75	-9.3	-18000	-0.029	-0.009		-1.7	-3300	-0.005	-0.002	
Burial	1879	3.25	-7.9	-15000	-0.025	-0.008		-1.4	-2700	-0.004	-0.001	
Mcleod	2002	0.25	-1700	-14000	-8.9	-3.4		-320	-2600	-1.6	-0.62	
Mcleod	1997	0.75	-790	-6900	-4.4	-1.7		-140	-1200	-0.8	-0.31	
Mcleod	1990	1.25	-500	-5100	-3.2	-1.2		-90	-910	-0.58	-0.22	
Mcleod	1982	1.75	-450	-4800	-3.6	-1.4		-81	-870	-0.65	-0.25	
Mcleod	1975	2.25	-450	-5000	-4.7	-1.8		-82	-910	-0.85	-0.33	
Mcleod	1969	2.75	-400	-4500	-4.5	-1.7		-73	-820	-0.82	-0.31	
Mcleod	1962	3.25	-390	-4100	-3.1	-1.2		-70	-740	-0.56	-0.22	
Mcleod	1952	3.75	-410	-4500	-2.6	-0.99		-74	-810	-0.46	-0.18	
Mcleod	1907	6.25	-520	-4800	-3	-1.1		-94	-870	-0.54	-0.21	
Matcharak	2001	0.25	-1400		-5.8	-4.6		-250		-1	-0.84	
Matcharak	1993	0.75	-900	-7100	-4	-3.2		-160	-1300	-0.73	-0.58	
Matcharak	1983	1.25	-730	-5900	-3.1	-2.5		-130	-1100	-0.57	-0.45	
Matcharak	1971	1.75	-720	-6100	-2.4	-1.9		-130	-1100	-0.43	-0.34	
Matcharak	1954	2.25	-660	-5900	-1.7	-1.3		-120	-1100	-0.3	-0.24	
Matcharak	1937	2.75	-630	-5900	-1.3	-1.1		-110	-1100	-0.24	-0.19	
Matcharak	1910	3.25	-550	-5400	-1.1	-0.88		-100	-980	-0.2	-0.16	
Wonder	2000	0.25	-430	-5900	-3.2	-0.9		410	5700	3	0.87	a
Wonder	1992	0.75	-510	-7100	-3.8	-1.1		-92	-1300	-0.69	-0.2	
Wonder	1985	1.25	-390	-6100	-2.8	-0.81		-71	-1100	-0.51	-0.15	
Wonder	1977	1.75	-360	-6100	-2.4	-0.69		-66	-1100	-0.43	-0.12	
Wonder	1968	2.25	-410	-6800	-1.9	-0.55		-75	-1200	-0.35	-0.1	
Wonder	1949	2.75	-500	-8300	-1.6	-0.46		-91	-1500	-0.29	-0.083	
Wonder	1919	3.25	-280	-5400	-0.65	-0.19		-51	-970	-0.12	-0.034	

Golden	2002.5	0.25	-2300		-3	-3		-410		-0.55	-0.55	
Golden	1996.5	0.75	-1500		-4.7	-4.7		-280		-0.86	-0.86	
Golden	1989.5	1.25	-880	-5200	-3.3	-3.3		-160	-940	-0.59	-0.59	
Golden	1981.5	1.75	-1100	-6200	-3.8	-3.8		-190	-1100	-0.68	-0.68	
Golden	1972.5	2.25	-1000	-4200	-3	-3		-180	-760	-0.54	-0.54	
Golden	1962.5	2.75	-1100	-4600	-2.7	-2.7		-200	-840	-0.49	-0.49	
Golden	1951	3.25	-1100	-4100	-2.3	-2.3		-190	-750	-0.41	-0.41	
Golden	1924	4.25	-1000	-3900	-1.7	-1.7		-180	-710	-0.31	-0.31	
LP 19	2004	0.25	-1800	-10000	-20	-13		-330	-1800	-3.6	-2.4	
LP 19	1999	1.25	-990		-9.4	-6.3		-180		-1.7	-1.1	
LP 19	1994	2.25	-780	-4300	-8.6	-5.7		-140	-770	-1.6	-1	
LP 19	1989	3.25	-900	-4900	-7.6	-5.1		-160	-890	-1.4	-0.92	
LP 19	1980	4.25	-900	-4900	-5.4	-3.6		-160	-880	-0.98	-0.65	
LP 19	1969	5.25	-820	-4500	-4.3	-2.8		-150	-820	-0.77	-0.51	
LP 19	1956	6.25	-790	-4200	-3.3	-2.2		-140	-760	-0.59	-0.39	
LP 19	1903	10.5	-440	-2600	-2.7	-1.8		-79	-460	-0.49	-0.33	
Hoh	2004	0.25	-600	-3000	-7.8	-2.5	d	-110	-540	-1.4	-0.46	d
Hoh	1998	1.25	-980	-5300	-8.8	-2.8		-180	-960	-1.6	-0.52	
Hoh	1990.5	2.25	-710	-5000	-7.8	-2.5		-130	-910	-1.4	-0.46	
Hoh	1983	3.25	-450	-4300	-6.6	-2.1		-82	-780	-1.2	-0.39	
Hoh	1973.5	4.25	-400	-4400	-5.9	-1.9		-72	-790	-1.1	-0.35	
Hoh	1963	5.25	-400	-4000	-5.4	-1.7		-73	-720	-0.98	-0.32	
Hoh	1952.5	6.25	-300	-3500	-5.9	-1.9		-55	-630	-1.1	-0.35	
Hoh	1901	12.75	-88	-1100	-1.8	-0.59		-16	-190	-0.33	-0.11	
PJ	2004.5	0.25	-1400	-8900	-40	-51		-260	-1600	-7.2	-9.2	
PJ	1999	2.75	-820	-5000	-22	-28		-150	-910	-4	-5.1	
PJ	1992	4.75	-770	-4800	-19	-24		-140	-860	-3.4	-4.4	
PJ	1984	6.75	-410	-2700	-13	-17		-74	-480	-2.4	-3.1	
PJ	1977.5	8.75	-420	-2800	-23	-30	d	-77	-510	-4.2	-5.4	d
PJ	1968	11.5	-160		-4.7	-6		-29		-0.84	-1.1	
PJ	1963	12.5	-160	-1100	-6.4	-8.2		-28	-190	-1.2	-1.5	
PJ	1955	15.5	-130	-860	-12	-16		-23	-160	-2.2	-2.9	

Oldman	2003.5	0.25	-180	-3500	-10	-2.2		-33	-630	-1.8	-0.4	
Oldman	1997	1.25	-200	-4000	-8.5	-1.9		-36	-720	-1.5	-0.34	
Oldman	1987	2.25	-180	-3400	-4.7	-1		-33	-610	-0.86	-0.19	
Oldman	1980.5	2.75	-160	-3200	-3.7	-0.81		-30	-580	-0.67	-0.15	
Oldman	1973	3.25	-150	-3100	-3.1	-0.67		-26	-560	-0.55	-0.12	
Oldman	1963.5	3.75	-160	-3500	-2.8	-0.62		-28	-640	-0.51	-0.11	
Oldman	1952	4.25	-140	-3300	-2.2	-0.48		-25	-590	-0.4	-0.087	
Oldman	1906.5	6.25	-120	-3500	-2.2	-0.48		-21	-630	-0.4	-0.087	
Snyder	2004	0.25	-1000	-7800	-22	-16		-190	-1400	-3.9	-2.9	
Snyder	2000	1.25	-660	-5300	-12	-8.6		-120	-970	-2.1	-1.6	
Snyder	1991.5	2.75	-590	-5300	-9.1	-6.7		-110	-960	-1.7	-1.2	
Snyder	1985	3.75	-570	-5500	-8.6	-6.2		-100	-990	-1.5	-1.1	
Snyder	1978	4.75	-520	-5300	-7.3	-5.3		-94	-960	-1.3	-0.96	
Snyder	1967.5	5.75	-450	-4800	-5.9	-4.3		-82	-880	-1.1	-0.78	
Snyder	1954.5	6.75	-460	-4500	-5	-3.7		-83	-820	-0.91	-0.66	
Snyder	1893	11.75	-190	-2200	-1.5	-1.1		-35	-400	-0.28	-0.2	

Site	Average Year (y)	Average Depth (cm)	PCB 118 pg/g dw	PCB 118 pg/g TOC	PCB 118 Flux pg/cm2.y	PCB 118 Flux (FF) pg/cm2.y	PCB 118 (penta) FLAG	Endrin pg/g dw	Endrin pg/g TOC	Endrin Flux pg/cm2.y	Endrin Flux (FF) pg/cm2.y	Endrin FLAG
Mills	2002	0.25	220	1400	6.3	4.2	e	-130	-790	-3.6	-2.5	
Mills	2000	0.75	160	1100	4.6	3.1	e	-160	-1100	-4.7	-3.2	
Mills	1996	1.75	190	1300	5.2	3.5		-110	-760	-3.1	-2.1	
Mills	1991	2.75	120	900	2.8	1.9	e	-110	-820	-2.6	-1.7	
Mills	1988	3.25	150	1300	3.1	2.1		-100	-830	-2	-1.4	
Mills	1974	4.75	160	1400	3	2	e	-100	-920	-1.9	-1.3	
Mills	1970	5.25	150	1400	3.6	2.5		-79	-720	-1.9	-1.3	
Mills	1964	6.25	100	830	3.2	2.2	e	-78	-640	-2.5	-1.7	
Mills	1954	7.75					X	-75	-660	-2.3	-1.5	
Mills	1947	8.75					X	-77	-680	-1.9	-1.3	
Mills	1938	9.75	-3.1	-28	-0.067	-0.045		-61	-560	-1.3	-0.91	
Mills	1905	17.5	-1.4	-11	-0.031	-0.021		-28	-230	-0.62	-0.42	
Lone Pine	2001	0.25					X	-98	-710	-1.5	-0.79	

Lone Pine	1998	0.75	81	630	1.3	0.69	c	-89	-680	-1.4	-0.76	
Lone Pine	1990	1.75	79	680	1.3	0.72	e	-98	-840	-1.7	-0.89	
Lone Pine	1986	2.25	130	1100	2.2	1.2		-92	-750	-1.6	-0.84	
Lone Pine	1982	2.75	110	830	2	1	c	-99	-720	-1.7	-0.9	
Lone Pine	1973	3.75	110	790	1.7	0.88		-110	-790	-1.6	-0.88	
Lone Pine	1967	4.25	140	970	2	1.1		-120	-880	-1.8	-0.98	
Lone Pine	1961	4.75	93	820	1.3	0.7		-86	-760	-1.2	-0.65	
Lone Pine	1955	5.25					X	-89	-780	-1.2	-0.62	
Lone Pine	1949	5.75	61	540	0.8	0.43	e	-81	-720	-1.1	-0.57	
Lone Pine	1936	6.75	68	610	0.82	0.44		-97	-870	-1.2	-0.63	
Lone Pine	1920	7.75	-3.8	-35	-0.046	-0.024		-76	-710	-0.92	-0.49	
Lone Pine	1870	11.5	-1.6	-14	-0.019	-0.01	a	-32	-280	-0.38	-0.21	
Pear	2002	0.25	900	5900	11	4.9	d	-270	-1800	-3.2	-1.5	c,d
Pear	2000	0.75	240	1800	2.9	1.3	e	-200	-1500	-2.5	-1.1	c
Pear	1997	1.25					X	-210	-1400	-2.5	-1.1	c
Pear	1991	2.25	110	780	1.3	0.57	e	-240	-1800	-2.9	-1.3	c
Pear	1980	3.75	260	1800	2.9	1.3	e	-190	-1300	-2.1	-0.93	c
Pear	1969	5.25	380	2900	4.1	1.9	e	-170	-1300	-1.9	-0.85	c
Pear	1961	6.25	400	2900	5.6	2.5		-180	-1300	-2.5	-1.1	c
Pear	1957	6.75	190	1600	2.7	1.2	e	-130	-1100	-1.8	-0.82	c
Pear	1926	10.5					X	-120	-1100	-0.96	-0.43	c
Pear	1872	14.5	-2.8	-25	-0.017	-0.008	d	-56	-500	-0.34	-0.15	c
Emerald	2002	0.25	71	810	3.3	0.88	e	-100	-1200	-4.8	-1.3	
Emerald	1997	1.75	140	1600	6.6	1.8		-65	-730	-3	-0.81	
Emerald	1989	3.75	97	1000	4.5	1.2		-60	-630	-2.8	-0.74	
Emerald	1980	5.75	140	1500	6.5	1.7		-68	-730	-3.1	-0.84	
Emerald	1971.5	7.75	100	1200	4.6	1.2	e	-72	-840	-3.3	-0.89	
Emerald	1961.5	9.75	290	2800	13	3.5	d	-50	-490	-2.3	-0.62	
Emerald	1958	10.5	71	900	3.3	0.88		-23	-290	-1.1	-0.29	
Emerald	1892	21.5	-0.71	-8.5	-0.041	-0.011		-14	-170	-0.82	-0.22	
Burial	2000	0.25	-0.16	-240	-0.001	-0.00021		-3.2	-4800	-0.013	-0.004	
Burial	1988	0.75	-0.12	-200	-0.00048	-0.00016		-2.4	-4000	-0.01	-0.003	
Burial	1974	1.25	-0.16	-280	-0.001	-0.00024		-3.3	-5600	-0.015	-0.005	

Burial	1957	1.75	-0.13	-240	-0.00042	-0.00014		-2.6	-4700	-0.008	-0.003	
Burial	1933	2.25	-0.13	-260	-0.00041	-0.00013		-2.7	-5200	-0.008	-0.003	
Burial	1906	2.75	-0.13	-260	-0.00041	-0.00013		-2.7	-5200	-0.008	-0.003	
Burial	1879	3.25					X	-2.3	-4300	-0.007	-0.002	
Mcleod	2002	0.25	-25	-210	-0.13	-0.049		-500	-4100	-2.6	-0.98	
Mcleod	1997	0.75	-11	-98	-0.063	-0.024		-230	-2000	-1.3	-0.49	
Mcleod	1990	1.25	-7.1	-72	-0.046	-0.018		-140	-1400	-0.92	-0.35	
Mcleod	1982	1.75	-6.4	-69	-0.052	-0.02		-130	-1400	-1	-0.4	
Mcleod	1975	2.25	-6.5	-72	-0.067	-0.026		-130	-1400	-1.4	-0.52	
Mcleod	1969	2.75	-5.8	-64	-0.065	-0.025		-120	-1300	-1.3	-0.5	d
Mcleod	1962	3.25	-5.5	-58	-0.045	-0.017		-110	-1200	-0.9	-0.34	
Mcleod	1952	3.75	-5.8	-64	-0.037	-0.014		-120	-1300	-0.74	-0.28	
Mcleod	1907	6.25	-7.4	-68	-0.042	-0.016		-150	-1400	-0.85	-0.33	
Matcharak	2001	0.25	-20		-0.083	-0.066		-400		-1.7	-1.3	
Matcharak	1993	0.75	-13	-100	-0.058	-0.046		-260	-2000	-1.2	-0.93	
Matcharak	1983	1.25	-10	-85	-0.045	-0.036		-210	-1700	-0.9	-0.72	
Matcharak	1971	1.75	-10	-87	-0.034	-0.027		-210	-1700	-0.68	-0.54	
Matcharak	1954	2.25	-9.5	-84	-0.024	-0.019		-190	-1700	-0.48	-0.38	
Matcharak	1937	2.75	-9	-85	-0.019	-0.015		-180	-1700	-0.38	-0.3	
Matcharak	1910	3.25	-7.9	-77	-0.016	-0.013		-160	-1500	-0.32	-0.25	
Wonder	2000	0.25	25	340	0.18	0.052	a	-120	-1700	-0.91	-0.26	
Wonder	1992	0.75	18	250	0.13	0.038	a	-150	-2000	-1.1	-0.31	
Wonder	1985	1.25	38	590	0.27	0.078		-110	-1700	-0.81	-0.23	
Wonder	1977	1.75	35	590	0.23	0.066		-100	-1700	-0.69	-0.2	
Wonder	1968	2.25	22	370	0.1	0.03	a	-120	-2000	-0.56	-0.16	
Wonder	1949	2.75	33	550	0.11	0.03	a	-140	-2400	-0.46	-0.13	
Wonder	1919	3.25	8.8	170	0.02	0.006	a	-81	-1500	-0.19	-0.054	
Golden	2002.5	0.25	420		0.56	0.56		-650		-0.87	-0.87	d
Golden	1996.5	0.75	480		1.5	1.5		-440		-1.4	-1.4	d
Golden	1989.5	1.25	310	1800	1.2	1.2		-250	-1500	-0.94	-0.94	
Golden	1981.5	1.75	580	3500	2.1	2.1		-300	-1800	-1.1	-1.1	d
Golden	1972.5	2.25	630	2600	1.9	1.9		-290	-1200	-0.85	-0.85	d

Golden	1962.5	2.75	580	2400	1.4	1.4		-320	-1300	-0.78	-0.78	
Golden	1951	3.25	270	1100	0.58	0.58		-300	-1200	-0.65	-0.65	
Golden	1924	4.25	-14	-56	-0.024	-0.024		-290	-1100	-0.49	-0.49	
LP 19	2004	0.25	300	1700	3.3	2.2		-530	-2900	-5.8	-3.9	d
LP 19	1999	1.25	230		2.2	1.5		-280		-2.7	-1.8	d
LP 19	1994	2.25	280	1500	3	2		-220	-1200	-2.5	-1.6	d
LP 19	1989	3.25	340	1900	2.9	1.9		-260	-1400	-2.2	-1.5	d
LP 19	1980	4.25	330	1800	2	1.3		-260	-1400	-1.6	-1	d
LP 19	1969	5.25	330	1800	1.7	1.1		-240	-1300	-1.2	-0.82	d
LP 19	1956	6.25	320	1700	1.3	0.88		-230	-1200	-0.94	-0.63	
LP 19	1903	10.5	-6.3	-37	-0.039	-0.026		-130	-740	-0.78	-0.52	
Hoh	2004	0.25	-8.6	-42	-0.11	-0.036	d	-170	-850	-2.2	-0.73	d
Hoh	1998	1.25	-14	-76	-0.13	-0.041		-280	-1500	-2.5	-0.82	
Hoh	1990.5	2.25	-10	-72	-0.11	-0.036		-200	-1400	-2.3	-0.73	
Hoh	1983	3.25	-6.5	-62	-0.094	-0.03		-130	-1200	-1.9	-0.61	
Hoh	1973.5	4.25	-5.7	-63	-0.085	-0.027		-110	-1300	-1.7	-0.55	
Hoh	1963	5.25	-5.7	-57	-0.078	-0.025		-120	-1100	-1.6	-0.5	
Hoh	1952.5	6.25	-4.3	-50	-0.085	-0.027		-87	-1000	-1.7	-0.55	
Hoh	1901	12.75	-1.3	-15	-0.026	-0.008		-25	-300	-0.53	-0.17	
PJ	2004.5	0.25	-20	-130	-0.57	-0.73		-410	-2600	-11	-15	
PJ	1999	2.75	-12	-72	-0.32	-0.4	a	-230	-1400	-6.3	-8.1	
PJ	1992	4.75	-11	-68	-0.27	-0.35		-220	-1400	-5.4	-6.9	
PJ	1984	6.75	-5.8	-38	-0.19	-0.24		-120	-760	-3.8	-4.9	
PJ	1977.5	8.75	-6.1	-40	-0.33	-0.42	d	-120	-810	-6.6	-8.5	d
PJ	1968	11.5	-2.3		-0.067	-0.085		-46		-1.3	-1.7	
PJ	1963	12.5	-2.2	-15	-0.092	-0.12		-45	-310	-1.8	-2.4	
PJ	1955	15.5	-1.8	-12	-0.18	-0.23		-37	-250	-3.5	-4.5	
Oldman	2003.5	0.25	46	870	2.5	0.56		-53	-990	-2.9	-0.64	
Oldman	1997	1.25	78	1600	3.4	0.74		-57	-1100	-2.4	-0.53	d
Oldman	1987	2.25	88	1600	2.3	0.5		-52	-970	-1.4	-0.3	
Oldman	1980.5	2.75	57	1100	1.3	0.28		-47	-920	-1.1	-0.23	
Oldman	1973	3.25	61	1300	1.3	0.28		-42	-890	-0.88	-0.19	

Oldman	1963.5	3.75	48	1100	0.86	0.19		-45	-1000	-0.81	-0.18	
Oldman	1952	4.25	53	1300	0.85	0.19		-39	-930	-0.63	-0.14	
Oldman	1906.5	6.25	12	360	0.23	0.05		-34	-990	-0.63	-0.14	
Snyder	2004	0.25	170	1300	3.5	2.6	e	-290	-2200	-6.2	-4.5	
Snyder	2000	1.25	100	830	1.8	1.3	e	-190	-1500	-3.4	-2.5	
Snyder	1991.5	2.75	110	1000	1.8	1.3	e	-170	-1500	-2.6	-1.9	
Snyder	1985	3.75	240	2300	3.6	2.7	e	-160	-1600	-2.5	-1.8	
Snyder	1978	4.75	130	1300	1.8	1.3	e	-150	-1500	-2.1	-1.5	
Snyder	1967.5	5.75	110	1200	1.5	1.1	e	-130	-1400	-1.7	-1.2	
Snyder	1954.5	6.75	190	1900	2.1	1.5		-130	-1300	-1.4	-1.1	
Snyder	1893	11.75	-2.7	-31	-0.022	-0.016		-55	-630	-0.44	-0.32	

Site	Average Year (y)	Average Depth (cm)	ENDO II pg/g dw	ENDO II pg/g TOC	ENDO II Flux pg/cm2.y	ENDO II Flux (FF) pg/cm2.y	ENDO II FLAG	c-NCLR pg/g dw	c-NCLR pg/g TOC	c-NCLR Flux pg/cm2.y	c-NCLR Flux (FF) pg/cm2.y	c-NCLR FLAG
Mills	2002	0.25	130	850	3.9	2.6		180	1100	5.2	3.5	
Mills	2000	0.75	140	950	3.9	2.7		150	1100	4.4	3	
Mills	1996	1.75	44	300	1.2	0.83		160	1100	4.4	3	
Mills	1991	2.75	62	470	1.5	1		200	1500	4.8	3.3	
Mills	1988	3.25	27	220	0.54	0.37	a	130	1100	2.6	1.7	
Mills	1974	4.75	30	270	0.56	0.38	a	170	1600	3.3	2.2	
Mills	1970	5.25	-3.5	-32	-0.083	-0.056		110	950	2.5	1.7	
Mills	1964	6.25	-3.4	-28	-0.11	-0.075	a	100	830	3.2	2.2	
Mills	1954	7.75	-3.3	-29	-0.1	-0.068		39	350	1.2	0.81	
Mills	1947	8.75	-3.4	-30	-0.084	-0.057		16	150	0.41	0.28	a
Mills	1938	9.75	-2.7	-25	-0.059	-0.04		-0.44	-4	-0.01	-0.007	
Mills	1905	17.5	-1.2	-10	-0.027	-0.018		-0.2	-1.6	-0.004	-0.003	
Lone Pine	2001	0.25	61	440	0.91	0.49		99	710	1.5	0.8	
Lone Pine	1998	0.75	36	280	0.57	0.31		100	810	1.7	0.9	
Lone Pine	1990	1.75	36	310	0.61	0.32	a	150	1300	2.6	1.4	
Lone Pine	1986	2.25	-4	-33	-0.069	-0.037		100	830	1.7	0.92	
Lone Pine	1982	2.75	-4.4	-32	-0.074	-0.04	a	150	1100	2.6	1.4	
Lone Pine	1973	3.75	-4.8	-35	-0.072	-0.039		100	730	1.5	0.81	

Lone Pine	1967	4.25	-5.4	-39	-0.081	-0.043		120	840	1.8	0.94	
Lone Pine	1961	4.75	-3.8	-33	-0.053	-0.028	a	110	970	1.5	0.83	
Lone Pine	1955	5.25	-3.9	-34	-0.051	-0.027		99	870	1.3	0.69	
Lone Pine	1949	5.75	-3.6	-32	-0.047	-0.025		86	750	1.1	0.59	
Lone Pine	1936	6.75	-4.3	-38	-0.051	-0.028	a	64	570	0.77	0.41	
Lone Pine	1920	7.75	-3.4	-31	-0.04	-0.022		34	310	0.41	0.22	
Lone Pine	1870	11.5	-1.4	-12	-0.017	-0.009		-0.23	-2	-0.003	-0.001	
Pear	2002	0.25	1000	6500	12	5.4	d	570	3800	6.9	3.1	d
Pear	2000	0.75	560	4100	6.7	3		860	6300	10	4.6	
Pear	1997	1.25	460	3100	5.6	2.5		820	5500	9.9	4.4	
Pear	1991	2.25	560	4100	6.7	3		1700	13000	21	9.3	
Pear	1980	3.75	240	1600	2.7	1.2		2800	19000	31	14	
Pear	1969	5.25	450	3400	4.9	2.2		1200	9400	14	6.2	
Pear	1961	6.25	140	1000	1.9	0.87		460	3300	6.4	2.9	
Pear	1957	6.75	-5.7	-50	-0.08	-0.036		220	1900	3.1	1.4	
Pear	1926	10.5	-5.3	-47	-0.042	-0.019		69	610	0.55	0.25	
Pear	1872	14.5	-2.5	-22	-0.015	-0.007		-0.4	-3.6	-0.002	-0.001	
Emerald	2002	0.25	420	4800	19	5.2		340	3900	16	4.2	
Emerald	1997	1.75	260	2900	12	3.2		270	3000	13	3.4	
Emerald	1989	3.75	250	2600	11	3.1		260	2800	12	3.3	
Emerald	1980	5.75	300	3200	14	3.7		470	5000	22	5.8	
Emerald	1971.5	7.75	150	1800	7	1.9		380	4400	17	4.7	
Emerald	1961.5	9.75	110	1100	5.1	1.4		230	2200	11	2.8	
Emerald	1958	10.5	78	990	3.6	0.97		150	1900	6.9	1.8	
Emerald	1892	21.5	-0.63	-7.5	-0.036	-0.01		-0.1	-1.2	-0.006	-0.002	
Burial	2000	0.25	-0.14	-210	-0.001	-0.00018		0.35	520	0.001	0.00045	a
Burial	1988	0.75	-0.1	-170	-0.00042	-0.00014		0.44	750	0.002	0.001	a
Burial	1974	1.25	-0.14	-250	-0.001	-0.00021		0.53	910	0.002	0.001	a
Burial	1957	1.75	-0.11	-210	-0.00037	-0.00012		0.31	570	0.001	0.00033	a
Burial	1933	2.25	-0.12	-230	-0.00036	-0.00012		0.36	700	0.001	0.00036	a
Burial	1906	2.75	-0.12	-230	-0.00037	-0.00012		0.072	140	0.00022	7.2E-05	a
Burial	1879	3.25	-0.1	-190	-0.00031	-0.0001		0.12	230	0.00038	0.00012	a

Mcleod	2002	0.25	-22	-180	-0.11	-0.043		-3.6	-30	-0.018	-0.007	
Mcleod	1997	0.75	-9.9	-87	-0.056	-0.021		6.1	53	0.034	0.013	a
Mcleod	1990	1.25	-6.3	-64	-0.04	-0.016		5.8	58	0.037	0.014	a
Mcleod	1982	1.75	-5.6	-61	-0.046	-0.018		5.2	56	0.042	0.016	a
Mcleod	1975	2.25	-5.7	-64	-0.06	-0.023		5.3	58	0.055	0.021	a
Mcleod	1969	2.75	-5.1	-57	-0.057	-0.022	d	-0.83	-9.3	-0.009	-0.004	d
Mcleod	1962	3.25	-4.9	-52	-0.039	-0.015		1.5	16	0.012	0.005	a
Mcleod	1952	3.75	-5.1	-57	-0.032	-0.012		-0.84	-9.2	-0.005	-0.002	
Mcleod	1907	6.25	-6.6	-60	-0.037	-0.014		36	330	0.21	0.079	
Matcharak	2001	0.25	-18		-0.073	-0.058		-2.9		-0.012	-0.009	
Matcharak	1993	0.75	-11	-89	-0.051	-0.041		-1.8	-14	-0.008	-0.007	
Matcharak	1983	1.25	-9.2	-75	-0.04	-0.032		8.4	69	0.036	0.029	a
Matcharak	1971	1.75	-9	-77	-0.03	-0.024		11	94	0.037	0.029	a
Matcharak	1954	2.25	-8.4	-74	-0.021	-0.017		-1.4	-12	-0.003	-0.003	
Matcharak	1937	2.75	-7.9	-75	-0.017	-0.013		-1.3	-12	-0.003	-0.002	
Matcharak	1910	3.25	-7	-68	-0.014	-0.011		-1.1	-11	-0.002	-0.002	
Wonder	2000	0.25	-5.4	-75	-0.04	-0.011		40	550	0.29	0.084	a
Wonder	1992	0.75	-6.4	-90	-0.048	-0.014		35	490	0.27	0.076	a
Wonder	1985	1.25	-4.9	-77	-0.036	-0.01		41	630	0.29	0.084	
Wonder	1977	1.75	-4.6	-77	-0.03	-0.009		57	960	0.38	0.11	
Wonder	1968	2.25	-5.2	-86	-0.024	-0.007		41	690	0.19	0.056	
Wonder	1949	2.75	-6.3	-110	-0.02	-0.006		37	610	0.12	0.034	a
Wonder	1919	3.25	-3.6	-68	-0.008	-0.002		-0.58	-11	-0.001	-0.00038	
Golden	2002.5	0.25	240		0.32	0.32	d	160		0.21	0.21	a,d
Golden	1996.5	0.75	240		0.75	0.75	d	290		0.9	0.9	d
Golden	1989.5	1.25	85	500	0.32	0.32		180	1100	0.67	0.67	
Golden	1981.5	1.75	73	430	0.26	0.26	a,d	190	1100	0.67	0.67	d
Golden	1972.5	2.25	16	65	0.046	0.046	a	160	680	0.48	0.48	d
Golden	1962.5	2.75	43	180	0.11	0.11	a	110	470	0.27	0.27	
Golden	1951	3.25	-13	-52	-0.029	-0.029		45	180	0.096	0.096	a
Golden	1924	4.25	-13	-49	-0.021	-0.021		7.7	30	0.013	0.013	a
LP 19	2004	0.25	280	1500	3.1	2.1	d	-3.8	-20	-0.041	-0.028	d

LP 19	1999	1.25	130		1.2	0.8	d	88		0.83	0.56	d,a
LP 19	1994	2.25	63	340	0.7	0.46	a,d	69	380	0.76	0.51	a,d
LP 19	1989	3.25	84	460	0.71	0.47	d,a	63	340	0.53	0.35	d,a
LP 19	1980	4.25	-11	-62	-0.068	-0.046	d	66	360	0.4	0.26	d,a
LP 19	1969	5.25	-10	-57	-0.054	-0.036	d	51	280	0.26	0.18	a,d
LP 19	1956	6.25	-10	-53	-0.041	-0.028		49	260	0.2	0.13	
LP 19	1903	10.5	-5.5	-32	-0.034	-0.023		-0.9	-5.3	-0.006	-0.004	
Hoh	2004	0.25	61	300	0.79	0.25	d	7	34	0.091	0.029	a,d
Hoh	1998	1.25	-12	-67	-0.11	-0.036		-2	-11	-0.018	-0.006	
Hoh	1990.5	2.25	-9	-63	-0.099	-0.032		22	150	0.24	0.078	
Hoh	1983	3.25	-5.7	-55	-0.083	-0.027		21	200	0.31	0.099	a
Hoh	1973.5	4.25	-5	-55	-0.075	-0.024		20	220	0.3	0.096	a
Hoh	1963	5.25	-5.1	-50	-0.068	-0.022		20	200	0.27	0.088	a
Hoh	1952.5	6.25	-3.8	-44	-0.075	-0.024		11	120	0.21	0.066	a
Hoh	1901	12.75	-1.1	-13	-0.023	-0.008		-0.18	-2.2	-0.004	-0.001	
PJ	2004.5	0.25	140	890	4	5.1	a	16	100	0.46	0.59	
PJ	1999	2.75	-10	-63	-0.28	-0.36		-1.7	-10	-0.045	-0.058	
PJ	1992	4.75	-9.7	-60	-0.24	-0.31		24	150	0.58	0.75	a
PJ	1984	6.75	-5.1	-34	-0.17	-0.21		19	120	0.61	0.79	a
PJ	1977.5	8.75	-5.3	-35	-0.29	-0.37	d	21	140	1.2	1.5	a,d
PJ	1968	11.5	-2		-0.059	-0.075		8		0.23	0.3	a
PJ	1963	12.5	-2	-14	-0.081	-0.1		5.4	37	0.22	0.29	a
PJ	1955	15.5	-1.6	-11	-0.16	-0.2		-0.26	-1.8	-0.025	-0.033	
Oldman	2003.5	0.25	21	390	1.1	0.25		25	470	1.4	0.3	
Oldman	1997	1.25	9.9	200	0.43	0.094	a,d	27	550	1.2	0.26	d
Oldman	1987	2.25	34	640	0.89	0.2		53	990	1.4	0.3	
Oldman	1980.5	2.75	24	470	0.54	0.12		37	730	0.84	0.18	
Oldman	1973	3.25	19	410	0.4	0.088		44	940	0.93	0.2	
Oldman	1963.5	3.75	-2	-45	-0.036	-0.008		35	790	0.63	0.14	
Oldman	1952	4.25	-1.7	-41	-0.028	-0.006		31	730	0.49	0.11	
Oldman	1906.5	6.25	-1.5	-44	-0.028	-0.006		1.8	53	0.034	0.007	a
Snyder	2004	0.25	79	600	1.7	1.2	a	7.9	60	0.17	0.12	a

Snyder	2000	1.25	56	450	1	0.73	a	13	100	0.23	0.17	a
Snyder	1991.5	2.75	48	430	0.74	0.54	a	9.1	82	0.14	0.1	a
Snyder	1985	3.75	40	380	0.59	0.43	a	15	150	0.23	0.17	a
Snyder	1978	4.75	20	210	0.28	0.21	a	16	160	0.23	0.16	a
Snyder	1967.5	5.75	17	190	0.23	0.17	a	14	150	0.18	0.13	a
Snyder	1954.5	6.75	23	230	0.25	0.18	a	18	180	0.19	0.14	a
Snyder	1893	11.75	7.4	85	0.059	0.043	a	-0.39	-4.5	-0.003	-0.002	

Site	Average Year (y)	Average Depth (cm)	Endrin A pg/g dw	Endrin A pg/g TOC	Endrin A Flux pg/cm2.y	Endrin A Flux (FF) pg/cm2.y	Endrin A FLAG	ENDO S pg/g dw	ENDO S pg/g TOC	ENDO S Flux pg/cm2.y	ENDO S Flux (FF) pg/cm2.y	ENDO S FLAG
Mills	2002	0.25	-12	-75	-0.35	-0.24		2400	15000	68	46	
Mills	2000	0.75	-16	-110	-0.45	-0.3		1600	11000	47	32	
Mills	1996	1.75	-11	-73	-0.3	-0.2		1700	12000	49	33	
Mills	1991	2.75	-10	-78	-0.25	-0.17		1800	14000	43	29	
Mills	1988	3.25	-9.7	-80	-0.19	-0.13		1200	9700	24	16	
Mills	1974	4.75	-9.6	-88	-0.18	-0.12		1100	10000	21	14	
Mills	1970	5.25	-7.6	-69	-0.18	-0.12		540	4900	13	8.7	
Mills	1964	6.25	-7.5	-62	-0.24	-0.16		320	2700	10	7	
Mills	1954	7.75	-7.2	-63	-0.22	-0.15		86	750	2.6	1.8	
Mills	1947	8.75	-7.3	-65	-0.18	-0.12		48	430	1.2	0.82	
Mills	1938	9.75	-5.9	-54	-0.13	-0.087		59	540	1.3	0.87	
Mills	1905	17.5	-2.7	-22	-0.059	-0.04		-0.6	-4.9	-0.013	-0.009	
Lone Pine	2001	0.25	-9.4	-68	-0.14	-0.076		960	6900	14	7.7	
Lone Pine	1998	0.75	-8.5	-66	-0.14	-0.073		680	5300	11	5.8	
Lone Pine	1990	1.75	-9.4	-81	-0.16	-0.086		800	6900	14	7.3	
Lone Pine	1986	2.25	-8.8	-72	-0.15	-0.08		450	3700	7.7	4.1	
Lone Pine	1982	2.75	-9.5	-69	-0.16	-0.087		560	4000	9.5	5.1	e
Lone Pine	1973	3.75	-10	-75	-0.16	-0.084		360	2600	5.4	2.9	
Lone Pine	1967	4.25	-12	-85	-0.18	-0.094		380	2800	5.8	3.1	
Lone Pine	1961	4.75	-8.3	-73	-0.12	-0.062		250	2200	3.5	1.9	
Lone Pine	1955	5.25	-8.5	-74	-0.11	-0.059		210	1900	2.8	1.5	
Lone Pine	1949	5.75	-7.8	-69	-0.1	-0.054		160	1400	2.1	1.1	
Lone Pine	1936	6.75	-9.4	-83	-0.11	-0.06		96	850	1.1	0.61	e

Lone Pine	1920	7.75	-7.3	-68	-0.088	-0.047						X
Lone Pine	1870	11.5	-3.1	-27	-0.037	-0.02		-0.69	-6.1	-0.008	-0.004	a
Pear	2002	0.25	-26	-170	-0.31	-0.14	d	4500	30000	54	24	d
Pear	2000	0.75	-20	-140	-0.24	-0.11		5100	38000	62	28	
Pear	1997	1.25	-20	-130	-0.24	-0.11		3300	22000	40	18	
Pear	1991	2.25	-23	-170	-0.27	-0.12		1900	14000	23	10	
Pear	1980	3.75	-18	-120	-0.2	-0.089		1100	7300	12	5.4	
Pear	1969	5.25	-16	-120	-0.18	-0.081		1100	8200	12	5.4	
Pear	1961	6.25	-17	-120	-0.24	-0.11		390	2800	5.4	2.4	
Pear	1957	6.75	-13	-110	-0.18	-0.079		150	1300	2.1	0.94	
Pear	1926	10.5	-11	-100	-0.092	-0.041		110	1000	0.92	0.41	
Pear	1872	14.5	-5.4	-48	-0.032	-0.015		-1.2	-11	-0.007	-0.003	
Emerald	2002	0.25	-9.9	-110	-0.46	-0.12		3500	40000	160	43	c
Emerald	1997	1.75	-6.3	-70	-0.29	-0.077		2800	31000	130	35	c
Emerald	1989	3.75	-5.8	-60	-0.27	-0.071		2900	31000	130	36	c
Emerald	1980	5.75	-6.6	-70	-0.3	-0.081		3900	42000	180	48	c
Emerald	1971.5	7.75	-6.9	-80	-0.32	-0.085		2200	25000	100	27	c
Emerald	1961.5	9.75	-4.8	-47	-0.22	-0.059		1900	18000	88	24	
Emerald	1958	10.5	-2.2	-28	-0.1	-0.027		1200	15000	55	15	c
Emerald	1892	21.5	-1.4	-16	-0.078	-0.021		-0.31	-3.7	-0.018	-0.005	
Burial	2000	0.25	-0.31	-460	-0.001			2	3000	0.008	0.003	
Burial	1988	0.75	-0.23	-380	-0.001			2.4	4100	0.01	0.003	
Burial	1974	1.25	-0.31	-540	-0.001			2.4	4100	0.011	0.004	
Burial	1957	1.75	-0.24	-450	-0.001			2.1	3900	0.007	0.002	
Burial	1933	2.25	-0.26	-500	-0.001			1.9	3800	0.006	0.002	
Burial	1906	2.75	-0.26	-500	-0.001			1	2000	0.003	0.001	
Burial	1879	3.25	-0.22	-410	-0.001			0.89	1700	0.003	0.001	
Mcleod	2002	0.25	-48	-400	-0.25	-0.094		190	1600	0.96	0.37	
Mcleod	1997	0.75	-22	-190	-0.12	-0.047		110	930	0.6	0.23	
Mcleod	1990	1.25	-14	-140	-0.088	-0.034		81	820	0.52	0.2	
Mcleod	1982	1.75	-12	-130	-0.099	-0.038		58	630	0.47	0.18	
Mcleod	1975	2.25	-12	-140	-0.13	-0.05		44	490	0.46	0.18	a

Mcleod	1969	2.75	-11	-120	-0.12	-0.048	d	-2.5	-28	-0.028	-0.011	d
Mcleod	1962	3.25	-11	-110	-0.086	-0.033		-2.4	-25	-0.019	-0.007	
Mcleod	1952	3.75	-11	-120	-0.071	-0.027		-2.5	-28	-0.016	-0.006	
Mcleod	1907	6.25	-14	-130	-0.082	-0.031		-3.2	-29	-0.018	-0.007	a
Matcharak	2001	0.25	-39		-0.16	-0.13	c	-8.7		-0.036	-0.028	c
Matcharak	1993	0.75	-25	-190	-0.11	-0.089	c	-5.5	-43	-0.025	-0.02	c
Matcharak	1983	1.25	-20	-160	-0.086	-0.069	c	-4.5	-37	-0.019	-0.015	c
Matcharak	1971	1.75	-20	-170	-0.065	-0.052	c	-4.4	-38	-0.015	-0.012	c
Matcharak	1954	2.25	-18	-160	-0.046	-0.037	c	-4.1	-36	-0.01	-0.008	c
Matcharak	1937	2.75	-17	-160	-0.036	-0.029	c	-3.9	-37	-0.008	-0.007	c
Matcharak	1910	3.25	-15	-150	-0.03	-0.024	c	-3.4	-33	-0.007	-0.005	c
Wonder	2000	0.25	-12	-160	-0.087	-0.025		-2.6	-37	-0.019	-0.006	
Wonder	1992	0.75	-14	-200	-0.11	-0.03		-3.1	-44	-0.024	-0.007	
Wonder	1985	1.25	-11	-170	-0.077	-0.022		-2.4	-37	-0.017	-0.005	
Wonder	1977	1.75	-10	-170	-0.066	-0.019		-2.2	-37	-0.015	-0.004	
Wonder	1968	2.25	-11	-190	-0.053	-0.015		-2.5	-42	-0.012	-0.003	
Wonder	1949	2.75	-14	-230	-0.044	-0.013		-3.1	-51	-0.01	-0.003	
Wonder	1919	3.25	-7.8	-150	-0.018	-0.005		-1.7	-33	-0.004	-0.001	
Golden	2002.5	0.25	-62		-0.084	-0.084	d	1800		2.5	2.5	d
Golden	1996.5	0.75	-42		-0.13	-0.13	d	1600		5	5	d,e
Golden	1989.5	1.25	-24	-140	-0.09	-0.09		790	4700	3	3	e
Golden	1981.5	1.75	-29	-170	-0.1	-0.1	d	510	3000	1.8	1.8	d
Golden	1972.5	2.25	-28	-120	-0.082	-0.082	d	360	1500	1.1	1.1	d
Golden	1962.5	2.75	-31	-130	-0.075	-0.075		-6.9	-29	-0.017	-0.017	
Golden	1951	3.25	-29	-110	-0.062	-0.062		-6.5	-25	-0.014	-0.014	
Golden	1924	4.25	-28	-110	-0.047	-0.047		-6.2	-24	-0.01	-0.01	c
LP 19	2004	0.25	-50	-270	-0.55	-0.37	d	510	2800	5.6	3.7	d
LP 19	1999	1.25	-27		-0.26	-0.17	d	440		4.2	2.8	d
LP 19	1994	2.25	-21	-120	-0.24	-0.16	d	-4.8	-26	-0.053	-0.035	d
LP 19	1989	3.25	-25	-140	-0.21	-0.14	d	140	760	1.2	0.79	d
LP 19	1980	4.25	-25	-130	-0.15	-0.099	d	-5.5	-30	-0.033	-0.022	d
LP 19	1969	5.25	-23	-120	-0.12	-0.078	d	-5	-28	-0.026	-0.018	d

LP 19	1956	6.25	-22	-120	-0.09	-0.06		-4.9	-26	-0.02	-0.013	
LP 19	1903	10.5	-12	-71	-0.075	-0.05		-2.7	-16	-0.017	-0.011	
Hoh	2004	0.25	-17	-81	-0.22	-0.07	d	58	290	0.76	0.24	d
Hoh	1998	1.25	-27	-150	-0.24	-0.078		-6	-33	-0.054	-0.018	
Hoh	1990.5	2.25	-20	-140	-0.22	-0.07		-4.4	-31	-0.048	-0.016	
Hoh	1983	3.25	-13	-120	-0.18	-0.059		-2.8	-27	-0.041	-0.013	
Hoh	1973.5	4.25	-11	-120	-0.16	-0.053		-2.4	-27	-0.037	-0.012	
Hoh	1963	5.25	-11	-110	-0.15	-0.048		-2.5	-24	-0.033	-0.011	
Hoh	1952.5	6.25	-8.3	-96	-0.16	-0.052		-1.9	-22	-0.036	-0.012	
Hoh	1901	12.75	-2.4	-29	-0.051	-0.016		-0.54	-6.5	-0.011	-0.004	
PJ	2004.5	0.25	-39	-240	-1.1	-1.4		140	860	3.8	4.9	a
PJ	1999	2.75	-22	-140	-0.61	-0.78		-5	-31	-0.14	-0.17	
PJ	1992	4.75	-21	-130	-0.52	-0.67		-4.8	-29	-0.12	-0.15	
PJ	1984	6.75	-11	-73	-0.36	-0.47		-2.5	-16	-0.081	-0.1	
PJ	1977.5	8.75	-12	-77	-0.64	-0.81	d	-2.6	-17	-0.14	-0.18	d
PJ	1968	11.5	-4.4		-0.13	-0.16		-0.99		-0.029	-0.037	
PJ	1963	12.5	-4.3	-29	-0.18	-0.23		-0.96	-6.6	-0.039	-0.051	
PJ	1955	15.5	-3.5	-24	-0.34	-0.44		-0.78	-5.3	-0.076	-0.098	
Oldman	2003.5	0.25	-5.1	-95	-0.28	-0.061		160	3000	8.9	2	c
Oldman	1997	1.25	-5.4	-110	-0.23	-0.051	d	120	2400	5.2	1.2	c,d
Oldman	1987	2.25	-5	-93	-0.13	-0.029		170	3100	4.3	0.95	c
Oldman	1980.5	2.75	-4.5	-88	-0.1	-0.022		77	1500	1.7	0.38	c
Oldman	1973	3.25	-4	-85	-0.084	-0.018		62	1300	1.3	0.29	c
Oldman	1963.5	3.75	-4.3	-97	-0.078	-0.017		50	1100	0.9	0.2	c
Oldman	1952	4.25	-3.8	-90	-0.06	-0.013		39	930	0.63	0.14	c
Oldman	1906.5	6.25	-3.3	-95	-0.06	-0.013		5.5	160	0.1	0.022	a,c
Snyder	2004	0.25	-28	-210	-0.59	-0.43		490	3700	10	7.5	
Snyder	2000	1.25	-18	-150	-0.33	-0.24		500	4000	8.9	6.5	
Snyder	1991.5	2.75	-16	-150	-0.25	-0.18		390	3500	6	4.4	
Snyder	1985	3.75	-16	-150	-0.24	-0.17		320	3100	4.8	3.5	
Snyder	1978	4.75	-14	-150	-0.2	-0.15		270	2800	3.8	2.8	
Snyder	1967.5	5.75	-12	-130	-0.16	-0.12		240	2500	3.1	2.3	

Snyder	1954.5	6.75	-13	-130	-0.14	-0.1		210	2100	2.3	1.7	
Snyder	1893	11.75	-5.3	-60	-0.042	-0.031		-1.2	-14	-0.009	-0.007	

Site	Average Year (y)	Average Depth (cm)	PCB 153 pg/g dw	PCB 153 pg/g TOC	PCB 153 Flux pg/cm2.y	PCB 153 Flux (FF) pg/cm2.y	PCB 153 FLAG	PCB 138 pg/g dw	PCB 138 pg/g TOC	PCB 138 Flux pg/cm2.y	PCB 138 Flux (FF) pg/cm2.y	PCB 138 FLAG
Mills	2002	0.25	320	2000	9.1	6.2		360	2300	10	7.1	
Mills	2000	0.75	170	1200	4.9	3.3		230	1600	6.8	4.6	
Mills	1996	1.75	170	1100	4.7	3.2		260	1800	7.4	5	
Mills	1991	2.75	190	1500	4.5	3.1		260	2000	6.3	4.3	
Mills	1988	3.25	140	1200	2.8	1.9		200	1600	3.9	2.6	
Mills	1974	4.75	240	2200	4.5	3.1		310	2900	5.9	4	
Mills	1970	5.25	130	1200	3.1	2.1		210	1900	5	3.4	
Mills	1964	6.25	130	1100	4.3	2.9		200	1600	6.2	4.2	
Mills	1954	7.75					X	120	1000	3.6	2.4	
Mills	1947	8.75					X	82	730	2.1	1.4	
Mills	1938	9.75	22	200	0.49	0.33		-2.9	-27	-0.064	-0.043	
Mills	1905	17.5	30	250	0.66	0.45		36	290	0.79	0.53	
Lone Pine	2001	0.25	130	910	1.9	1		170	1200	2.5	1.3	
Lone Pine	1998	0.75	110	850	1.8	0.94	c	160	1200	2.5	1.4	c
Lone Pine	1990	1.75	160	1400	2.8	1.5		210	1800	3.6	1.9	
Lone Pine	1986	2.25	110	910	1.9	1		160	1300	2.6	1.4	
Lone Pine	1982	2.75	130	940	2.2	1.2	c	180	1300	3.1	1.7	c
Lone Pine	1973	3.75	110	790	1.7	0.88		170	1200	2.5	1.3	
Lone Pine	1967	4.25	120	870	1.8	0.96		190	1400	2.8	1.5	
Lone Pine	1961	4.75	120	1100	1.7	0.9		160	1400	2.2	1.2	
Lone Pine	1955	5.25					X	130	1100	1.6	0.87	
Lone Pine	1949	5.75	96	850	1.3	0.67	e	210	1900	2.8	1.5	
Lone Pine	1936	6.75	80	710	0.96	0.51		120	1000	1.4	0.74	
Lone Pine	1920	7.75	35	320	0.42	0.22		44	410	0.53	0.28	
Lone Pine	1870	11.5	14	120	0.17	0.088		-1.5	-13	-0.018	-0.01	
Pear	2002	0.25	920	6000	11	5	d	2200	14000	26	12	c,d
Pear	2000	0.75	330	2500	4	1.8	e	630	4600	7.6	3.4	c

Pear	1997	1.25	250	1700	3.1	1.4	e	460	3100	5.6	2.5	c
Pear	1991	2.25	410	3000	4.9	2.2	e	700	5200	8.4	3.8	c,e
Pear	1980	3.75	570	3800	6.2	2.8	e	880	5900	9.7	4.4	c
Pear	1969	5.25	890	6700	9.8	4.4		1300	10000	15	6.5	c
Pear	1961	6.25	700	5100	9.7	4.4		1100	7900	15	6.8	c
Pear	1957	6.75	380	3300	5.3	2.4	e	610	5200	8.5	3.8	c
Pear	1926	10.5	77	680	0.62	0.28	e	130	1100	1	0.46	c,e
Pear	1872	14.5					Z	-2.7	-24	-0.016	-0.007	c,d
Emerald	2002	0.25	130	1500	6	1.6		190	2200	8.8	2.4	
Emerald	1997	1.75	99	1100	4.6	1.2		120	1400	5.7	1.5	
Emerald	1989	3.75	110	1200	5.1	1.4		130	1400	6.1	1.6	
Emerald	1980	5.75	150	1600	7	1.9		150	1600	7	1.9	
Emerald	1971.5	7.75	160	1900	7.4	2		220	2600	10	2.8	
Emerald	1961.5	9.75	68	660	3.1	0.84		120	1100	5.4	1.4	
Emerald	1958	10.5	91	1100	4.2	1.1		110	1400	5	1.3	
Emerald	1892	21.5	-0.25	-2.9	-0.014	-0.004		-0.68	-8.1	-0.039	-0.01	
Burial	2000	0.25	1.4	2100	0.006	0.002		1.9	2900	0.008	0.003	
Burial	1988	0.75	1.5	2500	0.006	0.002		2.1	3500	0.008	0.003	
Burial	1974	1.25	1.4	2400	0.006	0.002		1.8	3200	0.008	0.003	
Burial	1957	1.75	1.1	2000	0.004	0.001		1.4	2600	0.005	0.001	
Burial	1933	2.25	0.61	1200	0.002	0.001	a	0.93	1800	0.003	0.001	
Burial	1906	2.75	0.76	1500	0.002	0.001	a	1.1	2200	0.003	0.001	
Burial	1879	3.25	0.52	990	0.002	0.001	a	0.7	1300	0.002	0.001	a
Mcleod	2002	0.25	74	610	0.38	0.15	a	120	1000	0.62	0.24	a
Mcleod	1997	0.75	33	290	0.19	0.072	a	43	370	0.24	0.092	a
Mcleod	1990	1.25	27	270	0.17	0.066	a	52	530	0.33	0.13	
Mcleod	1982	1.75	24	260	0.19	0.075	a	29	320	0.24	0.091	a
Mcleod	1975	2.25	28	310	0.29	0.11	a	40	450	0.42	0.16	a
Mcleod	1969	2.75	25	280	0.28	0.11	a	40	450	0.45	0.17	
Mcleod	1962	3.25	21	220	0.17	0.065	a	27	280	0.22	0.083	a
Mcleod	1952	3.75	20	230	0.13	0.05	a	33	360	0.21	0.08	a
Mcleod	1907	6.25	64	590	0.37	0.14	a	18	170	0.1	0.04	a

Matcharak	2001	0.25	65		0.27	0.21	a	98		0.4	0.32	a
Matcharak	1993	0.75	45	350	0.2	0.16	a	69	540	0.31	0.25	a
Matcharak	1983	1.25	37	300	0.16	0.13	a	79	640	0.34	0.27	
Matcharak	1971	1.75	33	280	0.11	0.088	a	66	570	0.22	0.18	a
Matcharak	1954	2.25	41	360	0.1	0.082	a	64	570	0.16	0.13	a
Matcharak	1937	2.75	34	320	0.071	0.057	a	39	370	0.082	0.065	a
Matcharak	1910	3.25	28	270	0.055	0.044	a	45	440	0.09	0.072	a
Wonder	2000	0.25	31	440	0.23	0.066	a	41	570	0.3	0.087	
Wonder	1992	0.75	26	360	0.19	0.055	a	32	440	0.24	0.068	a
Wonder	1985	1.25	51	800	0.37	0.11		63	990	0.46	0.13	
Wonder	1977	1.75	35	590	0.23	0.066		49	820	0.32	0.093	
Wonder	1968	2.25	38	630	0.18	0.051	a	43	710	0.2	0.058	
Wonder	1949	2.75	37	610	0.12	0.034	a	58	960	0.19	0.053	
Wonder	1919	3.25	-1.4	-26	-0.003	-0.001		-3.9	-73	-0.009	-0.003	
Golden	2002.5	0.25	320		0.44	0.44		470		0.64	0.64	
Golden	1996.5	0.75	460		1.4	1.4		640		2	2	
Golden	1989.5	1.25	340	2000	1.3	1.3		470	2800	1.8	1.8	
Golden	1981.5	1.75	600	3500	2.1	2.1		820	4800	3	3	
Golden	1972.5	2.25	750	3100	2.2	2.2		990	4100	2.9	2.9	
Golden	1962.5	2.75	740	3100	1.8	1.8		830	3400	2	2	
Golden	1951	3.25	460	1800	0.99	0.99		550	2200	1.2	1.2	
Golden	1924	4.25	54	210	0.092	0.092	a	110	440	0.19	0.19	
LP 19	2004	0.25	240	1300	2.6	1.8		520	2800	5.7	3.8	
LP 19	1999	1.25	270		2.6	1.7		390		3.7	2.5	
LP 19	1994	2.25	320	1700	3.5	2.3		500	2700	5.5	3.7	
LP 19	1989	3.25	370	2000	3.1	2.1		600	3200	5	3.4	
LP 19	1980	4.25	360	1900	2.2	1.4		500	2700	3.1	2	
LP 19	1969	5.25	320	1800	1.7	1.1		470	2600	2.5	1.6	
LP 19	1956	6.25	310	1700	1.3	0.86		460	2400	1.9	1.3	
LP 19	1903	10.5	42	250	0.26	0.18		130	770	0.82	0.55	
Hoh	2004	0.25	14	69	0.18	0.059	a,d	21	100	0.27	0.088	a,d
Hoh	1998	1.25	34	190	0.31	0.099	a	53	290	0.48	0.15	a

Site	Average Year (y)	Average Depth	PCB 187 pg/g dw	PCB 187 pg/g	PCB 187 Flux	PCB 187 Flux	PCB 187 FLAG	PCB 183 pg/g dw	PCB 183 pg/g	PCB 183 Flux	PCB 183 Flux	PCB 183 FLAG
Hoh	1990.5	2.25	36	250	0.39	0.13	a	41	290	0.45	0.15	a
Hoh	1983	3.25	28	270	0.41	0.13	a	42	400	0.61	0.2	a
Hoh	1973.5	4.25	37	410	0.55	0.18	a	38	420	0.57	0.19	a
Hoh	1963	5.25	37	370	0.5	0.16	a	39	380	0.52	0.17	
Hoh	1952.5	6.25	29	340	0.57	0.18	a	33	380	0.64	0.21	a
Hoh	1901	12.75	3.7	45	0.078	0.025	a	5.1	61	0.11	0.034	a
PJ	2004.5	0.25	33	210	0.92	1.2	a	49	310	1.4	1.8	a
PJ	1999	2.75	28	170	0.77	0.98	a	44	270	1.2	1.5	a
PJ	1992	4.75	39	240	0.95	1.2	a	45	280	1.1	1.4	
PJ	1984	6.75	25	160	0.82	1		38	250	1.2	1.6	
PJ	1977.5	8.75	39	260	2.1	2.7		41	270	2.2	2.9	
PJ	1968	11.5	15		0.43	0.55		15		0.45	0.58	
PJ	1963	12.5	15	100	0.62	0.79		17	120	0.69	0.89	
PJ	1955	15.5	5.4	37	0.52	0.67		7.4	50	0.72	0.92	
Oldman	2003.5	0.25	41	770	2.3	0.5		66	1200	3.6	0.8	
Oldman	1997	1.25	62	1200	2.7	0.58		93	1900	4	0.88	
Oldman	1987	2.25	82	1500	2.1	0.47		120	2300	3.2	0.71	
Oldman	1980.5	2.75	71	1400	1.6	0.35		90	1800	2	0.45	
Oldman	1973	3.25	59	1300	1.2	0.27		84	1800	1.8	0.39	
Oldman	1963.5	3.75	46	1000	0.83	0.18		59	1300	1.1	0.23	
Oldman	1952	4.25	47	1100	0.74	0.16		61	1400	0.97	0.21	
Oldman	1906.5	6.25	5.9	170	0.11	0.024	a	7.8	230	0.14	0.032	a
Snyder	2004	0.25	120	930	2.6	1.9		250	1900	5.2	3.8	
Snyder	2000	1.25	81	660	1.5	1.1		130	1000	2.3	1.7	
Snyder	1991.5	2.75	96	860	1.5	1.1		140	1300	2.2	1.6	
Snyder	1985	3.75	170	1700	2.6	1.9		260	2500	3.9	2.9	
Snyder	1978	4.75	97	980	1.4	0.99		130	1300	1.8	1.3	
Snyder	1967.5	5.75	84	900	1.1	0.79		110	1200	1.5	1.1	
Snyder	1954.5	6.75	140	1400	1.6	1.2		250	2400	2.7	2	
Snyder	1893	11.75	10	120	0.083	0.06	a	14	160	0.11	0.082	a

		(cm)		TOC	pg/cm2.y	(FF) pg/cm2.y			TOC	pg/cm2.y	(FF) pg/cm2.y	
Mills	2002	0.25	130	840	3.9	2.6		61	380	1.8	1.2	
Mills	2000	0.75	94	660	2.7	1.8		41	290	1.2	0.81	a
Mills	1996	1.75	90	610	2.5	1.7		33	220	0.93	0.63	a
Mills	1991	2.75	110	850	2.7	1.8		44	340	1.1	0.72	
Mills	1988	3.25	82	670	1.6	1.1		30	250	0.6	0.4	a
Mills	1974	4.75	130	1200	2.4	1.6		53	480	1	0.68	
Mills	1970	5.25	75	680	1.8	1.2		28	250	0.66	0.45	
Mills	1964	6.25	84	690	2.7	1.8		32	260	1	0.68	
Mills	1954	7.75	28	250	0.86	0.58	e					X
Mills	1947	8.75					X	13	120	0.33	0.23	a,e
Mills	1938	9.75	11	98	0.24	0.16	a	6.6	61	0.15	0.098	a
Mills	1905	17.5	7.5	62	0.17	0.11		-0.51	-4.2	-0.011	-0.008	
Lone Pine	2001	0.25	63	460	0.95	0.51		-1.8	-13	-0.027	-0.014	a
Lone Pine	1998	0.75	66	510	1	0.56		-1.6	-13	-0.026	-0.014	a
Lone Pine	1990	1.75	92	800	1.6	0.84		34	300	0.58	0.31	
Lone Pine	1986	2.25	57	470	0.97	0.52		-1.7	-14	-0.029	-0.015	a
Lone Pine	1982	2.75	80	580	1.4	0.73		-1.8	-13	-0.031	-0.017	a
Lone Pine	1973	3.75	57	410	0.86	0.46		-2	-14	-0.03	-0.016	a
Lone Pine	1967	4.25	66	470	0.99	0.53		-2.2	-16	-0.034	-0.018	a
Lone Pine	1961	4.75	71	620	0.99	0.53		-1.6	-14	-0.022	-0.012	a
Lone Pine	1955	5.25	37	320	0.48	0.26	e					X
Lone Pine	1949	5.75	48	420	0.63	0.34	e	-1.5	-13	-0.019	-0.01	a,e
Lone Pine	1936	6.75	47	420	0.57	0.3		-1.8	-16	-0.021	-0.011	a
Lone Pine	1920	7.75	23	210	0.27	0.14	a	13	120	0.16	0.086	a
Lone Pine	1870	11.5	-0.61	-5.4	-0.007	-0.004		-0.58	-5.2	-0.007	-0.004	
Pear	2002	0.25	290	1900	3.5	1.6	de	120	780	1.4	0.65	de
Pear	2000	0.75	140	1000	1.7	0.74	e					Z
Pear	1997	1.25	130	870	1.6	0.7	e					Z
Pear	1991	2.25	200	1500	2.5	1.1	e	70	520	0.85	0.38	e
Pear	1980	3.75	270	1800	3	1.3	e	93	620	1	0.46	e
Pear	1969	5.25	430	3300	4.7	2.1		160	1200	1.7	0.79	e
Pear	1961	6.25	370	2700	5.1	2.3	e	130	930	1.8	0.8	e

Pear	1957	6.75	210	1800	2.9	1.3	e	72	620	1	0.45	e
Pear	1926	10.5	63	560	0.5	0.23	e					X
Pear	1872	14.5					Z					Z
Emerald	2002	0.25	85	970	3.9	1		24	270	1.1	0.29	a
Emerald	1997	1.75	77	860	3.6	0.95		-1.2	-13	-0.055	-0.015	
Emerald	1989	3.75	81	850	3.7	1		24	250	1.1	0.3	
Emerald	1980	5.75	110	1100	4.9	1.3		33	350	1.5	0.41	
Emerald	1971.5	7.75	98	1100	4.5	1.2		89	1000	4.1	1.1	
Emerald	1961.5	9.75	68	660	3.1	0.84		20	190	0.9	0.24	
Emerald	1958	10.5	67	850	3.1	0.83		21	260	0.96	0.26	
Emerald	1892	21.5	0.77	9.2	0.044	0.012	a	-0.26	-3.1	-0.015	-0.004	
Burial	2000	0.25	0.47	720	0.002	0.001	a	0.3	460	0.001		a
Burial	1988	0.75	0.57	960	0.002	0.001	a	0.25	430	0.001		a
Burial	1974	1.25	0.57	990	0.003	0.001	a	0.26	460	0.001		a
Burial	1957	1.75	0.48	890	0.002	0.001	a	0.24	450	0.001		a
Burial	1933	2.25	0.25	490	0.001	0.00025	a	0.11	210	0.00033		a
Burial	1906	2.75	0.25	490	0.001	0.00025	a	0.22	420	0.001		a
Burial	1879	3.25	-0.044	-83	-0.00014	-4.4E-05		0.12	230	0.00038		a
Mcleod	2002	0.25	20	170	0.1	0.04	a	14	110	0.069	0.026	a
Mcleod	1997	0.75	6.1	53	0.034	0.013	a	3	27	0.017	0.007	a
Mcleod	1990	1.25	7.7	78	0.049	0.019	a	1.9	19	0.012	0.005	a
Mcleod	1982	1.75	6.9	74	0.056	0.021	a	3.4	37	0.028	0.011	a
Mcleod	1975	2.25	7	78	0.073	0.028	a	3.5	39	0.036	0.014	a
Mcleod	1969	2.75	4.7	52	0.052	0.02	a	1.6	17	0.017	0.007	a
Mcleod	1962	3.25	4.5	47	0.036	0.014	a	1.5	16	0.012	0.005	a
Mcleod	1952	3.75	3.1	35	0.02	0.008	a	1.6	17	0.01	0.004	a
Mcleod	1907	6.25	50	460	0.29	0.11	a	46	420	0.26	0.1	a
Matcharak	2001	0.25	16		0.067	0.053	a	5.4		0.022	0.018	a
Matcharak	1993	0.75	14	110	0.062	0.05	a	6.9	54	0.031	0.025	a
Matcharak	1983	1.25	11	92	0.048	0.039	a	5.6	46	0.024	0.019	a
Matcharak	1971	1.75	14	120	0.046	0.037	a	5.5	47	0.018	0.015	a
Matcharak	1954	2.25	13	110	0.032	0.026	a	5.1	46	0.013	0.01	a

Matcharak	1937	2.75	9.7	92	0.02	0.016	a	4.9	46	0.01	0.008	a
Matcharak	1910	3.25	8.5	83	0.017	0.014	a	4.3	42	0.009	0.007	a
Wonder	2000	0.25	12	160	0.085	0.024	a	-2.2	-31	-0.017	-0.005	
Wonder	1992	0.75	9.8	140	0.074	0.021	a	-2.7	-37	-0.02	-0.006	
Wonder	1985	1.25	17	260	0.12	0.034	a	-2	-32	-0.015	-0.004	
Wonder	1977	1.75	18	310	0.12	0.034	a	-1.9	-32	-0.013	-0.004	
Wonder	1968	2.25	13	210	0.06	0.017	a	-2.2	-36	-0.01	-0.003	
Wonder	1949	2.75	15	260	0.05	0.014	a	-2.6	-44	-0.008	-0.002	
Wonder	1919	3.25	-1.6	-30	-0.004	-0.001		-1.5	-28	-0.003	-0.001	
Golden	2002.5	0.25	170		0.22	0.22	a	61		0.082	0.082	a
Golden	1996.5	0.75	240		0.73	0.73		210		0.64	0.64	
Golden	1989.5	1.25	190	1100	0.72	0.72		74	440	0.28	0.28	a
Golden	1981.5	1.75	330	1900	1.2	1.2		130	740	0.45	0.45	
Golden	1972.5	2.25	540	2300	1.6	1.6		200	840	0.6	0.6	
Golden	1962.5	2.75	680	2900	1.7	1.7		250	1100	0.62	0.62	
Golden	1951	3.25	530	2100	1.1	1.1		200	780	0.43	0.43	
Golden	1924	4.25	42	170	0.072	0.072	a	15	60	0.026	0.026	a
LP 19	2004	0.25	120	650	1.3	0.88	a	49	270	0.54	0.36	a
LP 19	1999	1.25	150		1.4	0.97		57		0.54	0.36	a
LP 19	1994	2.25	190	1000	2.1	1.4		66	360	0.73	0.49	a
LP 19	1989	3.25	240	1300	2	1.3		87	480	0.74	0.49	
LP 19	1980	4.25	230	1300	1.4	0.93		86	470	0.52	0.35	
LP 19	1969	5.25	210	1200	1.1	0.73		79	430	0.41	0.27	
LP 19	1956	6.25	200	1100	0.85	0.56		76	410	0.32	0.21	
LP 19	1903	10.5	22	130	0.14	0.091	a	10	59	0.063	0.042	a
Hoh	2004	0.25	4.7	23	0.061	0.02	a,d	4.7	23	0.061	0.02	a,d
Hoh	1998	1.25	15	82	0.14	0.044	a	7.6	41	0.068	0.022	a
Hoh	1990.5	2.25	17	120	0.18	0.059	a	-3.7	-26	-0.041	-0.013	
Hoh	1983	3.25	14	130	0.2	0.066	a	5.3	50	0.076	0.025	a
Hoh	1973.5	4.25	17	190	0.25	0.081	a	17	190	0.25	0.081	a
Hoh	1963	5.25	17	170	0.23	0.074	a	17	170	0.23	0.074	a
Hoh	1952.5	6.25	15	180	0.3	0.096	a	5.9	68	0.11	0.037	a

Hoh	1901	12.75	1.7	20	0.036	0.011	a	1	12	0.021	0.007	a
PJ	2004.5	0.25	11	69	0.31	0.39	a	11	69	0.31	0.39	a
PJ	1999	2.75	13	77	0.34	0.44	a	6.3	39	0.17	0.22	a
PJ	1992	4.75	18	110	0.44	0.56	a	-4	-25	-0.099	-0.13	a
PJ	1984	6.75	13	82	0.41	0.52	a	4.7	31	0.15	0.2	a
PJ	1977.5	8.75	18	120	0.98	1.3	a	18	120	0.98	1.3	a
PJ	1968	11.5	6.8		0.2	0.25		6.8		0.2	0.25	a
PJ	1963	12.5	7.8	54	0.32	0.41		3	21	0.12	0.16	a
PJ	1955	15.5	2.5	17	0.24	0.31		1.5	10	0.14	0.18	a
Oldman	2003.5	0.25	23	440	1.3	0.28		7.8	150	0.43	0.094	a
Oldman	1997	1.25	31	630	1.3	0.3		11	210	0.46	0.1	a
Oldman	1987	2.25	38	700	0.99	0.22		13	230	0.33	0.072	a
Oldman	1980.5	2.75	44	850	0.98	0.22		-0.86	-17	-0.019	-0.004	
Oldman	1973	3.25	30	630	0.63	0.14		9	190	0.19	0.042	a
Oldman	1963.5	3.75	30	680	0.55	0.12		9.1	200	0.16	0.036	a
Oldman	1952	4.25	29	680	0.46	0.1		9	210	0.14	0.032	a
Oldman	1906.5	6.25	2.3	67	0.042	0.009	a	0.91	27	0.017	0.004	a
Snyder	2004	0.25	40	300	0.83	0.61	a	16	120	0.33	0.24	a
Snyder	2000	1.25	30	250	0.55	0.4	a	10	83	0.18	0.13	a
Snyder	1991.5	2.75	36	330	0.56	0.41	a	14	120	0.21	0.15	a
Snyder	1985	3.75	59	570	0.89	0.65		22	210	0.33	0.24	a
Snyder	1978	4.75	46	470	0.65	0.47	a	16	160	0.23	0.16	a
Snyder	1967.5	5.75	40	430	0.52	0.38		14	150	0.18	0.13	a
Snyder	1954.5	6.75	62	610	0.68	0.5	a	23	230	0.25	0.18	a
Snyder	1893	11.75	3	34	0.024	0.017	a	-1	-11	-0.008	-0.006	

Site	Average Year (y)	Average Depth (cm)	Mirex pg/g dw	Mirex pg/g TOC	Mirex Flux pg/cm2.y	Mirex Flux (FF) pg/cm2.y	Mirex FLAG
Mills	2002	0.25	230	1400	6.7	4.5	
Mills	2000	0.75	-33	-230	-0.95	-0.64	
Mills	1996	1.75	-23	-150	-0.63	-0.43	

Mills	1991	2.75	270	2100	6.4	4.3	
Mills	1988	3.25	-20	-170	-0.41	-0.28	
Mills	1974	4.75	170	1600	3.3	2.2	
Mills	1970	5.25	38	350	0.92	0.62	
Mills	1964	6.25	120	1000	4	2.7	
Mills	1954	7.75	-15	-130	-0.46	-0.31	
Mills	1947	8.75	-15	-140	-0.39	-0.26	
Mills	1938	9.75	-12	-110	-0.27	-0.18	
Mills	1905	17.5	-5.7	-47	-0.12	-0.084	
Lone Pine	2001	0.25	-20	-140	-0.3	-0.16	
Lone Pine	1998	0.75	-18	-140	-0.29	-0.15	
Lone Pine	1990	1.75	-20	-170	-0.34	-0.18	
Lone Pine	1986	2.25	-19	-150	-0.32	-0.17	
Lone Pine	1982	2.75	-20	-140	-0.34	-0.18	
Lone Pine	1973	3.75	-22	-160	-0.33	-0.18	
Lone Pine	1967	4.25	-25	-180	-0.37	-0.2	
Lone Pine	1961	4.75	-17	-150	-0.24	-0.13	
Lone Pine	1955	5.25	-18	-160	-0.23	-0.12	
Lone Pine	1949	5.75	-16	-140	-0.21	-0.11	
Lone Pine	1936	6.75	-20	-180	-0.24	-0.13	
Lone Pine	1920	7.75	-15	-140	-0.19	-0.099	
Lone Pine	1870	11.5	-6.5	-57	-0.078	-0.042	
Pear	2002	0.25	-55	-360	-0.66	-0.3	d
Pear	2000	0.75	-41	-310	-0.5	-0.22	
Pear	1997	1.25	-42	-280	-0.51	-0.23	
Pear	1991	2.25	-48	-360	-0.58	-0.26	
Pear	1980	3.75	-38	-250	-0.42	-0.19	
Pear	1969	5.25	-35	-260	-0.38	-0.17	
Pear	1961	6.25	-36	-260	-0.51	-0.23	
Pear	1957	6.75	-26	-230	-0.37	-0.17	
Pear	1926	10.5	-24	-210	-0.19	-0.087	
Pear	1872	14.5	-11	-100	-0.068	-0.031	d
Emerald	2002	0.25	-21	-240	-0.96	-0.26	

Emerald	1997	1.75	-13	-150	-0.61	-0.16	
Emerald	1989	3.75	-12	-130	-0.56	-0.15	
Emerald	1980	5.75	-14	-150	-0.64	-0.17	
Emerald	1971.5	7.75	-15	-170	-0.67	-0.18	
Emerald	1961.5	9.75	6.8	65	0.31	0.083	a
Emerald	1958	10.5	-4.7	-59	-0.22	-0.058	
Emerald	1892	21.5	-2.9	-35	-0.17	-0.044	
Burial	2000	0.25	-0.65	-980	-0.003	-0.001	
Burial	1988	0.75	-0.48	-800	-0.002	-0.001	
Burial	1974	1.25	-0.66	-1100	-0.003	-0.001	
Burial	1957	1.75	-0.52	-960	-0.002	-0.001	
Burial	1933	2.25	-0.54	-1100	-0.002	-0.001	
Burial	1906	2.75	-0.54	-1100	-0.002	-0.001	
Burial	1879	3.25	-0.46	-870	-0.001	-0.00046	
Mcleod	2002	0.25	-100	-840	-0.52	-0.2	
Mcleod	1997	0.75	-46	-400	-0.26	-0.098	
Mcleod	1990	1.25	-29	-290	-0.19	-0.071	
Mcleod	1982	1.75	-26	-280	-0.21	-0.08	
Mcleod	1975	2.25	-26	-290	-0.27	-0.11	
Mcleod	1969	2.75	-23	-260	-0.26	-0.1	
Mcleod	1962	3.25	-22	-240	-0.18	-0.07	
Mcleod	1952	3.75	-24	-260	-0.15	-0.057	
Mcleod	1907	6.25	-30	-280	-0.17	-0.066	
Matcharak	2001	0.25	-82		-0.33	-0.27	
Matcharak	1993	0.75	-52	-410	-0.23	-0.19	
Matcharak	1983	1.25	-42	-340	-0.18	-0.15	
Matcharak	1971	1.75	-42	-350	-0.14	-0.11	
Matcharak	1954	2.25	-39	-340	-0.096	-0.077	
Matcharak	1937	2.75	-36	-340	-0.077	-0.061	
Matcharak	1910	3.25	-32	-310	-0.064	-0.051	
Wonder	2000	0.25	-25	-340	-0.18	-0.052	
Wonder	1992	0.75	-30	-410	-0.22	-0.064	

Wonder	1985	1.25	-23	-350	-0.16	-0.047	
Wonder	1977	1.75	-21	-350	-0.14	-0.04	
Wonder	1968	2.25	-24	-400	-0.11	-0.032	
Wonder	1949	2.75	-29	-480	-0.093	-0.027	
Wonder	1919	3.25	-16	-310	-0.038	-0.011	
Golden	2002.5	0.25	-130		-0.18	-0.18	c
Golden	1996.5	0.75	-89		-0.27	-0.27	c
Golden	1989.5	1.25	-51	-300	-0.19	-0.19	
Golden	1981.5	1.75	-61	-360	-0.22	-0.22	
Golden	1972.5	2.25	-58	-240	-0.17	-0.17	
Golden	1962.5	2.75	-65	-270	-0.16	-0.16	
Golden	1951	3.25	-61	-240	-0.13	-0.13	
Golden	1924	4.25	-58	-230	-0.099	-0.099	
LP 19	2004	0.25	-110	-580	-1.2	-0.78	c
LP 19	1999	1.25	-57		-0.54	-0.36	c
LP 19	1994	2.25	-45	-250	-0.5	-0.33	c
LP 19	1989	3.25	-52	-290	-0.44	-0.3	c
LP 19	1980	4.25	-52	-280	-0.31	-0.21	c
LP 19	1969	5.25	-48	-260	-0.25	-0.16	c
LP 19	1956	6.25	-46	-240	-0.19	-0.13	c
LP 19	1903	10.5	-25	-150	-0.16	-0.11	c
Hoh	2004	0.25	-35	-170	-0.45	-0.15	
Hoh	1998	1.25	-57	-310	-0.51	-0.17	
Hoh	1990.5	2.25	-41	-290	-0.46	-0.15	
Hoh	1983	3.25	-26	-250	-0.38	-0.12	
Hoh	1973.5	4.25	-23	-250	-0.34	-0.11	
Hoh	1963	5.25	-23	-230	-0.31	-0.1	
Hoh	1952.5	6.25	-18	-200	-0.34	-0.11	
Hoh	1901	12.75	-5.1	-61	-0.11	-0.034	
PJ	2004.5	0.25	-83	-520	-2.3	-3	
PJ	1999	2.75	-47	-290	-1.3	-1.6	
PJ	1992	4.75	-45	-280	-1.1	-1.4	

PJ	1984	6.75	-24	-150	-0.77	-0.98	
PJ	1977.5	8.75	-25	-160	-1.3	-1.7	
PJ	1968	11.5	-9.3		-0.27	-0.35	
PJ	1963	12.5	-9.1	-62	-0.37	-0.48	
PJ	1955	15.5	-7.4	-50	-0.72	-0.92	
Oldman	2003.5	0.25	-11	-200	-0.59	-0.13	
Oldman	1997	1.25	-11	-230	-0.49	-0.11	
Oldman	1987	2.25	-11	-200	-0.27	-0.06	
Oldman	1980.5	2.75	-9.5	-190	-0.21	-0.047	
Oldman	1973	3.25	-8.4	-180	-0.18	-0.039	
Oldman	1963.5	3.75	-9.1	-200	-0.16	-0.036	
Oldman	1952	4.25	-7.9	-190	-0.13	-0.028	
Oldman	1906.5	6.25	-6.9	-200	-0.13	-0.028	
Snyder	2004	0.25	-60	-450	-1.3	-0.91	
Snyder	2000	1.25	-38	-310	-0.69	-0.5	
Snyder	1991.5	2.75	-34	-310	-0.53	-0.39	
Snyder	1985	3.75	-33	-320	-0.5	-0.36	
Snyder	1978	4.75	-30	-310	-0.42	-0.31	
Snyder	1967.5	5.75	-26	-280	-0.34	-0.25	
Snyder	1954.5	6.75	-26	-260	-0.29	-0.21	
Snyder	1893	11.75	-11	-130	-0.089	-0.065	

Site	Average Year (y)	Average Depth (cm)	EPTC pg/g dw	EPTC pg/g TOC	EPTC Flux pg/cm2.y	EPTC Flux (FF) pg/cm2.y	EPTC FLAG	ETDZL pg/g dw	ETDZL pg/g TOC	ETDZL Flux pg/cm2.y	ETDZL Flux (FF) pg/cm2.y	ETDZL FLAG
Mills	2002	0.25	-940	-5900	-27	-18		-330	-2100	-9.7	-6.6	
Mills	2000	0.75	-1200	-8600	-35	-24		-430	-3000	-13	-8.5	
Mills	1996	1.75	-840	-5700	-24	-16		-300	-2000	-8.4	-5.7	
Mills	1990.5	2.75	-800	-6100	-19	-13		-280	-2200	-6.7	-4.5	
Mills	1987.5	3.25	-760	-6300	-15	-10	d	-270	-2200	-5.4	-3.6	d
Mills	1974	4.75	-760	-6900	-14	-9.4		-270	-2500	-5	-3.4	
Mills	1970	5.25	-590	-5400	-14	-9.2		-210	-1900	-4.8	-3.3	
Mills	1963.5	6.25	-590	-4800	-19	-13		-210	-1700	-6.7	-4.5	

Mills	1953.5	7.75	-560	-5000	-17	-12	d	-200	-1800	-6.1	-4.1	c,d
Mills	1947	8.75	-580	-5100	-14	-9.7	d	-200	-1800	-5.1	-3.5	c,d
Mills	1937.5	9.75	-460	-4200	-10	-6.9		-160	-1500	-3.6	-2.4	
Mills	1905	17.5	-210	-1700	-4.6	-3.1		-75	-610	-1.6	-1.1	
Lone Pine	2001	0.25	-740	-53	-11	-5.9		-260	-19	-3.9	-2.1	c
Lone Pine	1997.5	0.75	-670	-51	-11	-5.7		-240	-18	-3.8	-2	c
Lone Pine	1990	1.75	-740	-64	-13	-6.7		-260	-23	-4.5	-2.4	
Lone Pine	1986	2.25	-690	-57	-12	-6.3	d	-250	-20	-4.2	-2.2	c,d
Lone Pine	1982	2.75	-750	-54	-13	-6.8	d	-270	-19	-4.5	-2.4	d
Lone Pine	1972.5	3.75	-820	-59	-12	-6.6	d	-290	-21	-4.4	-2.3	c,d
Lone Pine	1967	4.25	-920	-66	-14	-7.4	d	-330	-24	-4.9	-2.6	c,d
Lone Pine	1961	4.75	-650	-57	-9.1	-4.9		-230	-20	-3.2	-1.7	
Lone Pine	1955	5.25	-670	-58	-8.7	-4.6	d	-240	-21	-3.1	-1.6	d
Lone Pine	1949	5.75	-1000	-91	-13	-7.2		-370	-32	-4.8	-2.6	
Lone Pine	1936	6.75	-730	-65	-8.8	-4.7	d	-260	-23	-3.1	-1.7	d
Lone Pine	1920	7.75	-570	-53	-6.9	-3.7		-200	-19	-2.4	-1.3	
Lone Pine	1870	11.5	-240	-21	-2.9	-1.5		-85	-7.6	-1	-0.55	
Pear	2002	0.25	-2000	-13000	-24	-11		-720	-4700	-8.7	-3.9	
Pear	2000	0.75	-1500	-11000	-18	-8.3		-550	-4000	-6.6	-3	
Pear	1997	1.25	-1600	-11000	-19	-8.5		-560	-3700	-6.7	-3	
Pear	1991	2.25	-1800	-13000	-21	-9.7		-640	-4700	-7.6	-3.4	
Pear	1980	3.75	-1400	-9400	-15	-7		-500	-3300	-5.5	-2.5	
Pear	1969	5.25	-1300	-9700	-14	-6.4		-460	-3500	-5	-2.3	
Pear	1961	6.25	-1300	-9800	-19	-8.5		-480	-3500	-6.7	-3	
Pear	1957	6.75	-980	-8500	-14	-6.2		-350	-3000	-4.9	-2.2	
Pear	1926	10.5	-900	-8000	-7.2	-3.2		-320	-2800	-2.6	-1.2	
Pear	1872	14.5	-420	-3800	-2.5	-1.1		-150	-1300	-0.9	-0.41	
Emerald	2002	0.25	-780	-8900	-36	-9.6	d	-280	-3200	-13	-3.4	d
Emerald	1997	1.75	-490	-5500	-23	-6.1	d	-170	-1900	-8	-2.2	d
Emerald	1989	3.75	-450	-4700	-21	-5.6		-160	-1700	-7.4	-2	
Emerald	1980	5.75	-510	-5500	-24	-6.3	d	-180	-1900	-8.4	-2.2	d
Emerald	1971.5	7.75	-540	-6300	-25	-6.7	d	-190	-2200	-8.8	-2.4	d
Emerald	1961.5	9.75	-380	-3700	-17	-4.7	d	-130	-1300	-6.2	-1.7	d

Emerald	1958	10.5	-170	-2200	-8	-2.2	d	-62	-780	-2.8	-0.76	d
Emerald	1892	21.5	-110	-1300	-6.1	-1.6		-38	-460	-2.2	-0.58	
Burial	2000	0.25	-24	-36000	-0.097	-0.11	d	-8.6	-13000	-0.034	-0.039	d
Burial	1988	0.75	-18	-30000	-0.073	-0.082		-6.3	-11000	-0.026	-0.029	
Burial	1974	1.25	-25	-42000	-0.11	-0.13	d	-8.7	-15000	-0.04	-0.046	d
Burial	1957	1.75	-19	-36000	-0.063	-0.072		-6.8	-13000	-0.022	-0.026	
Burial	1933	2.25	-20	-39000	-0.062	-0.07		-7.1	-14000	-0.022	-0.025	
Burial	1906	2.75	-20	-39000	-0.062	-0.071		-7.2	-14000	-0.022	-0.025	
Burial	1879	3.25	-17	-32000	-0.053	-0.06		-6.1	-12000	-0.019	-0.021	
Mcleod	2002	0.25	-3800	-31000	-19	-7.4	d	-1300	-11000	-6.8	-2.6	c,d
Mcleod	1997	0.75	-1700	-15000	-9.5	-3.7	d	-600	-5300	-3.4	-1.3	c,d
Mcleod	1990	1.25	-1100	-11000	-6.9	-2.7	d	-380	-3900	-2.4	-0.94	c,d
Mcleod	1982	1.75	-960	-10000	-7.8	-3	d	-340	-3700	-2.8	-1.1	c,d
Mcleod	1975	2.25	-980	-11000	-10	-3.9	d	-350	-3900	-3.6	-1.4	c,d
Mcleod	1969	2.75	-870	-9700	-9.7	-3.7	d	-310	-3500	-3.5	-1.3	c,d
Mcleod	1962	3.25	-830	-8800	-6.7	-2.6	d	-290	-3100	-2.4	-0.92	c,d
Mcleod	1952	3.75	-880	-9700	-5.5	-2.1	d	-310	-3400	-2	-0.76	c,d
Mcleod	1907	6.25	-1100	-10000	-6.4	-2.5	d	-400	-3700	-2.3	-0.87	c,d
Matcharak	2001	0.25	-3000		-12	-10	d	-1100		-4.4	-3.5	d
Matcharak	1993	0.75	-1900	-15000	-8.7	-7	d	-690	-5400	-3.1	-2.5	d
Matcharak	1983	1.25	-1600	-13000	-6.8	-5.4	d	-560	-4600	-2.4	-1.9	d
Matcharak	1971	1.75	-1500	-13000	-5.1	-4.1	d	-550	-4700	-1.8	-1.4	d
Matcharak	1954	2.25	-1400	-13000	-3.6	-2.9	d	-510	-4500	-1.3	-1	d
Matcharak	1937	2.75	-1400	-13000	-2.9	-2.3	d	-480	-4500	-1	-0.81	d
Matcharak	1910	3.25	-1200	-12000	-2.4	-1.9	d	-420	-4100	-0.85	-0.68	d
Wonder	2000	0.25	-920	-13000	-6.8	-2		-330	-4600	-2.4	-0.69	
Wonder	1992	0.75	-1100	-15000	-8.3	-2.4		-390	-5400	-2.9	-0.84	
Wonder	1985	1.25	-840	-13000	-6.1	-1.7		-300	-4700	-2.2	-0.62	
Wonder	1977	1.75	-780	-13000	-5.2	-1.5		-280	-4700	-1.8	-0.53	
Wonder	1968	2.25	-890	-15000	-4.2	-1.2		-320	-5200	-1.5	-0.42	
Wonder	1949	2.75	-1100	-18000	-3.5	-0.99		-380	-6400	-1.2	-0.35	
Wonder	1919	3.25	-610	-12000	-1.4	-0.4		-220	-4100	-0.5	-0.14	

Golden	2002.5	0.25	-4900		-6.6	-6.6		-1700		-2.3	-2.3	
Golden	1996.5	0.75	-3300		-10	-10	d	-1200		-3.6	-3.6	d
Golden	1989.5	1.25	-1900	-11000	-7.1	-7.1	d	-670	-4000	-2.5	-2.5	d
Golden	1981.5	1.75	-2300	-13000	-8.2	-8.2	d	-800	-4800	-2.9	-2.9	d
Golden	1972.5	2.25	-2200	-9000	-6.4	-6.4	d	-770	-3200	-2.3	-2.3	d
Golden	1962.5	2.75	-2400	-10000	-5.9	-5.9	d	-850	-3600	-2.1	-2.1	d
Golden	1951	3.25	-2300	-8900	-4.9	-4.9	d	-810	-3200	-1.7	-1.7	d
Golden	1924	4.25	-2200	-8400	-3.7	-3.7	d	-770	-3000	-1.3	-1.3	d
LP 19	2004	0.25	-4000	-21000	-43	-29	d	-1400	-7600	-15	-10	d
LP 19	1999	1.25	-2100		-20	-14	d	-760		-7.2	-4.8	d
LP 19	1994	2.25	-1700	-9200	-19	-12	d	-600	-3300	-6.6	-4.4	d
LP 19	1989	3.25	-1900	-11000	-16	-11		-690	-3800	-5.8	-3.9	
LP 19	1980	4.25	-1900	-11000	-12	-7.8	d	-690	-3700	-4.1	-2.8	d
LP 19	1969	5.25	-1800	-9700	-9.2	-6.1		-630	-3400	-3.3	-2.2	
LP 19	1956	6.25	-1700	-9100	-7.1	-4.7	d	-600	-3200	-2.5	-1.7	d
LP 19	1903	10.5	-950	-5500	-5.9	-3.9		-340	-2000	-2.1	-1.4	
Hoh	2004	0.25	-1300	-6400	-17	-5.5	d	-460	-2300	-6	-1.9	d
Hoh	1998	1.25	-2100	-12000	-19	-6.1		-750	-4100	-6.8	-2.2	
Hoh	1990.5	2.25	-1500	-11000	-17	-5.5		-550	-3800	-6	-1.9	
Hoh	1983	3.25	-980	-9300	-14	-4.6	d	-350	-3300	-5.1	-1.6	d
Hoh	1973.5	4.25	-860	-9400	-13	-4.1		-300	-3400	-4.6	-1.5	
Hoh	1963	5.25	-870	-8500	-12	-3.8		-310	-3000	-4.1	-1.3	
Hoh	1952.5	6.25	-650	-7500	-13	-4.1		-230	-2700	-4.5	-1.5	
Hoh	1901	12.75	-190	-2300	-4	-1.3		-67	-810	-1.4	-0.45	
PJ	2004.5	0.25	-3100	-19000	-86	-110	d	-1100	-6800	-30	-39	c,d
PJ	1999	2.75	-1800	-11000	-48	-61	d	-630	-3800	-17	-22	c,d
PJ	1992	4.75	-1700	-10000	-41	-52	d	-590	-3600	-14	-19	c,d
PJ	1984	6.75	-880	-5700	-29	-37	d	-310	-2000	-10	-13	c,d
PJ	1977.5	8.75	-910	-6100	-50	-64		-320	-2100	-18	-23	c
PJ	1968	11.5	-350		-10	-13	d	-120		-3.6	-4.6	c,d
PJ	1963	12.5	-340	-2300	-14	-18		-120	-820	-4.9	-6.3	c
PJ	1955	15.5	-270	-1900	-27	-34		-97	-660	-9.5	-12	c

Oldman	2003.5	0.25	-400	-7500	-22	-4.8	d	-140	-2600	-7.7	-1.7	d
Oldman	1997	1.25	-430	-8500	-18	-4	d	-150	-3000	-6.5	-1.4	d
Oldman	1987	2.25	-390	-7300	-10	-2.2	d	-140	-2600	-3.6	-0.8	d
Oldman	1980.5	2.75	-350	-6900	-8	-1.8		-130	-2500	-2.8	-0.62	
Oldman	1973	3.25	-310	-6700	-6.6	-1.5	d	-110	-2400	-2.3	-0.51	d
Oldman	1963.5	3.75	-340	-7600	-6.1	-1.3		-120	-2700	-2.2	-0.48	
Oldman	1952	4.25	-300	-7000	-4.7	-1	d	-100	-2500	-1.7	-0.37	d
Oldman	1906.5	6.25	-260	-7500	-4.7	-1	d	-91	-2600	-1.7	-0.37	d
Snyder	2004	0.25	-2200	-17000	-47	-34	d	-790	-6000	-17	-12	d
Snyder	2000	1.25	-1400	-12000	-26	-19	d	-500	-4100	-9	-6.6	d
Snyder	1991.5	2.75	-1300	-11000	-20	-14	d	-450	-4100	-7	-5.1	d
Snyder	1985	3.75	-1200	-12000	-18	-13	d	-440	-4200	-6.6	-4.8	d
Snyder	1978	4.75	-1100	-11000	-16	-11	d	-400	-4100	-5.6	-4.1	d
Snyder	1967.5	5.75	-970	-10000	-13	-9.2	d	-350	-3700	-4.5	-3.3	d
Snyder	1954.5	6.75	-990	-9800	-11	-7.9		-350	-3500	-3.8	-2.8	c
Snyder	1893	11.75	-410	-4700	-3.3	-2.4	d	-150	-1700	-1.2	-0.86	d

Site	Average Year (y)	Average Depth (cm)	PBLT pg/g dw	PBLT pg/g TOC	PBLT Flux pg/cm2.y	PBLT Flux (FF) pg/cm2.y	PBLT FLAG	ACY pg/g dw	ACY pg/g TOC	ACY Flux pg/cm2.y	ACY Flux (FF) pg/cm2.y	ACY FLAG
Mills	2002	0.25	-330	-2100	-9.6	-6.5		-150	-960	-4.4	-3	
Mills	2000	0.75	-430	-3000	-12	-8.4		-200	-1400	-5.7	-3.9	
Mills	1996	1.75	-300	-2000	-8.3	-5.6		1400	9600	40	27	
Mills	1990.5	2.75	-280	-2100	-6.6	-4.5		1400	11000	34	23	d
Mills	1987.5	3.25	-270	-2200	-5.3	-3.6	d	3400	28000	68	46	
Mills	1974	4.75	-260	-2400	-4.9	-3.3		-120	-1100	-2.3	-1.5	
Mills	1970	5.25	-210	-1900	-4.8	-3.2		3200	30000	75	51	
Mills	1963.5	6.25	-210	-1700	-6.6	-4.5		-96	-790	-3.1	-2.1	
Mills	1953.5	7.75	-200	-1700	-6	-4.1	d	2600	23000	80	54	
Mills	1947	8.75	-200	-1800	-5	-3.4	d	3000	26000	75	51	
Mills	1937.5	9.75	-160	-1500	-3.6	-2.4		-75	-690	-1.6	-1.1	
Mills	1905	17.5	-74	-610	-1.6	-1.1		-34	-280	-0.75	-0.51	

Lone Pine	2001	0.25	-260	-19	-3.9	-2.1		-120	-8.6	-1.8	-0.96	
Lone Pine	1997.5	0.75	-230	-18	-3.7	-2		-110	-8.3	-1.7	-0.93	d
Lone Pine	1990	1.75	-260	-22	-4.4	-2.3		-120	-10	-2	-1.1	
Lone Pine	1986	2.25	-240	-20	-4.1	-2.2	d	2000	160	34	18	
Lone Pine	1982	2.75	-260	-19	-4.4	-2.4	d	-120	-8.7	-2.1	-1.1	d
Lone Pine	1972.5	3.75	-290	-21	-4.3	-2.3	d	4200	300	63	33	
Lone Pine	1967	4.25	-320	-23	-4.8	-2.6	d	-150	-11	-2.2	-1.2	
Lone Pine	1961	4.75	-230	-20	-3.2	-1.7		-110	-9.3	-1.5	-0.79	
Lone Pine	1955	5.25	-230	-20	-3	-1.6	d	-110	-9.5	-1.4	-0.75	
Lone Pine	1949	5.75	-360	-32	-4.7	-2.5		-170	-15	-2.2	-1.2	
Lone Pine	1936	6.75	-260	-23	-3.1	-1.6	d	-120	-11	-1.4	-0.76	d
Lone Pine	1920	7.75	-200	-19	-2.4	-1.3		-93	-8.6	-1.1	-0.6	
Lone Pine	1870	11.5	-84	-7.5	-1	-0.54		-39	-3.5	-0.47	-0.25	
Pear	2002	0.25	-710	-4700	-8.5	-3.8		-330	-2200	-4	-1.8	c
Pear	2000	0.75	-540	-4000	-6.5	-2.9		24000	180000	290	130	c
Pear	1997	1.25	-550	-3700	-6.6	-3		13000	86000	160	70	c
Pear	1991	2.25	-630	-4700	-7.5	-3.4		46000	338000	550	250	c
Pear	1980	3.75	-490	-3300	-5.4	-2.4		41000	274000	450	200	c
Pear	1969	5.25	-450	-3400	-4.9	-2.2		44000	336000	490	220	c
Pear	1961	6.25	-470	-3400	-6.6	-3		58000	424000	820	370	c
Pear	1957	6.75	-340	-3000	-4.8	-2.2		52000	451000	730	330	c
Pear	1926	10.5	-320	-2800	-2.5	-1.1		-150	-1300	-1.2	-0.53	c
Pear	1872	14.5	-150	-1300	-0.89	-0.4		-69	-620	-0.41	-0.19	c,d
Emerald	2002	0.25	-270	-3100	-13	-3.4	d	-130	-1400	-5.8	-1.6	
Emerald	1997	1.75	-170	-1900	-7.9	-2.1	d	-80	-890	-3.7	-0.98	
Emerald	1989	3.75	-160	-1700	-7.3	-2		-73	-770	-3.4	-0.9	
Emerald	1980	5.75	-180	-1900	-8.3	-2.2	d	-83	-890	-3.8	-1	
Emerald	1971.5	7.75	-190	-2200	-8.7	-2.3	d	-88	-1000	-4	-1.1	d
Emerald	1961.5	9.75	-130	-1300	-6.1	-1.6	d	-61	-590	-2.8	-0.76	
Emerald	1958	10.5	-61	-770	-2.8	-0.75	d	-28	-360	-1.3	-0.35	d
Emerald	1892	21.5	-38	-450	-2.1	-0.58		-17	-210	-1	-0.27	
Burial	2000	0.25	-8.4	-13000	-0.034	-0.038	d	130	190000	0.5	0.57	d
Burial	1988	0.75	-6.2	-10000	-0.025	-0.029		110	182000	0.44	0.5	d

Burial	1974	1.25	-8.6	-15000	-0.04	-0.045	d	100	172000	0.46	0.52	d
Burial	1957	1.75	-6.7	-12000	-0.022	-0.025		32	59000	0.11	0.12	
Burial	1933	2.25	-7	-14000	-0.022	-0.025		-3.2	-6400	-0.01	-0.011	
Burial	1906	2.75	-7.1	-14000	-0.022	-0.025		19	38000	0.06	0.069	
Burial	1879	3.25	-6	-11000	-0.019	-0.021		-2.8	-5300	-0.009	-0.01	
Mcleod	2002	0.25	-1300	-11000	-6.7	-2.6	d	-610	-5000	-3.1	-1.2	d
Mcleod	1997	0.75	-590	-5200	-3.3	-1.3	d	-280	-2400	-1.5	-0.59	
Mcleod	1990	1.25	-380	-3800	-2.4	-0.93	d	-170	-1800	-1.1	-0.43	d
Mcleod	1982	1.75	-340	-3600	-2.7	-1	d	-160	-1700	-1.3	-0.49	d
Mcleod	1975	2.25	-340	-3800	-3.6	-1.4	d	-160	-1800	-1.7	-0.63	d
Mcleod	1969	2.75	-300	-3400	-3.4	-1.3	d	-140	-1600	-1.6	-0.61	d
Mcleod	1962	3.25	-290	-3100	-2.4	-0.91	d	-130	-1400	-1.1	-0.42	d
Mcleod	1952	3.75	-310	-3400	-1.9	-0.75	d	-140	-1600	-0.9	-0.35	
Mcleod	1907	6.25	-390	-3600	-2.2	-0.86	d	-180	-1700	-1	-0.4	d
Matcharak	2001	0.25	-1100		-4.4	-3.5	d	-490		-2	-1.6	d
Matcharak	1993	0.75	-680	-5300	-3	-2.4	d	-310	-2500	-1.4	-1.1	
Matcharak	1983	1.25	-550	-4500	-2.4	-1.9	d	-250	-2100	-1.1	-0.88	
Matcharak	1971	1.75	-540	-4600	-1.8	-1.4	d	-250	-2100	-0.83	-0.66	
Matcharak	1954	2.25	-500	-4500	-1.3	-1	d	-230	-2100	-0.58	-0.46	d
Matcharak	1937	2.75	-480	-4500	-1	-0.8	d	-220	-2100	-0.46	-0.37	d
Matcharak	1910	3.25	-420	-4100	-0.83	-0.67	d	-190	-1900	-0.39	-0.31	d
Wonder	2000	0.25	-320	-4500	-2.4	-0.68		-150	-2100	-1.1	-0.32	
Wonder	1992	0.75	-390	-5400	-2.9	-0.83		-180	-2500	-1.3	-0.38	
Wonder	1985	1.25	-300	-4600	-2.1	-0.61		-140	-2100	-0.99	-0.28	
Wonder	1977	1.75	-270	-4600	-1.8	-0.52		-130	-2100	-0.84	-0.24	
Wonder	1968	2.25	-310	-5200	-1.5	-0.42		-140	-2400	-0.68	-0.19	
Wonder	1949	2.75	-380	-6300	-1.2	-0.35		-180	-2900	-0.56	-0.16	
Wonder	1919	3.25	-210	-4100	-0.49	-0.14		-99	-1900	-0.23	-0.065	
Golden	2002.5	0.25	-1700		-2.3	-2.3		-790		-1.1	-1.1	
Golden	1996.5	0.75	-1200		-3.6	-3.6	d	-530		-1.7	-1.7	
Golden	1989.5	1.25	-660	-3900	-2.5	-2.5	d	-310	-1800	-1.2	-1.2	
Golden	1981.5	1.75	-790	-4700	-2.9	-2.9	d	-370	-2200	-1.3	-1.3	

Golden	1972.5	2.25	-760	-3200	-2.2	-2.2	d	-350	-1500	-1	-1	
Golden	1962.5	2.75	-840	-3500	-2.1	-2.1	d	-390	-1600	-0.96	-0.96	d
Golden	1951	3.25	-800	-3100	-1.7	-1.7	d	-370	-1400	-0.79	-0.79	d
Golden	1924	4.25	-760	-2900	-1.3	-1.3	d	-350	-1400	-0.6	-0.6	d
LP 19	2004	0.25	-1400	-7500	-15	-10	d	-640	-3500	-7	-4.7	
LP 19	1999	1.25	-750		-7.1	-4.7	d	-350		-3.3	-2.2	
LP 19	1994	2.25	-590	-3200	-6.5	-4.3	d	-270	-1500	-3	-2	
LP 19	1989	3.25	-680	-3700	-5.8	-3.8		-320	-1700	-2.7	-1.8	
LP 19	1980	4.25	-680	-3700	-4.1	-2.7	d	-310	-1700	-1.9	-1.3	
LP 19	1969	5.25	-620	-3400	-3.2	-2.1		-290	-1600	-1.5	-0.99	
LP 19	1956	6.25	-600	-3200	-2.5	-1.6	d	17000	88000	69	46	
LP 19	1903	10.5	-330	-1900	-2.1	-1.4		-150	-900	-0.95	-0.64	
Hoh	2004	0.25	-460	-2200	-5.9	-1.9	d	-210	-1000	-2.7	-0.88	d
Hoh	1998	1.25	-740	-4000	-6.7	-2.2		-340	-1900	-3.1	-1	
Hoh	1990.5	2.25	-540	-3800	-5.9	-1.9		-250	-1800	-2.7	-0.89	
Hoh	1983	3.25	-340	-3300	-5	-1.6	d	-160	-1500	-2.3	-0.74	d
Hoh	1973.5	4.25	-300	-3300	-4.5	-1.4		-140	-1500	-2.1	-0.67	
Hoh	1963	5.25	-300	-3000	-4.1	-1.3		-140	-1400	-1.9	-0.61	
Hoh	1952.5	6.25	-230	-2600	-4.5	-1.4		2100	25000	42	13	
Hoh	1901	12.75	-66	-800	-1.4	-0.45		-31	-370	-0.64	-0.21	
PJ	2004.5	0.25	-1100	-6700	-30	-39	d	-500	-3100	-14	-18	c,d
PJ	1999	2.75	-620	-3800	-17	-21	d	-290	-1800	-7.7	-9.9	c,d
PJ	1992	4.75	-580	-3600	-14	-18	d	-270	-1700	-6.6	-8.5	c
PJ	1984	6.75	-310	-2000	-10	-13	d	-140	-930	-4.6	-5.9	c
PJ	1977.5	8.75	-320	-2100	-17	-22		-150	-980	-8.1	-10	c
PJ	1968	11.5	-120		-3.5	-4.5	d	-56		-1.6	-2.1	c
PJ	1963	12.5	-120	-810	-4.8	-6.2		-55	-370	-2.2	-2.9	c
PJ	1955	15.5	-96	-650	-9.3	-12		-45	-300	-4.3	-5.5	c
Oldman	2003.5	0.25	-140	-2600	-7.6	-1.7	d	-64	-1200	-3.5	-0.78	
Oldman	1997	1.25	-150	-3000	-6.4	-1.4	d	-69	-1400	-3	-0.65	
Oldman	1987	2.25	-140	-2600	-3.6	-0.79	d	-64	-1200	-1.7	-0.36	d
Oldman	1980.5	2.75	-120	-2400	-2.8	-0.61		-57	-1100	-1.3	-0.28	

Oldman	1973	3.25	-110	-2300	-2.3	-0.51	d	-51	-1100	-1.1	-0.24	
Oldman	1963.5	3.75	-120	-2700	-2.1	-0.47		-55	-1200	-0.99	-0.22	
Oldman	1952	4.25	-100	-2500	-1.7	-0.36	d	-48	-1100	-0.77	-0.17	d
Oldman	1906.5	6.25	-89	-2600	-1.7	-0.36	d	-41	-1200	-0.77	-0.17	d
Snyder	2004	0.25	-780	-5900	-16	-12	d	-360	-2700	-7.6	-5.5	d
Snyder	2000	1.25	-500	-4000	-8.9	-6.5	d	-230	-1900	-4.1	-3	d
Snyder	1991.5	2.75	-450	-4000	-6.9	-5	d	-210	-1900	-3.2	-2.3	
Snyder	1985	3.75	-430	-4100	-6.5	-4.7	d	-200	-1900	-3	-2.2	
Snyder	1978	4.75	-390	-4000	-5.5	-4	d	-180	-1900	-2.6	-1.9	d
Snyder	1967.5	5.75	-340	-3700	-4.4	-3.2	d	-160	-1700	-2.1	-1.5	d
Snyder	1954.5	6.75	-340	-3400	-3.8	-2.8		-160	-1600	-1.8	-1.3	
Snyder	1893	11.75	-140	-1700	-1.2	-0.84	d	-67	-770	-0.54	-0.39	d

Site	Average Year (y)	Average Depth (cm)	ACE pg/g dw	ACE pg/g TOC	ACE Flux pg/cm2.y	ACE Flux (FF) pg/cm2.y	ACE FLAG	FLO pg/g dw	FLO pg/g TOC	FLO Flux pg/cm2.y	FLO Flux (FF) pg/cm2.y	FLO FLAG
Mills	2002	0.25	-130	-810	-3.7	-2.5		-83	-520	-2.4	-1.6	
Mills	2000	0.75	14000	102000	420	280		9400	66000	270	180	
Mills	1996	1.75	16000	109000	450	310		7700	52000	210	150	
Mills	1990.5	2.75	6300	48000	150	100	d	7200	55000	170	110	d
Mills	1987.5	3.25	10000	82000	200	140		9200	76000	180	120	
Mills	1974	4.75	3700	34000	69	47		8700	79000	160	110	
Mills	1970	5.25	7200	65000	170	110		8200	75000	190	130	
Mills	1963.5	6.25	5600	46000	180	120		6600	54000	210	140	
Mills	1953.5	7.75	-77	-680	-2.3	-1.6		8100	71000	250	170	
Mills	1947	8.75	-79	-690	-2	-1.3		8700	76000	220	150	
Mills	1937.5	9.75	3600	33000	80	54		7700	71000	170	110	
Mills	1905	17.5	1400	12000	31	21		5100	42000	110	75	
Lone Pine	2001	0.25	-100	-7.3	-1.5	-0.81		5600	400	84	45	
Lone Pine	1997.5	0.75	-91	-7	-1.5	-0.78	d	4400	340	70	37	d
Lone Pine	1990	1.75	-100	-8.7	-1.7	-0.92		6000	510	100	54	
Lone Pine	1986	2.25	-94	-7.7	-1.6	-0.86		5200	420	88	47	
Lone Pine	1982	2.75	-100	-7.4	-1.7	-0.93	d	6800	490	110	61	d

Lone Pine	1972.5	3.75	-110	-8.1	-1.7	-0.9		9700	700	140	77	
Lone Pine	1967	4.25	11000	760	160	85		9400	680	140	75	
Lone Pine	1961	4.75	-89	-7.8	-1.2	-0.66		6000	530	84	45	
Lone Pine	1955	5.25	-91	-8	-1.2	-0.63		6800	600	89	48	
Lone Pine	1949	5.75	-140	-12	-1.8	-0.99		12000	1100	160	85	
Lone Pine	1936	6.75	-100	-8.9	-1.2	-0.64	d	12000	1100	150	78	d
Lone Pine	1920	7.75	-78	-7.2	-0.94	-0.5		10000	930	120	65	
Lone Pine	1870	11.5	-33	-2.9	-0.39	-0.21		6300	550	75	40	e
Pear	2002	0.25	-280	-1800	-3.3	-1.5		-180	-1200	-2.2	-0.97	
Pear	2000	0.75				-1.1	X	13000	92000	150	68	
Pear	1997	1.25	-220	-1400	-2.6	-1.2		10000	67000	120	55	
Pear	1991	2.25	-240	-1800	-2.9	-1.3		18000	131000	210	96	
Pear	1980	3.75	-190	-1300	-2.1	-0.95		13000	90000	150	67	
Pear	1969	5.25	-180	-1300	-1.9	-0.87		30000	227000	330	150	
Pear	1961	6.25	-180	-1300	-2.6	-1.2		31000	226000	430	200	
Pear	1957	6.75	-130	-1200	-1.9	-0.85		12000	100000	160	73	
Pear	1926	10.5	-120	-1100	-0.98	-0.44		12000	108000	98	44	
Pear	1872	14.5	-58	-520	-0.35	-0.16	d	-38	-340	-0.23	-0.1	
Emerald	2002	0.25	-110	-1200	-4.9	-1.3		-69	-790	-3.2	-0.85	
Emerald	1997	1.75	-67	-750	-3.1	-0.83		-43	-490	-2	-0.54	
Emerald	1989	3.75	-62	-650	-2.8	-0.76		-40	-420	-1.8	-0.49	
Emerald	1980	5.75	-70	-750	-3.2	-0.87		-45	-490	-2.1	-0.56	
Emerald	1971.5	7.75	-74	-860	-3.4	-0.91	d	-48	-560	-2.2	-0.59	d
Emerald	1961.5	9.75	-52	-500	-2.4	-0.64		-33	-320	-1.5	-0.41	
Emerald	1958	10.5	-24	-300	-1.1	-0.29	d	2900	36000	130	35	d
Emerald	1892	21.5	-15	-180	-0.84	-0.22		2400	29000	140	37	
Burial	2000	0.25	290	440000	1.2	1.3	d	-2.1	-3200	-0.009	-0.01	d
Burial	1988	0.75	930	1572000	3.8	4.3	d	110	179000	0.43	0.49	d
Burial	1974	1.25	120	216000	0.57	0.65	d	140	241000	0.64	0.73	d
Burial	1957	1.75	65	120000	0.21	0.24		99	184000	0.33	0.37	
Burial	1933	2.25	-2.7	-5400	-0.008	-0.01		-1.8	-3500	-0.005	-0.006	
Burial	1906	2.75	96	187000	0.3	0.34		76	149000	0.24	0.27	
Burial	1879	3.25	83	157000	0.26	0.29		-1.5	-2900	-0.005	-0.005	

Mcleod	2002	0.25	-520	-4300	-2.6	-1	d	-330	-2800	-1.7	-0.66	d
Mcleod	1997	0.75	-230	-2000	-1.3	-0.5		-150	-1300	-0.84	-0.32	
Mcleod	1990	1.25	-150	-1500	-0.94	-0.36	d	-95	-960	-0.61	-0.23	d
Mcleod	1982	1.75	-130	-1400	-1.1	-0.41	d	-85	-920	-0.69	-0.26	d
Mcleod	1975	2.25	-130	-1500	-1.4	-0.53	d	-87	-960	-0.9	-0.35	d
Mcleod	1969	2.75	-120	-1300	-1.3	-0.51	d	-77	-860	-0.86	-0.33	d
Mcleod	1962	3.25	-110	-1200	-0.92	-0.35	d	-74	-780	-0.6	-0.23	d
Mcleod	1952	3.75	-120	-1300	-0.76	-0.29		-78	-860	-0.49	-0.19	
Mcleod	1907	6.25	-150	-1400	-0.87	-0.34	d	-99	-910	-0.57	-0.22	d
Matcharak	2001	0.25	-410		-1.7	-1.4	d	-270		-1.1	-0.88	d
Matcharak	1993	0.75	-260	-2100	-1.2	-0.95		-170	-1300	-0.77	-0.62	
Matcharak	1983	1.25	-210	-1800	-0.92	-0.74		-140	-1100	-0.6	-0.48	
Matcharak	1971	1.75	-210	-1800	-0.7	-0.56		-140	-1200	-0.45	-0.36	
Matcharak	1954	2.25	-200	-1700	-0.49	-0.39	d	-130	-1100	-0.32	-0.25	d
Matcharak	1937	2.75	-190	-1700	-0.39	-0.31	d	-120	-1100	-0.25	-0.2	d
Matcharak	1910	3.25	-160	-1600	-0.33	-0.26	d	-110	-1000	-0.21	-0.17	d
Wonder	2000	0.25	-130	-1800	-0.93	-0.27		-81	-1100	-0.6	-0.17	
Wonder	1992	0.75	-150	-2100	-1.1	-0.32		-97	-1400	-0.73	-0.21	
Wonder	1985	1.25	-120	-1800	-0.83	-0.24		-75	-1200	-0.54	-0.15	
Wonder	1977	1.75	-110	-1800	-0.71	-0.2		-69	-1200	-0.46	-0.13	
Wonder	1968	2.25	-120	-2000	-0.57	-0.16		-79	-1300	-0.37	-0.11	
Wonder	1949	2.75	-150	-2500	-0.47	-0.14		-96	-1600	-0.31	-0.088	
Wonder	1919	3.25	-84	-1600	-0.19	-0.055		-54	-1000	-0.12	-0.036	
Golden	2002.5	0.25	130000		170	170		-430		-0.58	-0.58	
Golden	1996.5	0.75	-450		-1.4	-1.4		25000		79	79	
Golden	1989.5	1.25	97000	576000	370	370		11000	65000	41	41	
Golden	1981.5	1.75	-310	-1800	-1.1	-1.1		-200	-1200	-0.72	-0.72	
Golden	1972.5	2.25	-300	-1200	-0.87	-0.87		-190	-800	-0.57	-0.57	
Golden	1962.5	2.75	-330	-1400	-0.81	-0.81	d	-210	-890	-0.52	-0.52	d
Golden	1951	3.25	-310	-1200	-0.67	-0.67	d	-200	-790	-0.43	-0.43	d
Golden	1924	4.25	-290	-1100	-0.5	-0.5	d	-190	-740	-0.32	-0.32	d

LP 19	2004	0.25	-540	-2900	-5.9	-4		-350	-1900	-3.8	-2.6	
LP 19	1999	1.25	-290		-2.8	-1.8		-190		-1.8	-1.2	
LP 19	1994	2.25	-230	-1300	-2.5	-1.7		-150	-810	-1.6	-1.1	
LP 19	1989	3.25	-270	-1500	-2.2	-1.5		-170	-940	-1.5	-0.97	
LP 19	1980	4.25	-260	-1400	-1.6	-1.1		-170	-930	-1	-0.69	
LP 19	1969	5.25	-240	-1300	-1.3	-0.84		-160	-860	-0.81	-0.54	
LP 19	1956	6.25	-230	-1200	-0.96	-0.64		-150	-800	-0.62	-0.42	
LP 19	1903	10.5	-130	-760	-0.8	-0.53		-84	-490	-0.52	-0.35	
Hoh	2004	0.25	-180	-870	-2.3	-0.75	d					X
Hoh	1998	1.25	-290	-1600	-2.6	-0.84						X
Hoh	1990.5	2.25	-210	-1500	-2.3	-0.75						X
Hoh	1983	3.25	-130	-1300	-1.9	-0.63	d					X
Hoh	1973.5	4.25	-120	-1300	-1.8	-0.57						X
Hoh	1963	5.25	-120	-1200	-1.6	-0.52						X
Hoh	1952.5	6.25	13000	152000	260	83						X
Hoh	1901	12.75	-26	-310	-0.54	-0.18		2400	29000	51	16	e
PJ	2004.5	0.25	-420	-2600	-12	-15	d	-270	-1700	-7.6	-9.7	d
PJ	1999	2.75	-240	-1500	-6.5	-8.3	d	7100	43000	190	250	d
PJ	1992	4.75	-230	-1400	-5.6	-7.1		4900	30000	120	160	
PJ	1984	6.75	-120	-780	-3.9	-5		4000	26000	130	170	
PJ	1977.5	8.75	-120	-830	-6.8	-8.7		4000	27000	220	280	
PJ	1968	11.5	-47		-1.4	-1.8		3300		97	120	
PJ	1963	12.5	-46	-320	-1.9	-2.4		3500	24000	140	180	
PJ	1955	15.5	-38	-250	-3.6	-4.7		3300	22000	320	410	
Oldman	2003.5	0.25	-54	-1000	-3	-0.65		-35	-660	-1.9	-0.42	
Oldman	1997	1.25	-58	-1200	-2.5	-0.55		3500	70000	150	33	e
Oldman	1987	2.25	-54	-1000	-1.4	-0.31	d	7600	141000	200	43	d,e
Oldman	1980.5	2.75	-48	-950	-1.1	-0.24		5200	101000	120	26	e
Oldman	1973	3.25	-43	-910	-0.9	-0.2		6200	133000	130	29	e
Oldman	1963.5	3.75	-46	-1000	-0.83	-0.18		5100	114000	91	20	e
Oldman	1952	4.25	-40	-960	-0.65	-0.14	d	6400	152000	100	22	e
Oldman	1906.5	6.25	-35	-1000	-0.65	-0.14	d	8700	254000	160	35	d,e

Snyder	2004	0.25	-300	-2300	-6.4	-4.6	d	-200	-1500	-4.1	-3	d
Snyder	2000	1.25	-190	-1600	-3.5	-2.5	d	11000	86000	190	140	d
Snyder	1991.5	2.75	-170	-1600	-2.7	-2		8700	78000	130	98	
Snyder	1985	3.75	-170	-1600	-2.5	-1.8		10000	99000	150	110	
Snyder	1978	4.75	-150	-1600	-2.1	-1.6	d	10000	102000	140	100	d
Snyder	1967.5	5.75	-130	-1400	-1.7	-1.3	d	11000	121000	150	110	d
Snyder	1954.5	6.75	-130	-1300	-1.5	-1.1		-87	-870	-0.96	-0.7	

Site	Average Year (y)	Average Depth (cm)	PCLR pg/g dw	PCLR pg/g TOC	PCLR Flux pg/cm2.y	PCLR Flux (FF) pg/cm2.y	PCLR FLAG	SIMZ pg/g dw	SIMZ pg/g TOC	SIMZ Flux pg/cm2.y	SIMZ Flux (FF) pg/cm2.y	SIMZ FLAG
Mills	2002	0.25	-89	-560	-2.6	-1.8		-670	-4200	-19	-13	
Mills	2000	0.75	-120	-810	-3.4	-2.3		-870	-6100	-25	-17	
Mills	1996	1.75	-80	-540	-2.2	-1.5		-600	-4100	-17	-11	
Mills	1990.5	2.75	-76	-580	-1.8	-1.2		-570	-4400	-13	-9.1	
Mills	1987.5	3.25	-72	-590	-1.4	-0.97	d	-540	-4500	-11	-7.3	d
Mills	1974	4.75	-72	-660	-1.3	-0.9		-540	-4900	-10	-6.7	
Mills	1970	5.25	-56	-510	-1.3	-0.87	d	-420	-3800	-9.7	-6.6	d
Mills	1963.5	6.25	-56	-460	-1.8	-1.2		-420	-3500	-13	-9.1	
Mills	1953.5	7.75	-53	-470	-1.6	-1.1		-400	-3500	-12	-8.3	
Mills	1947	8.75	-55	-480	-1.4	-0.92		-410	-3600	-10	-6.9	
Mills	1937.5	9.75	-44	-400	-0.96	-0.65		-330	-3000	-7.2	-4.9	
Mills	1905	17.5	-20	-160	-0.44	-0.3		-150	-1200	-3.3	-2.2	
Lone Pine	2001	0.25	-70	-5	-1.1	-0.56	d	-530	-38	-7.9	-4.2	d
Lone Pine	1997.5	0.75	-63	-4.9	-1	-0.54		-470	-37	-7.6	-4.1	
Lone Pine	1990	1.75	-70	-6	-1.2	-0.64		-530	-45	-8.9	-4.8	
Lone Pine	1986	2.25	-66	-5.4	-1.1	-0.6	d	-490	-40	-8.4	-4.5	d
Lone Pine	1982	2.75	-71	-5.1	-1.2	-0.64		-530	-38	-9	-4.8	
Lone Pine	1972.5	3.75	-78	-5.6	-1.2	-0.62	d	-580	-42	-8.8	-4.7	d
Lone Pine	1967	4.25	-87	-6.3	-1.3	-0.7	d	-660	-47	-9.8	-5.3	d
Lone Pine	1961	4.75	-62	-5.4	-0.86	-0.46	d	-460	-41	-6.5	-3.5	d
Lone Pine	1955	5.25	-63	-5.5	-0.82	-0.44		-470	-42	-6.2	-3.3	
Lone Pine	1949	5.75	-98	-8.7	-1.3	-0.68		-740	-65	-9.6	-5.1	
Lone Pine	1936	6.75	-70	-6.2	-0.83	-0.45		-520	-47	-6.3	-3.4	

Lone Pine	1920	7.75	-54	-5	-0.65	-0.35		-410	-38	-4.9	-2.6	
Lone Pine	1870	11.5	-23	-2	-0.27	-0.15		-170	-15	-2.1	-1.1	
Pear	2002	0.25	-190	-1300	-2.3	-1		-1400	-9500	-17	-7.8	
Pear	2000	0.75	-150	-1100	-1.8	-0.79		-1100	-8100	-13	-5.9	
Pear	1997	1.25	-150	-1000	-1.8	-0.81		-1100	-7500	-14	-6.1	
Pear	1991	2.25	-170	-1300	-2	-0.92		-1300	-9500	-15	-6.9	
Pear	1980	3.75	-130	-890	-1.5	-0.66		-1000	-6700	-11	-5	
Pear	1969	5.25	-120	-920	-1.3	-0.6		-910	-6900	-10	-4.5	
Pear	1961	6.25	-130	-930	-1.8	-0.81		-960	-7000	-13	-6	
Pear	1957	6.75	-93	-800	-1.3	-0.59		-700	-6000	-9.8	-4.4	
Pear	1926	10.5	-85	-760	-0.68	-0.31		-640	-5700	-5.1	-2.3	
Pear	1872	14.5	-40	-360	-0.24	-0.11	d	-300	-2700	-1.8	-0.82	d
Emerald	2002	0.25	-74	-840	-3.4	-0.91		-560	-6300	-26	-6.8	
Emerald	1997	1.75	-47	-520	-2.1	-0.57		-350	-3900	-16	-4.3	
Emerald	1989	3.75	-43	-450	-2	-0.53		-320	-3400	-15	-4	
Emerald	1980	5.75	-49	-520	-2.2	-0.6		-370	-3900	-17	-4.5	
Emerald	1971.5	7.75	-51	-600	-2.4	-0.63		-390	-4500	-18	-4.8	
Emerald	1961.5	9.75	-36	-350	-1.6	-0.44		-270	-2600	-12	-3.3	
Emerald	1958	10.5	-17	-210	-0.76	-0.2		-120	-1600	-5.7	-1.5	
Emerald	1892	21.5	-10	-120	-0.58	-0.16		-77	-920	-4.4	-1.2	
Burial	2000	0.25	-2.3	-3500	-0.009	-0.01		-17	-26000	-0.069	-0.078	
Burial	1988	0.75	-1.7	-2800	-0.007	-0.008		-13	-21000	-0.052	-0.059	
Burial	1974	1.25	-2.3	-4000	-0.011	-0.012		-17	-30000	-0.08	-0.091	
Burial	1957	1.75	-1.8	-3400	-0.006	-0.007		-14	-25000	-0.045	-0.051	
Burial	1933	2.25	-1.9	-3700	-0.006	-0.007		-14	-28000	-0.044	-0.05	
Burial	1906	2.75	-1.9	-3700	-0.006	-0.007		-14	-28000	-0.044	-0.051	
Burial	1879	3.25	-1.6	-3100	-0.005	-0.006		-12	-23000	-0.038	-0.043	
Mcleod	2002	0.25	-360	-3000	-1.8	-0.7		-2700	-22000	-14	-5.3	
Mcleod	1997	0.75	-160	-1400	-0.9	-0.35		-1200	-11000	-6.8	-2.6	
Mcleod	1990	1.25	-100	-1000	-0.65	-0.25		-770	-7800	-4.9	-1.9	
Mcleod	1982	1.75	-91	-980	-0.74	-0.28		-680	-7400	-5.5	-2.1	
Mcleod	1975	2.25	-93	-1000	-0.97	-0.37		-700	-7700	-7.2	-2.8	

Mcleod	1969	2.75	-82	-920	-0.92	-0.35		-620	-6900	-6.9	-2.7	
Mcleod	1962	3.25	-79	-840	-0.64	-0.25		-590	-6300	-4.8	-1.8	
Mcleod	1952	3.75	-83	-920	-0.53	-0.2		-630	-6900	-3.9	-1.5	
Mcleod	1907	6.25	-110	-980	-0.61	-0.23		-800	-7300	-4.6	-1.8	
Matcharak	2001	0.25	-290		-1.2	-0.95		-2200		-8.9	-7.1	
Matcharak	1993	0.75	-180	-1400	-0.83	-0.66		-1400	-11000	-6.2	-5	
Matcharak	1983	1.25	-150	-1200	-0.64	-0.51		-1100	-9100	-4.8	-3.8	
Matcharak	1971	1.75	-150	-1200	-0.48	-0.39		-1100	-9400	-3.6	-2.9	
Matcharak	1954	2.25	-140	-1200	-0.34	-0.27		-1000	-9100	-2.5	-2	
Matcharak	1937	2.75	-130	-1200	-0.27	-0.22		-970	-9100	-2	-1.6	
Matcharak	1910	3.25	-110	-1100	-0.23	-0.18		-850	-8300	-1.7	-1.4	
Wonder	2000	0.25	-87	-1200	-0.65	-0.19	c	-660	-9100	-4.9	-1.4	
Wonder	1992	0.75	-100	-1500	-0.78	-0.22	c	-780	-11000	-5.9	-1.7	
Wonder	1985	1.25	-80	-1200	-0.58	-0.17	c	-600	-9300	-4.3	-1.2	
Wonder	1977	1.75	-74	-1200	-0.49	-0.14	c	-560	-9300	-3.7	-1.1	
Wonder	1968	2.25	-84	-1400	-0.4	-0.11	c	-630	-11000	-3	-0.85	
Wonder	1949	2.75	-100	-1700	-0.33	-0.094	c	-770	-13000	-2.5	-0.71	
Wonder	1919	3.25	-58	-1100	-0.13	-0.038	c	-440	-8300	-1	-0.29	
Golden	2002.5	0.25	-460		-0.62	-0.62		-3500		-4.7	-4.7	
Golden	1996.5	0.75	-310		-0.97	-0.97		-2300		-7.3	-7.3	
Golden	1989.5	1.25	-180	-1100	-0.67	-0.67		-1300	-8000	-5.1	-5.1	
Golden	1981.5	1.75	-220	-1300	-0.77	-0.77		-1600	-9600	-5.8	-5.8	
Golden	1972.5	2.25	-210	-860	-0.61	-0.61		-1500	-6400	-4.6	-4.6	
Golden	1962.5	2.75	-230	-950	-0.56	-0.56		-1700	-7100	-4.2	-4.2	
Golden	1951	3.25	-220	-850	-0.46	-0.46		-1600	-6300	-3.5	-3.5	
Golden	1924	4.25	-200	-800	-0.35	-0.35		-1500	-6000	-2.6	-2.6	
LP 19	2004	0.25	-370	-2000	-4.1	-2.7		-2800	-15000	-31	-21	
LP 19	1999	1.25	-200		-1.9	-1.3		-1500		-14	-9.6	
LP 19	1994	2.25	-160	-870	-1.8	-1.2		-1200	-6500	-13	-8.8	
LP 19	1989	3.25	-180	-1000	-1.6	-1		-1400	-7600	-12	-7.8	
LP 19	1980	4.25	-180	-1000	-1.1	-0.74		-1400	-7500	-8.3	-5.5	
LP 19	1969	5.25	-170	-920	-0.87	-0.58		-1300	-6900	-6.5	-4.4	

LP 19	1956	6.25	-160	-860	-0.67	-0.45		-1200	-6500	-5	-3.4	
LP 19	1903	10.5	-90	-530	-0.56	-0.37		-670	-3900	-4.2	-2.8	
Hoh	2004	0.25	-120	-610	-1.6	-0.52		-930	-4500	-12	-3.9	
Hoh	1998	1.25	-200	-1100	-1.8	-0.58		-1500	-8200	-14	-4.4	
Hoh	1990.5	2.25	-150	-1000	-1.6	-0.52		-1100	-7700	-12	-3.9	
Hoh	1983	3.25	-93	-890	-1.4	-0.44		-700	-6700	-10	-3.3	
Hoh	1973.5	4.25	-81	-900	-1.2	-0.39		-610	-6700	-9.1	-2.9	
Hoh	1963	5.25	-82	-810	-1.1	-0.36		-620	-6100	-8.3	-2.7	
Hoh	1952.5	6.25	-62	-720	-1.2	-0.39		-470	-5400	-9.1	-2.9	
Hoh	1901	12.75	-18	-220	-0.38	-0.12		-130	-1600	-2.8	-0.91	
PJ	2004.5	0.25	-290	-1800	-8.2	-10	c	-2200	-14000	-61	-78	
PJ	1999	2.75	-170	-1000	-4.5	-5.8	c	-1300	-7700	-34	-43	
PJ	1992	4.75	-160	-970	-3.9	-5	c	-1200	-7300	-29	-37	
PJ	1984	6.75	-83	-540	-2.7	-3.5	c	-620	-4100	-20	-26	
PJ	1977.5	8.75	-87	-570	-4.7	-6.1	c	-650	-4300	-35	-45	
PJ	1968	11.5	-33		-0.95	-1.2	c	-250		-7.1	-9.2	
PJ	1963	12.5	-32	-220	-1.3	-1.7	c	-240	-1600	-9.8	-13	
PJ	1955	15.5	-26	-180	-2.5	-3.2	c	-200	-1300	-19	-24	
Oldman	2003.5	0.25	-38	-710	-2.1	-0.45		-280	-5300	-16	-3.4	
Oldman	1997	1.25	-40	-810	-1.7	-0.38		-300	-6100	-13	-2.9	
Oldman	1987	2.25	-37	-690	-0.97	-0.21		-280	-5200	-7.3	-1.6	
Oldman	1980.5	2.75	-34	-660	-0.76	-0.17		-250	-4900	-5.7	-1.2	
Oldman	1973	3.25	-30	-630	-0.63	-0.14		-220	-4800	-4.7	-1	
Oldman	1963.5	3.75	-32	-720	-0.58	-0.13		-240	-5400	-4.3	-0.95	
Oldman	1952	4.25	-28	-670	-0.45	-0.099		-210	-5000	-3.4	-0.74	
Oldman	1906.5	6.25	-24	-710	-0.45	-0.098		-180	-5300	-3.4	-0.74	
Snyder	2004	0.25	-210	-1600	-4.4	-3.2		-1600	-12000	-33	-24	
Snyder	2000	1.25	-130	-1100	-2.4	-1.8		-1000	-8200	-18	-13	
Snyder	1991.5	2.75	-120	-1100	-1.9	-1.4		-910	-8200	-14	-10	
Snyder	1985	3.75	-120	-1100	-1.8	-1.3		-880	-8400	-13	-9.6	
Snyder	1978	4.75	-110	-1100	-1.5	-1.1		-800	-8200	-11	-8.2	
Snyder	1967.5	5.75	-92	-990	-1.2	-0.88		-690	-7400	-9	-6.6	

Snyder	1954.5	6.75	-93	-930	-1	-0.75		-700	-7000	-7.7	-5.6	
Snyder	1893	11.75	-39	-450	-0.31	-0.23		-290	-3400	-2.4	-1.7	

Site	Average Year (y)	Average Depth (cm)	PMTN pg/g dw	PMTN pg/g TOC	PMTN Flux pg/cm2.y	PMTN Flux (FF) pg/cm2.y	PMTN FLAG	ATRZ pg/g dw	ATRZ pg/g TOC	ATRZ Flux pg/cm2.y	ATRZ Flux (FF) pg/cm2.y	ATRZ FLAG
Mills	2002	0.25	-660	-4100	-19	-13		-110	-690	-3.2	-2.2	
Mills	2000	0.75	-850	-6000	-25	-17		-140	-1000	-4.1	-2.8	
Mills	1996	1.75	-590	-4000	-16	-11		-98	-660	-2.7	-1.9	
Mills	1990.5	2.75	-560	-4300	-13	-8.9		-93	-720	-2.2	-1.5	
Mills	1987.5	3.25	-530	-4400	-11	-7.2	d	-89	-730	-1.8	-1.2	d
Mills	1974	4.75	-530	-4800	-9.7	-6.6		-88	-810	-1.6	-1.1	
Mills	1970	5.25	-410	-3800	-9.5	-6.4	d	-69	-630	-1.6	-1.1	d
Mills	1963.5	6.25	-410	-3400	-13	-8.9		-69	-560	-2.2	-1.5	
Mills	1953.5	7.75	-390	-3500	-12	-8.1		-66	-580	-2	-1.4	
Mills	1947	8.75	-400	-3500	-10	-6.8		-67	-590	-1.7	-1.1	
Mills	1937.5	9.75	-320	-3000	-7.1	-4.8		-54	-490	-1.2	-0.8	
Mills	1905	17.5	-150	-1200	-3.2	-2.2		-25	-200	-0.54	-0.36	
Lone Pine	2001	0.25	-520	-37	-7.7	-4.1	c,d	-86	-6.2	-1.3	-0.69	d
Lone Pine	1997.5	0.75	-460	-36	-7.4	-4		-78	-6	-1.2	-0.66	
Lone Pine	1990	1.75	-510	-44	-8.7	-4.7		-86	-7.4	-1.5	-0.78	
Lone Pine	1986	2.25	-480	-40	-8.2	-4.4	d	-80	-6.6	-1.4	-0.73	d
Lone Pine	1982	2.75	-520	-38	-8.9	-4.7		-87	-6.3	-1.5	-0.79	
Lone Pine	1972.5	3.75	-570	-41	-8.6	-4.6	d	-96	-6.9	-1.4	-0.77	d
Lone Pine	1967	4.25	-640	-46	-9.6	-5.1	d	-110	-7.7	-1.6	-0.86	d
Lone Pine	1961	4.75	-450	-40	-6.3	-3.4	d	-76	-6.6	-1.1	-0.57	d
Lone Pine	1955	5.25	-470	-41	-6	-3.2		-78	-6.8	-1	-0.54	
Lone Pine	1949	5.75	-720	-64	-9.4	-5		-120	-11	-1.6	-0.84	
Lone Pine	1936	6.75	-510	-46	-6.1	-3.3		-85	-7.6	-1	-0.55	
Lone Pine	1920	7.75	-400	-37	-4.8	-2.6		-67	-6.2	-0.8	-0.43	
Lone Pine	1870	11.5	-170	-15	-2	-1.1		-28	-2.5	-0.34	-0.18	
Pear	2002	0.25	-1400	-9300	-17	-7.7		-240	-1500	-2.8	-1.3	
Pear	2000	0.75	-1100	-7900	-13	-5.8		-180	-1300	-2.2	-0.97	

Pear	1997	1.25	-1100	-7300	-13	-6		-180	-1200	-2.2	-0.99	
Pear	1991	2.25	-1200	-9300	-15	-6.7		-210	-1500	-2.5	-1.1	
Pear	1980	3.75	-980	-6600	-11	-4.9		-160	-1100	-1.8	-0.81	
Pear	1969	5.25	-900	-6800	-9.9	-4.4		-150	-1100	-1.6	-0.74	
Pear	1961	6.25	-940	-6800	-13	-5.9		-160	-1100	-2.2	-0.99	
Pear	1957	6.75	-680	-5900	-9.6	-4.3		-110	-990	-1.6	-0.72	
Pear	1926	10.5	-630	-5600	-5	-2.3		-100	-930	-0.84	-0.38	
Pear	1872	14.5	-300	-2600	-1.8	-0.8	d	-49	-440	-0.3	-0.13	d
Emerald	2002	0.25	-540	-6200	-25	-6.7		-91	-1000	-4.2	-1.1	
Emerald	1997	1.75	-340	-3800	-16	-4.2		-57	-640	-2.6	-0.71	
Emerald	1989	3.75	-320	-3300	-15	-3.9		-53	-550	-2.4	-0.65	
Emerald	1980	5.75	-360	-3800	-16	-4.4		-60	-640	-2.8	-0.74	
Emerald	1971.5	7.75	-380	-4400	-17	-4.7		-63	-730	-2.9	-0.78	
Emerald	1961.5	9.75	-260	-2500	-12	-3.2		-44	-430	-2	-0.54	
Emerald	1958	10.5	-120	-1500	-5.6	-1.5		-20	-260	-0.93	-0.25	
Emerald	1892	21.5	-75	-900	-4.3	-1.1		-13	-150	-0.71	-0.19	
Burial	2000	0.25	-17	-25000	-0.067	-0.076		-2.8	-4200	-0.011	-0.013	
Burial	1988	0.75	-12	-21000	-0.051	-0.057		-2.1	-3500	-0.008	-0.01	
Burial	1974	1.25	-17	-30000	-0.079	-0.089		-2.9	-4900	-0.013	-0.015	
Burial	1957	1.75	-13	-25000	-0.044	-0.05		-2.2	-4100	-0.007	-0.008	
Burial	1933	2.25	-14	-27000	-0.043	-0.049		-2.3	-4600	-0.007	-0.008	
Burial	1906	2.75	-14	-27000	-0.044	-0.05		-2.3	-4600	-0.007	-0.008	
Burial	1879	3.25	-12	-23000	-0.037	-0.042		-2	-3800	-0.006	-0.007	
Mcleod	2002	0.25	-2600	-22000	-13	-5.2		-440	-3600	-2.2	-0.86	
Mcleod	1997	0.75	-1200	-10000	-6.6	-2.5		-200	-1700	-1.1	-0.43	
Mcleod	1990	1.25	-750	-7600	-4.8	-1.8		-130	-1300	-0.8	-0.31	
Mcleod	1982	1.75	-670	-7200	-5.4	-2.1		-110	-1200	-0.91	-0.35	
Mcleod	1975	2.25	-680	-7600	-7.1	-2.7		-110	-1300	-1.2	-0.46	
Mcleod	1969	2.75	-610	-6800	-6.8	-2.6		-100	-1100	-1.1	-0.44	
Mcleod	1962	3.25	-580	-6100	-4.7	-1.8		-97	-1000	-0.78	-0.3	
Mcleod	1952	3.75	-610	-6800	-3.9	-1.5		-100	-1100	-0.64	-0.25	
Mcleod	1907	6.25	-780	-7200	-4.5	-1.7		-130	-1200	-0.75	-0.29	

Matcharak	2001	0.25	-2100		-8.7	-6.9		-350		-1.4	-1.2	
Matcharak	1993	0.75	-1300	-11000	-6.1	-4.9		-230	-1800	-1	-0.81	
Matcharak	1983	1.25	-1100	-8900	-4.7	-3.8		-180	-1500	-0.79	-0.63	
Matcharak	1971	1.75	-1100	-9200	-3.6	-2.8		-180	-1500	-0.59	-0.48	
Matcharak	1954	2.25	-1000	-8900	-2.5	-2		-170	-1500	-0.42	-0.33	
Matcharak	1937	2.75	-950	-8900	-2	-1.6		-160	-1500	-0.33	-0.27	
Matcharak	1910	3.25	-830	-8100	-1.7	-1.3		-140	-1400	-0.28	-0.22	
Wonder	2000	0.25	-640	-8900	-4.8	-1.4		-110	-1500	-0.79	-0.23	
Wonder	1992	0.75	-770	-11000	-5.8	-1.6		-130	-1800	-0.96	-0.28	
Wonder	1985	1.25	-590	-9200	-4.2	-1.2		-98	-1500	-0.71	-0.2	
Wonder	1977	1.75	-550	-9200	-3.6	-1		-91	-1500	-0.6	-0.17	
Wonder	1968	2.25	-620	-10000	-2.9	-0.83		-100	-1700	-0.49	-0.14	
Wonder	1949	2.75	-750	-13000	-2.4	-0.69		-130	-2100	-0.4	-0.12	
Wonder	1919	3.25	-430	-8100	-0.98	-0.28		-71	-1300	-0.16	-0.047	
Golden	2002.5	0.25	-3400		-4.6	-4.6		-570		-0.77	-0.77	
Golden	1996.5	0.75	-2300		-7.1	-7.1		-380		-1.2	-1.2	
Golden	1989.5	1.25	-1300	-7800	-4.9	-4.9		-220	-1300	-0.83	-0.83	
Golden	1981.5	1.75	-1600	-9400	-5.7	-5.7		-260	-1600	-0.95	-0.95	
Golden	1972.5	2.25	-1500	-6300	-4.5	-4.5		-250	-1100	-0.74	-0.74	
Golden	1962.5	2.75	-1700	-7000	-4.1	-4.1		-280	-1200	-0.69	-0.69	
Golden	1951	3.25	-1600	-6200	-3.4	-3.4		-260	-1000	-0.57	-0.57	
Golden	1924	4.25	-1500	-5900	-2.6	-2.6		-250	-980	-0.43	-0.43	
LP 19	2004	0.25	-2800	-15000	-30	-20		-460	-2500	-5.1	-3.4	
LP 19	1999	1.25	-1500		-14	-9.4		-250		-2.4	-1.6	
LP 19	1994	2.25	-1200	-6400	-13	-8.6		-200	-1100	-2.2	-1.4	
LP 19	1989	3.25	-1400	-7400	-11	-7.7		-230	-1200	-1.9	-1.3	
LP 19	1980	4.25	-1300	-7300	-8.1	-5.4		-220	-1200	-1.4	-0.91	
LP 19	1969	5.25	-1200	-6800	-6.4	-4.3		-210	-1100	-1.1	-0.71	
LP 19	1956	6.25	-1200	-6300	-4.9	-3.3		-200	-1100	-0.82	-0.55	
LP 19	1903	10.5	-660	-3900	-4.1	-2.7		-110	-640	-0.68	-0.46	
Hoh	2004	0.25	-910	-4500	-12	-3.8		-150	-740	-2	-0.64	
Hoh	1998	1.25	-1500	-8000	-13	-4.3		-250	-1300	-2.2	-0.72	

Site	Average Year (y)	Average Depth	CYAZ pg/g dw	CYAZ pg/g	CYAZ Flux	CYAZ Flux	CYAZ FLAG	PHE pg/g dw	PHE pg/g	PHE Flux	PHE Flux	PHE FLAG
Hoh	1990.5	2.25	-1100	-7500	-12	-3.8		-180	-1300	-2	-0.64	
Hoh	1983	3.25	-680	-6500	-9.9	-3.2		-110	-1100	-1.7	-0.53	
Hoh	1973.5	4.25	-600	-6600	-8.9	-2.9		-100	-1100	-1.5	-0.48	
Hoh	1963	5.25	-600	-5900	-8.2	-2.6		-100	-990	-1.4	-0.44	
Hoh	1952.5	6.25	-460	-5300	-8.9	-2.9		-76	-880	-1.5	-0.48	
Hoh	1901	12.75	-130	-1600	-2.8	-0.89		-22	-260	-0.46	-0.15	
PJ	2004.5	0.25	-2100	-13000	-60	-77		-360	-2200	-10	-13	
PJ	1999	2.75	-1200	-7500	-33	-43		-210	-1300	-5.5	-7.1	
PJ	1992	4.75	-1200	-7100	-28	-36		-190	-1200	-4.7	-6.1	
PJ	1984	6.75	-610	-4000	-20	-25		-100	-670	-3.3	-4.3	
PJ	1977.5	8.75	-640	-4200	-35	-45		-110	-710	-5.8	-7.4	
PJ	1968	11.5	-240		-7	-9		-40		-1.2	-1.5	
PJ	1963	12.5	-240	-1600	-9.6	-12		-39	-270	-1.6	-2.1	
PJ	1955	15.5	-190	-1300	-19	-24		-32	-220	-3.1	-4	
Oldman	2003.5	0.25	-280	-5200	-15	-3.3		-46	-870	-2.5	-0.56	
Oldman	1997	1.25	-300	-6000	-13	-2.8		-50	-990	-2.1	-0.47	
Oldman	1987	2.25	-270	-5100	-7.1	-1.6		-46	-850	-1.2	-0.26	
Oldman	1980.5	2.75	-250	-4800	-5.6	-1.2		-41	-810	-0.93	-0.2	
Oldman	1973	3.25	-220	-4700	-4.6	-1		-37	-780	-0.77	-0.17	
Oldman	1963.5	3.75	-240	-5300	-4.2	-0.93		-39	-890	-0.71	-0.16	
Oldman	1952	4.25	-210	-4900	-3.3	-0.72		-34	-820	-0.55	-0.12	
Oldman	1906.5	6.25	-180	-5200	-3.3	-0.72		-30	-870	-0.55	-0.12	
Snyder	2004	0.25	-1500	-12000	-32	-24		-260	-2000	-5.4	-4	
Snyder	2000	1.25	-990	-8000	-18	-13		-160	-1300	-3	-2.2	
Snyder	1991.5	2.75	-890	-8000	-14	-10		-150	-1300	-2.3	-1.7	
Snyder	1985	3.75	-860	-8300	-13	-9.4		-140	-1400	-2.1	-1.6	
Snyder	1978	4.75	-780	-8000	-11	-8		-130	-1300	-1.8	-1.3	
Snyder	1967.5	5.75	-680	-7300	-8.8	-6.4		-110	-1200	-1.5	-1.1	
Snyder	1954.5	6.75	-690	-6800	-7.6	-5.5	c	-110	-1100	-1.3	-0.92	
Snyder	1893	11.75	-290	-3300	-2.3	-1.7		-48	-550	-0.39	-0.28	

		(cm)		TOC	pg/cm2.y	(FF) pg/cm2.y			TOC	pg/cm2.y	(FF) pg/cm2.y	
Mills	2002	0.25	-2000	-12000	-57	-39		68000	426000	2000	1300	
Mills	2000	0.75	-2600	-18000	-74	-50		64000	449000	1900	1300	e
Mills	1996	1.75	-1800	-12000	-49	-33		20000	132000	550	370	e
Mills	1990.5	2.75	-1700	-13000	-39	-27		42000	321000	980	660	e
Mills	1987.5	3.25	-1600	-13000	-32	-21	d	23000	186000	450	310	e
Mills	1974	4.75	-1600	-14000	-29	-20		60000	553000	1100	750	
Mills	1970	5.25	-1200	-11000	-29	-19	d	20000	185000	470	320	e
Mills	1963.5	6.25	-1200	-10000	-39	-27		35000	284000	1100	750	e
Mills	1953.5	7.75	-1200	-10000	-36	-24	c	33000	291000	1000	680	e
Mills	1947	8.75	-1200	-11000	-30	-20	c	36000	319000	900	610	e
Mills	1937.5	9.75	-970	-8900	-21	-14		37000	335000	800	540	e
Mills	1905	17.5	-440	-3600	-9.7	-6.5		26000	210000	560	380	e
Lone Pine	2001	0.25	-1500	-110	-23	-12	d	49000	3500	740	390	d
Lone Pine	1997.5	0.75	-1400	-110	-22	-12		27000	2100	430	230	e
Lone Pine	1990	1.75	-1500	-130	-26	-14		38000	3300	650	350	
Lone Pine	1986	2.25	-1400	-120	-25	-13	c,d	12000	1000	210	110	e
Lone Pine	1982	2.75	-1600	-110	-27	-14		25000	1800	420	220	e
Lone Pine	1972.5	3.75	-1700	-120	-26	-14	c,d	24000	1800	360	200	e
Lone Pine	1967	4.25	-1900	-140	-29	-15	c,d	31000	2200	460	250	e
Lone Pine	1961	4.75	-1400	-120	-19	-10	d	28000	2400	390	210	e
Lone Pine	1955	5.25	-1400	-120	-18	-9.7		32000	2800	420	230	e
Lone Pine	1949	5.75	-2200	-190	-28	-15		58000	5100	760	400	e
Lone Pine	1936	6.75	-1500	-140	-18	-9.8		38000	3400	460	250	e
Lone Pine	1920	7.75	-1200	-110	-14	-7.7						X
Lone Pine	1870	11.5	-500	-45	-6	-3.2		21000	1900	250	140	e
Pear	2002	0.25	-4300	-28000	-51	-23		-320	-2100	-3.9	-1.7	
Pear	2000	0.75	-3200	-24000	-39	-17						X
Pear	1997	1.25	-3300	-22000	-40	-18						X
Pear	1991	2.25	-3700	-28000	-45	-20		74000	548000	890	400	e
Pear	1980	3.75	-2900	-20000	-32	-15		46000	307000	500	230	
Pear	1969	5.25	-2700	-20000	-30	-13		98000	742000	1100	490	e
Pear	1961	6.25	-2800	-20000	-39	-18		261000	1897000	3700	1600	e

Pear	1957	6.75	-2100	-18000	-29	-13		38000	325000	530	240	e
Pear	1926	10.5	-1900	-17000	-15	-6.8		37000	328000	300	130	e
Pear	1872	14.5	-890	-7900	-5.3	-2.4	d	-67	-600	-0.4	-0.18	
Emerald	2002	0.25	-1600	-19000	-75	-20						X
Emerald	1997	1.75	-1000	-11000	-47	-13		4600	51000	210	56	e
Emerald	1989	3.75	-950	-9900	-44	-12		5500	58000	250	68	
Emerald	1980	5.75	-1100	-11000	-49	-13		7300	79000	340	91	e
Emerald	1971.5	7.75	-1100	-13000	-52	-14		17000	198000	780	210	d,e
Emerald	1961.5	9.75	-790	-7600	-36	-9.7		18000	174000	830	220	e
Emerald	1958	10.5	-360	-4600	-17	-4.5		7400	94000	340	92	d,e
Emerald	1892	21.5	-230	-2700	-13	-3.4		13000	150000	720	190	e
Burial	2000	0.25	-50	-76000	-0.2	-0.23	c	370	561000	1.5	1.7	e
Burial	1988	0.75	-37	-62000	-0.15	-0.17	c	500	843000	2	2.3	e
Burial	1974	1.25	-51	-89000	-0.24	-0.27	c	690	1188000	3.2	3.6	e
Burial	1957	1.75	-40	-74000	-0.13	-0.15	c	830	1537000	2.7	3.1	e
Burial	1933	2.25	-42	-82000	-0.13	-0.15	c	680	1340000	2.1	2.4	e
Burial	1906	2.75	-42	-82000	-0.13	-0.15	c	840	1640000	2.6	3	e
Burial	1879	3.25	-36	-68000	-0.11	-0.13	c	680	1294000	2.1	2.4	e
Mcleod	2002	0.25	-7900	-65000	-40	-15	c					X
Mcleod	1997	0.75	-3500	-31000	-20	-7.6	c					X
Mcleod	1990	1.25	-2300	-23000	-14	-5.5	c					X
Mcleod	1982	1.75	-2000	-22000	-16	-6.3	c					X
Mcleod	1975	2.25	-2000	-23000	-21	-8.2	c					X
Mcleod	1969	2.75	-1800	-20000	-20	-7.8	c					X
Mcleod	1962	3.25	-1700	-18000	-14	-5.4	c	20000	209000	160	61	e
Mcleod	1952	3.75	-1800	-20000	-12	-4.5	c					X
Mcleod	1907	6.25	-2300	-22000	-13	-5.1	c	21000	197000	120	47	e
Matcharak	2001	0.25	-6400		-26	-21	c	26000		110	85	e
Matcharak	1993	0.75	-4000	-32000	-18	-15	c	10000	81000	46	37	e
Matcharak	1983	1.25	-3300	-27000	-14	-11	c	10000	84000	44	35	e
Matcharak	1971	1.75	-3200	-28000	-11	-8.5	c	6400	54000	21	17	e
Matcharak	1954	2.25	-3000	-27000	-7.5	-6	c					X

Matcharak	1937	2.75	-2800	-27000	-6	-4.8	c					X
Matcharak	1910	3.25	-2500	-24000	-5	-4	c					X
Wonder	2000	0.25	-1900	-27000	-14	-4.1	c					X
Wonder	1992	0.75	-2300	-32000	-17	-4.9	c					X
Wonder	1985	1.25	-1800	-27000	-13	-3.6	c	11000	168000	78	22	e
Wonder	1977	1.75	-1600	-27000	-11	-3.1	c	11000	189000	74	21	e
Wonder	1968	2.25	-1900	-31000	-8.7	-2.5	c	32000	538000	150	44	e
Wonder	1949	2.75	-2300	-38000	-7.2	-2.1	c	51000	842000	160	47	e
Wonder	1919	3.25	-1300	-24000	-2.9	-0.84	c	9700	185000	22	6.4	e
Golden	2002.5	0.25	-10000		-14	-14		-770		-1	-1	e
Golden	1996.5	0.75	-6900		-21	-21		-520		-1.6	-1.6	e
Golden	1989.5	1.25	-4000	-23000	-15	-15		-300	-1800	-1.1	-1.1	e
Golden	1981.5	1.75	-4700	-28000	-17	-17		-360	-2100	-1.3	-1.3	e
Golden	1972.5	2.25	-4500	-19000	-13	-13		-340	-1400	-1	-1	e
Golden	1962.5	2.75	-5000	-21000	-12	-12		-380	-1600	-0.94	-0.94	e
Golden	1951	3.25	-4800	-19000	-10	-10		387000	1517000	830	830	b,e
Golden	1924	4.25	-4500	-18000	-7.7	-7.7		-340	-1300	-0.58	-0.58	b,e
LP 19	2004	0.25	-8300	-45000	-91	-61	c					X
LP 19	1999	1.25	-4500		-42	-28	c	57000		540	360	e
LP 19	1994	2.25	-3500	-19000	-39	-26	c	99000	539000	1100	730	e
LP 19	1989	3.25	-4100	-22000	-34	-23	c	131000	712000	1100	740	e
LP 19	1980	4.25	-4000	-22000	-24	-16	c	98000	535000	590	400	e
LP 19	1969	5.25	-3700	-20000	-19	-13	c	107000	586000	550	370	e
LP 19	1956	6.25	-3600	-19000	-15	-9.8	c	140000	745000	580	390	e
LP 19	1903	10.5	-2000	-12000	-12	-8.2	c	52000	302000	320	210	e
Hoh	2004	0.25	-2700	-13000	-35	-11	c					X
Hoh	1998	1.25	-4400	-24000	-40	-13	c					X
Hoh	1990.5	2.25	-3200	-23000	-35	-11	c					X
Hoh	1983	3.25	-2100	-20000	-30	-9.6	c					X
Hoh	1973.5	4.25	-1800	-20000	-27	-8.7	c					X
Hoh	1963	5.25	-1800	-18000	-24	-7.9	c					X
Hoh	1952.5	6.25	-1400	-16000	-27	-8.6	c					X

Hoh	1901	12.75	-400	-4800	-8.3	-2.7	c	6600	79000	140	45	e
PJ	2004.5	0.25	-6400	-40000	-180	-230						X
PJ	1999	2.75	-3700	-23000	-100	-130						X
PJ	1992	4.75	-3500	-21000	-85	-110						X
PJ	1984	6.75	-1800	-12000	-60	-76						X
PJ	1977.5	8.75	-1900	-13000	-100	-130						X
PJ	1968	11.5	-720		-21	-27		14000		410	520	e
PJ	1963	12.5	-710	-4800	-29	-37		14000	93000	550	710	e
PJ	1955	15.5	-570	-3900	-56	-71		12000	79000	1100	1400	e
Oldman	2003.5	0.25	-830	-16000	-46	-10		25000	466000	1400	300	e
Oldman	1997	1.25	-890	-18000	-38	-8.4		32000	643000	1400	300	e
Oldman	1987	2.25	-820	-15000	-21	-4.7		60000	1117000	1600	340	
Oldman	1980.5	2.75	-740	-14000	-17	-3.7		43000	848000	980	210	
Oldman	1973	3.25	-660	-14000	-14	-3		51000	1081000	1100	230	
Oldman	1963.5	3.75	-710	-16000	-13	-2.8		41000	924000	740	160	
Oldman	1952	4.25	-620	-15000	-9.9	-2.2		47000	1107000	750	160	
Oldman	1906.5	6.25	-530	-16000	-9.9	-2.2		28000	812000	510	110	e
Snyder	2004	0.25	-4600	-35000	-97	-71	c	73000	557000	1500	1100	e
Snyder	2000	1.25	-3000	-24000	-53	-39	c	91000	745000	1600	1200	e
Snyder	1991.5	2.75	-2700	-24000	-41	-30	c	95000	853000	1500	1100	e
Snyder	1985	3.75	-2600	-25000	-39	-28	c	108000	1042000	1600	1200	e
Snyder	1978	4.75	-2400	-24000	-33	-24	c	105000	1071000	1500	1100	e
Snyder	1967.5	5.75	-2000	-22000	-27	-19	c	133000	1423000	1700	1300	e
Snyder	1954.5	6.75	-2100	-21000	-23	-17		117000	1167000	1300	940	
Snyder	1893	11.75	-860	-9900	-6.9	-5	c	30000	348000	240	180	e

Site	Average Year (y)	Average Depth (cm)	ANT pg/g dw	ANT pg/g TOC	ANT Flux pg/cm2.y	ANT Flux (FF) pg/cm2.y	ANT FLAG	DIAZ pg/g dw	DIAZ pg/g TOC	DIAZ Flux pg/cm2.y	DIAZ Flux (FF) pg/cm2.y	DIAZ FLAG
Mills	2002	0.25	3200	20000	92	62		-59	-370	-1.7	-1.2	
Mills	2000	0.75	3800	27000	110	74		-76	-540	-2.2	-1.5	
Mills	1996	1.75	2600	17000	72	48		-53	-360	-1.5	-1	

Mills	1990.5	2.75	3100	24000	73	49		-50	-380	-1.2	-0.8	
Mills	1987.5	3.25	2900	24000	59	40		-47	-390	-0.95	-0.64	d
Mills	1974	4.75	4800	44000	89	60		-47	-430	-0.87	-0.59	
Mills	1970	5.25	3100	29000	72	49		-37	-340	-0.85	-0.58	d
Mills	1963.5	6.25	3400	28000	110	74		-37	-300	-1.2	-0.8	
Mills	1953.5	7.75	3500	31000	110	72		-35	-310	-1.1	-0.73	
Mills	1947	8.75	3700	33000	93	63		-36	-320	-0.9	-0.61	
Mills	1937.5	9.75	3900	36000	86	58		-29	-260	-0.63	-0.43	
Mills	1905	17.5	760	6200	17	11	e	-13	-110	-0.29	-0.2	
Lone Pine	2001	0.25	2800	200	42	23	d	-46	-3.3	-0.69	-0.37	
Lone Pine	1997.5	0.75	2200	170	35	19		-42	-3.2	-0.67	-0.36	
Lone Pine	1990	1.75	4300	370	73	39		-46	-4	-0.78	-0.42	
Lone Pine	1986	2.25	2300	190	39	21		-43	-3.5	-0.73	-0.39	
Lone Pine	1982	2.75	2700	190	45	24		-47	-3.4	-0.79	-0.42	
Lone Pine	1972.5	3.75	4300	310	64	34		-51	-3.7	-0.77	-0.41	
Lone Pine	1967	4.25	4300	310	65	35		-57	-4.1	-0.86	-0.46	
Lone Pine	1961	4.75	2400	210	34	18		-41	-3.6	-0.57	-0.3	
Lone Pine	1955	5.25	3100	270	40	22		-42	-3.6	-0.54	-0.29	
Lone Pine	1949	5.75	5900	520	76	41		-65	-5.7	-0.84	-0.45	
Lone Pine	1936	6.75	4700	420	57	30		-46	-4.1	-0.55	-0.29	
Lone Pine	1920	7.75	3900	360	47	25		-36	-3.3	-0.43	-0.23	
Lone Pine	1870	11.5	1100	93	13	6.8		-15	-1.3	-0.18	-0.096	
Pear	2002	0.25	-610	-4000	-7.3	-3.3	c	-130	-830	-1.5	-0.69	
Pear	2000	0.75	-460	-3400	-5.6	-2.5	c	-96	-710	-1.2	-0.52	
Pear	1997	1.25	-480	-3200	-5.7	-2.6		-99	-660	-1.2	-0.53	
Pear	1991	2.25	-540	-4000	-6.5	-2.9	c	-110	-830	-1.3	-0.6	
Pear	1980	3.75	-420	-2800	-4.6	-2.1	c	-88	-590	-0.96	-0.43	
Pear	1969	5.25	-390	-2900	-4.3	-1.9	c	-80	-610	-0.88	-0.4	
Pear	1961	6.25	-410	-2900	-5.7	-2.6	c	-84	-610	-1.2	-0.53	
Pear	1957	6.75	-300	-2600	-4.1	-1.9	c	-61	-530	-0.86	-0.39	
Pear	1926	10.5	-270	-2400	-2.2	-0.98	c	-56	-500	-0.45	-0.2	
Pear	1872	14.5	-130	-1100	-0.77	-0.34	c,d	-26	-240	-0.16	-0.072	d
Emerald	2002	0.25	-230	-2700	-11	-2.9	d	-49	-560	-2.2	-0.6	

Emerald	1997	1.75	-150	-1700	-6.8	-1.8		-31	-340	-1.4	-0.38	
Emerald	1989	3.75	-140	-1400	-6.3	-1.7		-28	-300	-1.3	-0.35	
Emerald	1980	5.75	-150	-1700	-7.1	-1.9		-32	-340	-1.5	-0.4	
Emerald	1971.5	7.75	-160	-1900	-7.5	-2	d	-34	-390	-1.6	-0.42	
Emerald	1961.5	9.75	-110	-1100	-5.2	-1.4		-24	-230	-1.1	-0.29	
Emerald	1958	10.5	-52	-660	-2.4	-0.65	d	-11	-140	-0.5	-0.13	
Emerald	1892	21.5	-32	-390	-1.8	-0.5		-6.7	-80	-0.38	-0.1	
Burial	2000	0.25	-7.3	-11000	-0.029	-0.033		-1.5	-2300	-0.006	-0.007	
Burial	1988	0.75	-5.3	-9000	-0.022	-0.025		-1.1	-1900	-0.005	-0.005	
Burial	1974	1.25	-7.4	-13000	-0.034	-0.039		-1.5	-2600	-0.007	-0.008	
Burial	1957	1.75	-5.8	-11000	-0.019	-0.022		-1.2	-2200	-0.004	-0.004	
Burial	1933	2.25	-6	-12000	-0.019	-0.021		-1.2	-2500	-0.004	-0.004	
Burial	1906	2.75	-6.1	-12000	-0.019	-0.021		-1.3	-2500	-0.004	-0.004	
Burial	1879	3.25	-5.1	-9800	-0.016	-0.018		-1.1	-2000	-0.003	-0.004	
Mcleod	2002	0.25	-1100	-9400	-5.8	-2.2		-240	-1900	-1.2	-0.46	
Mcleod	1997	0.75	-510	-4500	-2.9	-1.1		-110	-930	-0.59	-0.23	
Mcleod	1990	1.25	-320	-3300	-2.1	-0.8		-67	-680	-0.43	-0.17	
Mcleod	1982	1.75	-290	-3100	-2.3	-0.9		-60	-650	-0.49	-0.19	
Mcleod	1975	2.25	-290	-3300	-3.1	-1.2		-61	-680	-0.64	-0.24	
Mcleod	1969	2.75	-260	-2900	-2.9	-1.1		-54	-610	-0.61	-0.23	
Mcleod	1962	3.25	-250	-2700	-2	-0.78		-52	-550	-0.42	-0.16	
Mcleod	1952	3.75	-260	-2900	-1.7	-0.64		-55	-610	-0.35	-0.13	
Mcleod	1907	6.25	-340	-3100	-1.9	-0.74		-70	-640	-0.4	-0.15	
Matcharak	2001	0.25	-910		-3.7	-3		-190		-0.78	-0.62	
Matcharak	1993	0.75	-580	-4600	-2.6	-2.1		-120	-950	-0.54	-0.43	
Matcharak	1983	1.25	-470	-3900	-2	-1.6		-98	-800	-0.42	-0.34	
Matcharak	1971	1.75	-470	-4000	-1.5	-1.2		-97	-820	-0.32	-0.25	
Matcharak	1954	2.25	-430	-3800	-1.1	-0.86		-89	-790	-0.22	-0.18	
Matcharak	1937	2.75	-410	-3900	-0.86	-0.69		-85	-800	-0.18	-0.14	
Matcharak	1910	3.25	-360	-3500	-0.72	-0.57		-74	-730	-0.15	-0.12	
Wonder	2000	0.25	-280	-3900	-2.1	-0.59		-57	-800	-0.43	-0.12	
Wonder	1992	0.75	-330	-4600	-2.5	-0.71		-69	-960	-0.52	-0.15	

Wonder	1985	1.25	-250	-4000	-1.8	-0.52		-53	-820	-0.38	-0.11	
Wonder	1977	1.75	-240	-4000	-1.6	-0.45		-49	-820	-0.32	-0.093	
Wonder	1968	2.25	-270	-4400	-1.3	-0.36		-55	-920	-0.26	-0.075	
Wonder	1949	2.75	-330	-5400	-1	-0.3		-68	-1100	-0.22	-0.062	
Wonder	1919	3.25	-180	-3500	-0.42	-0.12		-38	-720	-0.088	-0.025	
Golden	2002.5	0.25	-1500		-2	-2		-300		-0.41	-0.41	
Golden	1996.5	0.75	-990		-3.1	-3.1		-210		-0.64	-0.64	
Golden	1989.5	1.25	-570	-3400	-2.1	-2.1		-120	-700	-0.44	-0.44	
Golden	1981.5	1.75	-680	-4000	-2.5	-2.5		-140	-840	-0.51	-0.51	
Golden	1972.5	2.25	22000	91000	64	64		-140	-560	-0.4	-0.4	
Golden	1962.5	2.75	42000	174000	100	100		-150	-630	-0.37	-0.37	
Golden	1951	3.25	62000	241000	130	130		-140	-560	-0.31	-0.31	
Golden	1924	4.25	65000	254000	110	110		-130	-530	-0.23	-0.23	
LP 19	2004	0.25	-1200	-6500	-13	-8.7		-250	-1300	-2.7	-1.8	
LP 19	1999	1.25	6500		62	41		-130		-1.3	-0.84	
LP 19	1994	2.25	9200	50000	100	67		-110	-570	-1.2	-0.77	
LP 19	1989	3.25	13000	68000	110	71		-120	-660	-1	-0.69	
LP 19	1980	4.25	10000	55000	61	40		-120	-660	-0.73	-0.49	
LP 19	1969	5.25	10000	55000	52	35		-110	-610	-0.57	-0.38	
LP 19	1956	6.25	14000	74000	58	39		-110	-570	-0.44	-0.29	
LP 19	1903	10.5	3600	21000	22	15		-59	-350	-0.37	-0.24	
Hoh	2004	0.25	-390	-1900	-5.1	-1.6		-81	-400	-1.1	-0.34	
Hoh	1998	1.25	-640	-3500	-5.7	-1.8		-130	-720	-1.2	-0.38	
Hoh	1990.5	2.25	-460	-3300	-5.1	-1.6		-96	-670	-1.1	-0.34	
Hoh	1983	3.25	-300	-2800	-4.3	-1.4		-61	-580	-0.89	-0.29	
Hoh	1973.5	4.25	-260	-2800	-3.9	-1.2		-53	-590	-0.8	-0.26	
Hoh	1963	5.25	1400	13000	18	5.9		-54	-530	-0.73	-0.24	
Hoh	1952.5	6.25	-200	-2300	-3.8	-1.2		-41	-470	-0.8	-0.26	
Hoh	1901	12.75	660	8000	14	4.5		-12	-140	-0.25	-0.08	
PJ	2004.5	0.25	-920	-5800	-26	-33		-190	-1200	-5.4	-6.9	
PJ	1999	2.75	-530	-3300	-14	-18		-110	-670	-3	-3.8	
PJ	1992	4.75	-500	-3100	-12	-16		-100	-640	-2.5	-3.3	

PJ	1984	6.75	-260	-1700	-8.6	-11		-55	-360	-1.8	-2.3	
PJ	1977.5	8.75	-280	-1800	-15	-19		-57	-380	-3.1	-4	
PJ	1968	11.5	1300		39	50		-22		-0.63	-0.8	
PJ	1963	12.5	-100	-690	-4.2	-5.3		-21	-140	-0.86	-1.1	
PJ	1955	15.5	1200	8100	120	150		-17	-120	-1.7	-2.1	
Oldman	2003.5	0.25	2000	39000	110	25		-25	-470	-1.4	-0.3	
Oldman	1997	1.25	3100	62000	130	29		-27	-530	-1.1	-0.25	
Oldman	1987	2.25	5700	106000	150	33		-25	-460	-0.64	-0.14	
Oldman	1980.5	2.75	3600	71000	81	18		-22	-430	-0.5	-0.11	
Oldman	1973	3.25	53000	1135000	1100	250		-20	-420	-0.41	-0.091	
Oldman	1963.5	3.75	4000	89000	71	16		-21	-480	-0.38	-0.084	
Oldman	1952	4.25	4200	100000	67	15		-18	-440	-0.3	-0.065	
Oldman	1906.5	6.25	2700	80000	51	11		-16	-470	-0.29	-0.065	
Snyder	2004	0.25	-670	-5100	-14	-10		-140	-1100	-2.9	-2.1	
Snyder	2000	1.25	6500	53000	120	85		-88	-720	-1.6	-1.2	
Snyder	1991.5	2.75	9100	82000	140	100		-79	-720	-1.2	-0.9	
Snyder	1985	3.75	11000	105000	160	120		-77	-740	-1.2	-0.84	
Snyder	1978	4.75	11000	110000	150	110		-70	-720	-0.98	-0.72	
Snyder	1967.5	5.75	15000	159000	190	140		-61	-650	-0.79	-0.58	
Snyder	1954.5	6.75	131000	1302000	1400	1100		-62	-610	-0.68	-0.49	
Snyder	1893	11.75	2400	27000	19	14		-26	-300	-0.21	-0.15	

Site	Average Year (y)	Average Depth (cm)	ACLR pg/g dw	ACLR pg/g TOC	ACLR Flux pg/cm2.y	ACLR Flux (FF) pg/cm2.y	ACLR FLAG	ALCLR pg/g dw	ALCLR pg/g TOC	ALCLR Flux pg/cm2.y	ALCLR Flux (FF) pg/cm2.y	ALCLR FLAG
Mills	2002	0.25	-110	-670	-3.1	-2.1		-150	-960	-4.4	-3	d
Mills	2000	0.75	-140	-980	-4	-2.7		-200	-1400	-5.8	-3.9	d
Mills	1996	1.75	-96	-650	-2.7	-1.8		-140	-930	-3.8	-2.6	d
Mills	1990.5	2.75	-91	-700	-2.1	-1.5		-130	-1000	-3.1	-2.1	d
Mills	1987.5	3.25	-87	-710	-1.7	-1.2		-120	-1000	-2.5	-1.7	d
Mills	1974	4.75	-86	-790	-1.6	-1.1		-120	-1100	-2.3	-1.5	
Mills	1970	5.25	-68	-610	-1.6	-1.1	d	-96	-880	-2.2	-1.5	
Mills	1963.5	6.25	-67	-550	-2.2	-1.5	d	-96	-790	-3.1	-2.1	

Mills	1953.5	7.75	-64	-570	-2	-1.3		-92	-810	-2.8	-1.9	
Mills	1947	8.75	-66	-580	-1.6	-1.1		-94	-830	-2.3	-1.6	
Mills	1937.5	9.75	-53	-480	-1.2	-0.78		-75	-690	-1.7	-1.1	
Mills	1905	17.5	-24	-200	-0.53	-0.36		-34	-280	-0.75	-0.51	
Lone Pine	2001	0.25	-84	-6.1	-1.3	-0.68		-120	-8.6	-1.8	-0.96	
Lone Pine	1997.5	0.75	-76	-5.9	-1.2	-0.65		-110	-8.4	-1.7	-0.93	
Lone Pine	1990	1.75	-84	-7.2	-1.4	-0.76		-120	-10	-2	-1.1	
Lone Pine	1986	2.25	-79	-6.5	-1.3	-0.72		-110	-9.2	-1.9	-1	
Lone Pine	1982	2.75	-85	-6.1	-1.4	-0.77		-120	-8.8	-2.1	-1.1	
Lone Pine	1972.5	3.75	-94	-6.7	-1.4	-0.75		-130	-9.6	-2	-1.1	
Lone Pine	1967	4.25	-100	-7.6	-1.6	-0.84		-150	-11	-2.2	-1.2	
Lone Pine	1961	4.75	-74	-6.5	-1	-0.55		-110	-9.3	-1.5	-0.79	
Lone Pine	1955	5.25	-76	-6.7	-0.99	-0.53		-110	-9.5	-1.4	-0.75	
Lone Pine	1949	5.75	-120	-10	-1.5	-0.82		-170	-15	-2.2	-1.2	
Lone Pine	1936	6.75	-84	-7.5	-1	-0.54		-120	-11	-1.4	-0.77	
Lone Pine	1920	7.75	-65	-6.1	-0.79	-0.42		-93	-8.6	-1.1	-0.6	
Lone Pine	1870	11.5	-27	-2.4	-0.33	-0.18		-39	-3.5	-0.47	-0.25	
Pear	2002	0.25	-230	-1500	-2.8	-1.3		-330	-2200	-4	-1.8	
Pear	2000	0.75	-180	-1300	-2.1	-0.95		-250	-1800	-3	-1.4	
Pear	1997	1.25	-180	-1200	-2.2	-0.97		-260	-1700	-3.1	-1.4	
Pear	1991	2.25	-200	-1500	-2.5	-1.1		-290	-2200	-3.5	-1.6	
Pear	1980	3.75	-160	-1100	-1.8	-0.79		-230	-1500	-2.5	-1.1	
Pear	1969	5.25	-150	-1100	-1.6	-0.73		-210	-1600	-2.3	-1	
Pear	1961	6.25	-150	-1100	-2.1	-0.97		-220	-1600	-3.1	-1.4	
Pear	1957	6.75	-110	-970	-1.6	-0.71		-160	-1400	-2.2	-1	
Pear	1926	10.5	-100	-910	-0.82	-0.37		-150	-1300	-1.2	-0.53	
Pear	1872	14.5	-48	-430	-0.29	-0.13		-69	-620	-0.41	-0.19	
Emerald	2002	0.25	-89	-1000	-4.1	-1.1		-130	-1400	-5.8	-1.6	
Emerald	1997	1.75	-56	-630	-2.6	-0.69	d	-80	-890	-3.7	-0.99	
Emerald	1989	3.75	-52	-540	-2.4	-0.64		-74	-770	-3.4	-0.91	
Emerald	1980	5.75	-59	-630	-2.7	-0.72	d	-84	-890	-3.8	-1	
Emerald	1971.5	7.75	-62	-720	-2.8	-0.76		-88	-1000	-4.1	-1.1	
Emerald	1961.5	9.75	-43	-420	-2	-0.53		-61	-590	-2.8	-0.76	

Emerald	1958	10.5	-20	-250	-0.92	-0.25		-28	-360	-1.3	-0.35	
Emerald	1892	21.5	-12	-150	-0.7	-0.19		-18	-210	-1	-0.27	
Burial	2000	0.25	-2.8	-4200	-0.011	-0.013		-3.9	-5900	-0.016	-0.018	
Burial	1988	0.75	-2	-3400	-0.008	-0.009		-2.9	-4900	-0.012	-0.013	
Burial	1974	1.25	-2.8	-4800	-0.013	-0.015		-4	-6900	-0.018	-0.021	
Burial	1957	1.75	-2.2	-4100	-0.007	-0.008		-3.1	-5800	-0.01	-0.012	
Burial	1933	2.25	-2.3	-4500	-0.007	-0.008		-3.3	-6400	-0.01	-0.011	
Burial	1906	2.75	-2.3	-4500	-0.007	-0.008		-3.3	-6400	-0.01	-0.012	
Burial	1879	3.25	-2	-3700	-0.006	-0.007		-2.8	-5300	-0.009	-0.01	
Mcleod	2002	0.25	-430	-3500	-2.2	-0.84	d	-610	-5100	-3.1	-1.2	
Mcleod	1997	0.75	-190	-1700	-1.1	-0.42	d	-280	-2400	-1.5	-0.59	
Mcleod	1990	1.25	-120	-1200	-0.79	-0.3	d	-180	-1800	-1.1	-0.43	
Mcleod	1982	1.75	-110	-1200	-0.89	-0.34		-160	-1700	-1.3	-0.49	
Mcleod	1975	2.25	-110	-1200	-1.2	-0.45	d	-160	-1800	-1.7	-0.64	
Mcleod	1969	2.75	-99	-1100	-1.1	-0.43		-140	-1600	-1.6	-0.61	
Mcleod	1962	3.25	-95	-1000	-0.77	-0.3	d	-140	-1400	-1.1	-0.42	
Mcleod	1952	3.75	-100	-1100	-0.63	-0.24	d	-140	-1600	-0.9	-0.35	
Mcleod	1907	6.25	-130	-1200	-0.73	-0.28		-180	-1700	-1	-0.4	
Matcharak	2001	0.25	-350		-1.4	-1.1		-490		-2	-1.6	
Matcharak	1993	0.75	-220	-1700	-0.99	-0.79	d	-310	-2500	-1.4	-1.1	
Matcharak	1983	1.25	-180	-1500	-0.77	-0.62	d	-260	-2100	-1.1	-0.88	
Matcharak	1971	1.75	-180	-1500	-0.58	-0.47	d	-250	-2100	-0.83	-0.66	
Matcharak	1954	2.25	-160	-1500	-0.41	-0.33		-230	-2100	-0.58	-0.47	
Matcharak	1937	2.75	-150	-1500	-0.33	-0.26	d	-220	-2100	-0.46	-0.37	
Matcharak	1910	3.25	-140	-1300	-0.27	-0.22		-190	-1900	-0.39	-0.31	
Wonder	2000	0.25	-110	-1500	-0.78	-0.22		-150	-2100	-1.1	-0.32	
Wonder	1992	0.75	-130	-1700	-0.94	-0.27		-180	-2500	-1.3	-0.38	
Wonder	1985	1.25	-96	-1500	-0.69	-0.2		-140	-2100	-0.99	-0.28	
Wonder	1977	1.75	-89	-1500	-0.59	-0.17		-130	-2100	-0.84	-0.24	
Wonder	1968	2.25	-100	-1700	-0.48	-0.14		-140	-2400	-0.68	-0.19	
Wonder	1949	2.75	-120	-2000	-0.39	-0.11		-180	-2900	-0.56	-0.16	
Wonder	1919	3.25	-70	-1300	-0.16	-0.046		-99	-1900	-0.23	-0.066	

Golden	2002.5	0.25	-560		-0.75	-0.75		-790		-1.1	-1.1	
Golden	1996.5	0.75	-380		-1.2	-1.2		-540		-1.7	-1.7	
Golden	1989.5	1.25	-220	-1300	-0.81	-0.81		-310	-1800	-1.2	-1.2	
Golden	1981.5	1.75	-260	-1500	-0.93	-0.93		-370	-2200	-1.3	-1.3	
Golden	1972.5	2.25	-250	-1000	-0.73	-0.73		-350	-1500	-1	-1	
Golden	1962.5	2.75	-270	-1100	-0.67	-0.67		-390	-1600	-0.96	-0.96	
Golden	1951	3.25	-260	-1000	-0.56	-0.56		-370	-1400	-0.8	-0.8	
Golden	1924	4.25	-250	-960	-0.42	-0.42		-350	-1400	-0.6	-0.6	
LP 19	2004	0.25	-450	-2500	-5	-3.3		-640	-3500	-7.1	-4.7	
LP 19	1999	1.25	-240		-2.3	-1.5		-350		-3.3	-2.2	
LP 19	1994	2.25	-190	-1000	-2.1	-1.4		-270	-1500	-3	-2	
LP 19	1989	3.25	-220	-1200	-1.9	-1.3		-320	-1700	-2.7	-1.8	
LP 19	1980	4.25	-220	-1200	-1.3	-0.89		-310	-1700	-1.9	-1.3	
LP 19	1969	5.25	-200	-1100	-1	-0.7		-290	-1600	-1.5	-1	
LP 19	1956	6.25	-190	-1000	-0.81	-0.54		-280	-1500	-1.1	-0.77	
LP 19	1903	10.5	-110	-630	-0.67	-0.45		-150	-900	-0.95	-0.64	
Hoh	2004	0.25	-150	-730	-1.9	-0.62		-210	-1000	-2.7	-0.89	
Hoh	1998	1.25	-240	-1300	-2.2	-0.7		-340	-1900	-3.1	-1	
Hoh	1990.5	2.25	-180	-1200	-1.9	-0.62		-250	-1800	-2.8	-0.89	
Hoh	1983	3.25	-110	-1100	-1.6	-0.52		-160	-1500	-2.3	-0.75	
Hoh	1973.5	4.25	-98	-1100	-1.5	-0.47		-140	-1500	-2.1	-0.67	
Hoh	1963	5.25	-99	-970	-1.3	-0.43		-140	-1400	-1.9	-0.61	
Hoh	1952.5	6.25	-75	-860	-1.5	-0.47		-110	-1200	-2.1	-0.67	
Hoh	1901	12.75	-22	-260	-0.45	-0.15		-31	-370	-0.65	-0.21	
PJ	2004.5	0.25	-350	-2200	-9.8	-13		-500	-3100	-14	-18	d
PJ	1999	2.75	-200	-1200	-5.4	-7		-290	-1800	-7.7	-9.9	d
PJ	1992	4.75	-190	-1200	-4.6	-6		-270	-1700	-6.6	-8.5	d
PJ	1984	6.75	-100	-650	-3.3	-4.2		-140	-930	-4.6	-5.9	d
PJ	1977.5	8.75	-100	-690	-5.7	-7.3		-150	-980	-8.1	-10	d
PJ	1968	11.5	-39		-1.1	-1.5		-56		-1.6	-2.1	d
PJ	1963	12.5	-38	-260	-1.6	-2		-55	-380	-2.2	-2.9	d
PJ	1955	15.5	-31	-210	-3	-3.9		-45	-300	-4.3	-5.6	d

Oldman	2003.5	0.25	-45	-850	-2.5	-0.55		-64	-1200	-3.5	-0.78	
Oldman	1997	1.25	-49	-970	-2.1	-0.46		-69	-1400	-3	-0.65	
Oldman	1987	2.25	-45	-830	-1.2	-0.26		-64	-1200	-1.7	-0.36	
Oldman	1980.5	2.75	-40	-790	-0.91	-0.2		-58	-1100	-1.3	-0.28	
Oldman	1973	3.25	-36	-760	-0.75	-0.17		-51	-1100	-1.1	-0.24	
Oldman	1963.5	3.75	-39	-870	-0.69	-0.15		-55	-1200	-0.99	-0.22	
Oldman	1952	4.25	-34	-800	-0.54	-0.12		-48	-1100	-0.77	-0.17	
Oldman	1906.5	6.25	-29	-850	-0.54	-0.12		-42	-1200	-0.77	-0.17	
Snyder	2004	0.25	-250	-1900	-5.3	-3.9		-360	-2700	-7.6	-5.5	d
Snyder	2000	1.25	-160	-1300	-2.9	-2.1		-230	-1900	-4.1	-3	d
Snyder	1991.5	2.75	-150	-1300	-2.3	-1.6		-210	-1900	-3.2	-2.3	d
Snyder	1985	3.75	-140	-1400	-2.1	-1.5		-200	-1900	-3	-2.2	d
Snyder	1978	4.75	-130	-1300	-1.8	-1.3		-180	-1900	-2.6	-1.9	d
Snyder	1967.5	5.75	-110	-1200	-1.4	-1.1		-160	-1700	-2.1	-1.5	d
Snyder	1954.5	6.75	-110	-1100	-1.2	-0.9	c	-160	-1600	-1.8	-1.3	d
Snyder	1893	11.75	-47	-540	-0.38	-0.28		-67	-770	-0.54	-0.39	d

Site	Average Year (y)	Average Depth (cm)	MCLR pg/g dw	MCLR pg/g TOC	MCLR Flux pg/cm2.y	MCLR Flux (FF) pg/cm2.y	MCLR FLAG	MTHN pg/g dw	MTHN pg/g TOC	MTHN Flux pg/cm2.y	MTHN Flux (FF) pg/cm2.y	MTHN FLAG
Mills	2002	0.25	-160	-1000	-4.7	-3.2	d	-760	-4700	-22	-15	d
Mills	2000	0.75	-210	-1500	-6.1	-4.1	d	-980	-6900	-28	-19	
Mills	1996	1.75	-150	-990	-4.1	-2.8	d	-680	-4600	-19	-13	
Mills	1990.5	2.75	-140	-1100	-3.3	-2.2	d	-640	-4900	-15	-10	
Mills	1987.5	3.25	-130	-1100	-2.6	-1.8	d	-610	-5000	-12	-8.3	
Mills	1974	4.75	-130	-1200	-2.4	-1.6		-610	-5600	-11	-7.6	
Mills	1970	5.25	-100	-940	-2.4	-1.6		-480	-4300	-11	-7.4	d
Mills	1963.5	6.25	-100	-840	-3.3	-2.2		-470	-3900	-15	-10	d
Mills	1953.5	7.75	-98	-860	-3	-2		-450	-4000	-14	-9.3	
Mills	1947	8.75	-100	-880	-2.5	-1.7		-460	-4100	-12	-7.8	
Mills	1937.5	9.75	-80	-730	-1.8	-1.2		-370	-3400	-8.2	-5.5	
Mills	1905	17.5	-37	-300	-0.8	-0.54		-170	-1400	-3.7	-2.5	d

Lone Pine	2001	0.25	-130	-9.2	-1.9	-1		-590	-43	-8.9	-4.8	d
Lone Pine	1997.5	0.75	-120	-8.9	-1.9	-0.99		-540	-41	-8.6	-4.6	
Lone Pine	1990	1.75	-130	-11	-2.2	-1.2		-590	-51	-10	-5.4	d
Lone Pine	1986	2.25	-120	-9.8	-2	-1.1		-560	-46	-9.4	-5.1	d
Lone Pine	1982	2.75	-130	-9.3	-2.2	-1.2		-600	-43	-10	-5.5	
Lone Pine	1972.5	3.75	-140	-10	-2.1	-1.1		-660	-48	-9.9	-5.3	d
Lone Pine	1967	4.25	-160	-12	-2.4	-1.3		-740	-53	-11	-5.9	
Lone Pine	1961	4.75	-110	-9.9	-1.6	-0.84		-520	-46	-7.3	-3.9	
Lone Pine	1955	5.25	-120	-10	-1.5	-0.8		-540	-47	-7	-3.7	
Lone Pine	1949	5.75	-180	-16	-2.3	-1.3		-830	-73	-11	-5.8	
Lone Pine	1936	6.75	-130	-11	-1.5	-0.82		-590	-53	-7.1	-3.8	
Lone Pine	1920	7.75	-99	-9.2	-1.2	-0.64		-460	-43	-5.5	-3	d
Lone Pine	1870	11.5	-42	-3.7	-0.5	-0.27		-190	-17	-2.3	-1.2	d
Pear	2002	0.25	-350	-2300	-4.2	-1.9		-1600	-11000	-20	-8.8	
Pear	2000	0.75	-270	-2000	-3.2	-1.4		-1200	-9100	-15	-6.7	
Pear	1997	1.25	-270	-1800	-3.3	-1.5		-1300	-8500	-15	-6.9	
Pear	1991	2.25	-310	-2300	-3.7	-1.7		-1400	-11000	-17	-7.8	
Pear	1980	3.75	-240	-1600	-2.7	-1.2		-1100	-7600	-12	-5.6	
Pear	1969	5.25	-220	-1700	-2.5	-1.1		-1000	-7800	-11	-5.1	
Pear	1961	6.25	-230	-1700	-3.3	-1.5		-1100	-7900	-15	-6.8	
Pear	1957	6.75	-170	-1500	-2.4	-1.1		-790	-6800	-11	-5	
Pear	1926	10.5	-160	-1400	-1.2	-0.56		-720	-6400	-5.8	-2.6	
Pear	1872	14.5	-74	-660	-0.44	-0.2						Z
Emerald	2002	0.25	-140	-1500	-6.2	-1.7		-630	-7200	-29	-7.7	d
Emerald	1997	1.75	-85	-950	-3.9	-1.1		-400	-4400	-18	-4.9	d
Emerald	1989	3.75	-78	-820	-3.6	-0.97		-360	-3800	-17	-4.5	
Emerald	1980	5.75	-89	-950	-4.1	-1.1		-410	-4400	-19	-5.1	d
Emerald	1971.5	7.75	-94	-1100	-4.3	-1.2		-440	-5000	-20	-5.4	
Emerald	1961.5	9.75	-66	-630	-3	-0.81		-300	-2900	-14	-3.7	d
Emerald	1958	10.5	-30	-380	-1.4	-0.37		-140	-1800	-6.5	-1.7	
Emerald	1892	21.5	-19	-220	-1.1	-0.29		-87	-1000	-4.9	-1.3	
Burial	2000	0.25	-4.2	-6300	-0.017	-0.019		-19	-29000	-0.078	-0.088	
Burial	1988	0.75	-3.1	-5200	-0.013	-0.014		-14	-24000	-0.058	-0.066	

Burial	1974	1.25	-4.3	-7400	-0.02	-0.022		-20	-34000	-0.091	-0.1	
Burial	1957	1.75	-3.3	-6200	-0.011	-0.012		-15	-29000	-0.051	-0.058	
Burial	1933	2.25	-3.5	-6800	-0.011	-0.012		-16	-32000	-0.05	-0.057	
Burial	1906	2.75	-3.5	-6800	-0.011	-0.012		-16	-32000	-0.05	-0.057	
Burial	1879	3.25	-3	-5600	-0.009	-0.01		-14	-26000	-0.043	-0.048	
Mcleod	2002	0.25	-650	-5400	-3.3	-1.3		-3000	-25000	-15	-6	d
Mcleod	1997	0.75	-290	-2600	-1.6	-0.63		-1400	-12000	-7.6	-2.9	d
Mcleod	1990	1.25	-190	-1900	-1.2	-0.46		-870	-8800	-5.5	-2.1	d
Mcleod	1982	1.75	-170	-1800	-1.3	-0.52		-770	-8300	-6.3	-2.4	d
Mcleod	1975	2.25	-170	-1900	-1.8	-0.68		-790	-8700	-8.2	-3.1	d
Mcleod	1969	2.75	-150	-1700	-1.7	-0.65		-700	-7800	-7.8	-3	d
Mcleod	1962	3.25	-140	-1500	-1.2	-0.45		-670	-7100	-5.4	-2.1	d
Mcleod	1952	3.75	-150	-1700	-0.96	-0.37		-710	-7800	-4.4	-1.7	d
Mcleod	1907	6.25	-190	-1800	-1.1	-0.43		-900	-8300	-5.1	-2	d
Matcharak	2001	0.25	-530		-2.2	-1.7		-2400		-10	-8	d
Matcharak	1993	0.75	-340	-2600	-1.5	-1.2		-1600	-12000	-7	-5.6	d
Matcharak	1983	1.25	-270	-2200	-1.2	-0.94		-1300	-10000	-5.4	-4.3	d
Matcharak	1971	1.75	-270	-2300	-0.89	-0.71		-1200	-11000	-4.1	-3.3	d
Matcharak	1954	2.25	-250	-2200	-0.62	-0.5		-1200	-10000	-2.9	-2.3	d
Matcharak	1937	2.75	-240	-2200	-0.49	-0.4		-1100	-10000	-2.3	-1.8	d
Matcharak	1910	3.25	-210	-2000	-0.41	-0.33		-960	-9400	-1.9	-1.5	d
Wonder	2000	0.25	-160	-2200	-1.2	-0.34		-740	-10000	-5.5	-1.6	d
Wonder	1992	0.75	-190	-2700	-1.4	-0.41		-880	-12000	-6.6	-1.9	d
Wonder	1985	1.25	-150	-2300	-1.1	-0.3		-680	-11000	-4.9	-1.4	d
Wonder	1977	1.75	-140	-2300	-0.9	-0.26		-630	-11000	-4.2	-1.2	d
Wonder	1968	2.25	-150	-2600	-0.72	-0.21		-710	-12000	-3.4	-0.96	d
Wonder	1949	2.75	-190	-3100	-0.6	-0.17		-870	-14000	-2.8	-0.8	d
Wonder	1919	3.25	-110	-2000	-0.24	-0.07		-490	-9300	-1.1	-0.32	d
Golden	2002.5	0.25	-840		-1.1	-1.1		-3900		-5.3	-5.3	d
Golden	1996.5	0.75	-570		-1.8	-1.8		-2700		-8.2	-8.2	d
Golden	1989.5	1.25	-330	-1900	-1.2	-1.2		-1500	-9000	-5.7	-5.7	d
Golden	1981.5	1.75	-390	-2300	-1.4	-1.4		-1800	-11000	-6.6	-6.6	d

Golden	1972.5	2.25	-380	-1600	-1.1	-1.1		-1700	-7300	-5.1	-5.1	d
Golden	1962.5	2.75	-420	-1700	-1	-1		-1900	-8100	-4.7	-4.7	d
Golden	1951	3.25	-390	-1500	-0.85	-0.85		-1800	-7200	-3.9	-3.9	d
Golden	1924	4.25	-370	-1500	-0.64	-0.64		-1700	-6800	-2.9	-2.9	d
LP 19	2004	0.25	-690	-3700	-7.5	-5		-3200	-17000	-35	-23	d
LP 19	1999	1.25	-370		-3.5	-2.3		-1700		-16	-11	d
LP 19	1994	2.25	-290	-1600	-3.2	-2.1		-1400	-7400	-15	-9.9	
LP 19	1989	3.25	-340	-1800	-2.9	-1.9		-1600	-8500	-13	-8.8	
LP 19	1980	4.25	-330	-1800	-2	-1.4		-1600	-8500	-9.4	-6.3	d
LP 19	1969	5.25	-310	-1700	-1.6	-1.1		-1400	-7800	-7.4	-4.9	d
LP 19	1956	6.25	-300	-1600	-1.2	-0.82		-1400	-7300	-5.7	-3.8	
LP 19	1903	10.5	-160	-960	-1	-0.68		-760	-4400	-4.7	-3.1	d
Hoh	2004	0.25	-230	-1100	-2.9	-0.95		-1000	-5100	-14	-4.4	
Hoh	1998	1.25	-370	-2000	-3.3	-1.1		-1700	-9200	-15	-4.9	d
Hoh	1990.5	2.25	-270	-1900	-2.9	-0.95		-1200	-8700	-14	-4.4	d
Hoh	1983	3.25	-170	-1600	-2.5	-0.8		-790	-7500	-11	-3.7	
Hoh	1973.5	4.25	-150	-1600	-2.2	-0.72		-690	-7600	-10	-3.3	d
Hoh	1963	5.25	-150	-1500	-2	-0.65		-700	-6900	-9.4	-3	
Hoh	1952.5	6.25	-110	-1300	-2.2	-0.71		-530	-6100	-10	-3.3	d
Hoh	1901	12.75	-33	-390	-0.69	-0.22		-150	-1800	-3.2	-1	
PJ	2004.5	0.25	-530	-3300	-15	-19	d	-2500	-15000	-69	-89	
PJ	1999	2.75	-310	-1900	-8.3	-11	d	-1400	-8700	-38	-49	
PJ	1992	4.75	-290	-1800	-7.1	-9.1	d	-1300	-8200	-33	-42	
PJ	1984	6.75	-150	-990	-4.9	-6.3	d	-710	-4600	-23	-29	
PJ	1977.5	8.75	-160	-1100	-8.6	-11	d	-730	-4900	-40	-51	
PJ	1968	11.5	-60		-1.7	-2.2	d	-280		-8.1	-10	
PJ	1963	12.5	-58	-400	-2.4	-3.1	d	-270	-1900	-11	-14	
PJ	1955	15.5	-48	-320	-4.6	-5.9	d	-220	-1500	-21	-27	
Oldman	2003.5	0.25	-69	-1300	-3.8	-0.83		-320	-6000	-18	-3.8	
Oldman	1997	1.25	-74	-1500	-3.2	-0.7		-340	-6900	-15	-3.2	
Oldman	1987	2.25	-68	-1300	-1.8	-0.39		-320	-5900	-8.2	-1.8	d
Oldman	1980.5	2.75	-61	-1200	-1.4	-0.3		-280	-5600	-6.4	-1.4	d

Oldman	1973	3.25	-54	-1200	-1.1	-0.25		-250	-5400	-5.3	-1.2	d
Oldman	1963.5	3.75	-59	-1300	-1.1	-0.23		-270	-6100	-4.9	-1.1	d
Oldman	1952	4.25	-51	-1200	-0.82	-0.18		-240	-5600	-3.8	-0.84	d
Oldman	1906.5	6.25	-44	-1300	-0.82	-0.18		-210	-6000	-3.8	-0.83	
Snyder	2004	0.25	-380	-2900	-8.1	-5.9	d	-1800	-14000	-37	-27	
Snyder	2000	1.25	-250	-2000	-4.4	-3.2	d	-1100	-9300	-21	-15	
Snyder	1991.5	2.75	-220	-2000	-3.4	-2.5	d	-1000	-9200	-16	-12	
Snyder	1985	3.75	-210	-2100	-3.2	-2.3	d	-990	-9500	-15	-11	
Snyder	1978	4.75	-190	-2000	-2.7	-2	d	-900	-9200	-13	-9.2	
Snyder	1967.5	5.75	-170	-1800	-2.2	-1.6	d	-780	-8400	-10	-7.4	
Snyder	1954.5	6.75	-170	-1700	-1.9	-1.4	d	-790	-7900	-8.7	-6.4	
Snyder	1893	11.75	-72	-820	-0.57	-0.42	d	-330	-3800	-2.7	-1.9	

Site	Average Year (y)	Average Depth (cm)	M-PTHN pg/g dw	M-PTHN pg/g TOC	M-PTHN Flux pg/cm2.y	M-PTHN Flux (FF) pg/cm2.y	M-PTHN FLAG	PTHN pg/g dw	PTHN pg/g TOC	PTHN Flux pg/cm2.y	PTHN Flux (FF) pg/cm2.y	PTHN FLAG
Mills	2002	0.25	-380	-2400	-11	-7.5	d	-180	-1100	-5.3	-3.5	d
Mills	2000	0.75	-490	-3500	-14	-9.6		-230	-1600	-6.8	-4.6	d
Mills	1996	1.75	-340	-2300	-9.5	-6.4	d	-160	-1100	-4.5	-3.1	d
Mills	1990.5	2.75	-320	-2500	-7.6	-5.1		-150	-1200	-3.6	-2.4	d
Mills	1987.5	3.25	-310	-2500	-6.1	-4.1	d	-150	-1200	-2.9	-2	d
Mills	1974	4.75	-300	-2800	-5.6	-3.8	d	-150	-1300	-2.7	-1.8	d
Mills	1970	5.25	-240	-2200	-5.5	-3.7	d	-110	-1000	-2.6	-1.8	d
Mills	1963.5	6.25	-240	-2000	-7.6	-5.1	d	-110	-930	-3.6	-2.4	d
Mills	1953.5	7.75	-230	-2000	-6.9	-4.7		-110	-950	-3.3	-2.2	d
Mills	1947	8.75	-230	-2000	-5.8	-3.9	d	-110	-980	-2.8	-1.9	d
Mills	1937.5	9.75	-190	-1700	-4.1	-2.8	d	-89	-810	-1.9	-1.3	d
Mills	1905	17.5	-85	-700	-1.9	-1.3	d	-40	-330	-0.89	-0.6	d
Lone Pine	2001	0.25	-300	-21	-4.5	-2.4	d	-140	-10	-2.1	-1.1	d
Lone Pine	1997.5	0.75	-270	-21	-4.3	-2.3	d	-130	-9.9	-2	-1.1	d
Lone Pine	1990	1.75	-300	-26	-5.1	-2.7	d	-140	-12	-2.4	-1.3	d
Lone Pine	1986	2.25	-280	-23	-4.7	-2.5	d	-130	-11	-2.3	-1.2	d

Lone Pine	1982	2.75	-300	-22	-5.1	-2.7	d	-140	-10	-2.4	-1.3	
Lone Pine	1972.5	3.75	-330	-24	-5	-2.7	d	-160	-11	-2.4	-1.3	
Lone Pine	1967	4.25	-370	-27	-5.6	-3		-180	-13	-2.7	-1.4	
Lone Pine	1961	4.75	-260	-23	-3.7	-2	d	-120	-11	-1.7	-0.93	
Lone Pine	1955	5.25	-270	-24	-3.5	-1.9	d	-130	-11	-1.7	-0.89	d
Lone Pine	1949	5.75	-420	-37	-5.4	-2.9	d	-200	-18	-2.6	-1.4	d
Lone Pine	1936	6.75	-300	-26	-3.5	-1.9	d	-140	-13	-1.7	-0.9	
Lone Pine	1920	7.75	-230	-21	-2.8	-1.5	d	-110	-10	-1.3	-0.71	d
Lone Pine	1870	11.5	-97	-8.6	-1.2	-0.62	d	-46	-4.1	-0.55	-0.3	d
Pear	2002	0.25	-820	-5400	-9.8	-4.4		-390	-2600	-4.7	-2.1	
Pear	2000	0.75	-620	-4600	-7.4	-3.4		-300	-2200	-3.5	-1.6	
Pear	1997	1.25	-640	-4200	-7.6	-3.4		-300	-2000	-3.6	-1.6	c
Pear	1991	2.25	-720	-5400	-8.7	-3.9		-340	-2600	-4.1	-1.9	
Pear	1980	3.75	-570	-3800	-6.2	-2.8		-270	-1800	-3	-1.3	
Pear	1969	5.25	-520	-3900	-5.7	-2.6		-250	-1900	-2.7	-1.2	
Pear	1961	6.25	-540	-3900	-7.6	-3.4		-260	-1900	-3.6	-1.6	
Pear	1957	6.75	-400	-3400	-5.5	-2.5		-190	-1600	-2.6	-1.2	
Pear	1926	10.5	-360	-3200	-2.9	-1.3		-170	-1500	-1.4	-0.62	
Pear	1872	14.5				0	Z				0	Z
Emerald	2002	0.25	-310	-3600	-14	-3.9	d	-150	-1700	-6.9	-1.8	
Emerald	1997	1.75	-200	-2200	-9.1	-2.4	d	-94	-1100	-4.3	-1.2	c,d
Emerald	1989	3.75	-180	-1900	-8.4	-2.2		-87	-910	-4	-1.1	
Emerald	1980	5.75	-210	-2200	-9.5	-2.6	d	-99	-1100	-4.5	-1.2	c,d
Emerald	1971.5	7.75	-220	-2500	-10	-2.7	d	-100	-1200	-4.8	-1.3	c,d
Emerald	1961.5	9.75	-150	-1500	-7	-1.9	d	-73	-700	-3.3	-0.89	d
Emerald	1958	10.5	-70	-890	-3.2	-0.87		-33	-420	-1.5	-0.41	d
Emerald	1892	21.5	-43	-520	-2.5	-0.66		-21	-250	-1.2	-0.32	
Burial	2000	0.25	-9.7	-15000	-0.039	-0.044		-4.6	-7000	-0.019	-0.021	
Burial	1988	0.75	-7.1	-12000	-0.029	-0.033		-3.4	-5700	-0.014	-0.016	
Burial	1974	1.25	-9.9	-17000	-0.046	-0.052		-4.7	-8100	-0.022	-0.025	
Burial	1957	1.75	-7.7	-14000	-0.026	-0.029		-3.7	-6800	-0.012	-0.014	
Burial	1933	2.25	-8.1	-16000	-0.025	-0.028		-3.8	-7600	-0.012	-0.014	
Burial	1906	2.75	-8.1	-16000	-0.025	-0.029		-3.9	-7500	-0.012	-0.014	

Burial	1879	3.25	-6.9	-13000	-0.021	-0.024		-3.3	-6200	-0.01	-0.012		
Mcleod	2002	0.25	-1500	-13000	-7.8	-3	d	-720	-6000	-3.7	-1.4	d	
Mcleod	1997	0.75	-680	-6000	-3.8	-1.5	d	-330	-2800	-1.8	-0.7	d	
Mcleod	1990	1.25	-430	-4400	-2.8	-1.1	d	-210	-2100	-1.3	-0.51	d	
Mcleod	1982	1.75	-390	-4200	-3.1	-1.2		-180	-2000	-1.5	-0.57	d	
Mcleod	1975	2.25	-390	-4400	-4.1	-1.6	d	-190	-2100	-2	-0.75	d	
Mcleod	1969	2.75	-350	-3900	-3.9	-1.5	d	-170	-1900	-1.9	-0.72	d	
Mcleod	1962	3.25	-340	-3600	-2.7	-1	d	-160	-1700	-1.3	-0.5	d	
Mcleod	1952	3.75	-350	-3900	-2.2	-0.86	d	-170	-1900	-1.1	-0.41	d	
Mcleod	1907	6.25	-450	-4200	-2.6	-0.99	d	-220	-2000	-1.2	-0.47	d	
Matcharak	2001	0.25	-1200		-5	-4	d	-580		-2.4	-1.9	d	
Matcharak	1993	0.75	-780	-6100	-3.5	-2.8	d	-370	-2900	-1.7	-1.3	d	
Matcharak	1983	1.25	-630	-5200	-2.7	-2.2	d	-300	-2500	-1.3	-1	d	
Matcharak	1971	1.75	-620	-5300	-2.1	-1.6	d	-300	-2500	-0.98	-0.78	d	
Matcharak	1954	2.25	-580	-5100	-1.4	-1.2	d	-280	-2400	-0.69	-0.55	d	
Matcharak	1937	2.75	-550	-5200	-1.1	-0.92	d	-260	-2500	-0.55	-0.44	d	
Matcharak	1910	3.25	-480	-4700	-0.96	-0.77	d	-230	-2200	-0.46	-0.37	d	
Wonder	2000	0.25	-370	-5200	-2.7	-0.79	d	-180	-2500	-1.3	-0.37	d	
Wonder	1992	0.75	-440	-6200	-3.3	-0.95	d	-210	-2900	-1.6	-0.45	d	
Wonder	1985	1.25	-340	-5300	-2.4	-0.7	d	-160	-2500	-1.2	-0.33	d	
Wonder	1977	1.75	-320	-5300	-2.1	-0.6	d	-150	-2500	-0.99	-0.28	d	
Wonder	1968	2.25	-360	-6000	-1.7	-0.48	d	-170	-2800	-0.8	-0.23	d	
Wonder	1949	2.75	-440	-7200	-1.4	-0.4	d	-210	-3400	-0.66	-0.19	d	
Wonder	1919	3.25	-250	-4700	-0.57	-0.16	d	-120	-2200	-0.27	-0.077	d	
Golden	2002.5	0.25	-2000		-2.7	-2.7	d	-930		-1.3	-1.3	d	
Golden	1996.5	0.75	-1300		-4.1	-4.1	d	-630		-2	-2	d	
Golden	1989.5	1.25	-760	-4500	-2.9	-2.9	d	-360	-2100	-1.4	-1.4	d	
Golden	1981.5	1.75	-910	-5400	-3.3	-3.3	d	-440	-2600	-1.6	-1.6	d	
Golden	1972.5	2.25	-870	-3600	-2.6	-2.6	d	-420	-1700	-1.2	-1.2	d	
Golden	1962.5	2.75	-970	-4000	-2.4	-2.4		-460	-1900	-1.1	-1.1	d	
Golden	1951	3.25	-920	-3600	-2	-2		-440	-1700	-0.94	-0.94	d	
Golden	1924	4.25	-870	-3400	-1.5	-1.5		-410	-1600	-0.7	-0.7	d	

LP 19	2004	0.25	-1600	-8700	-18	-12	d	-760	-4100	-8.3	-5.6	d
LP 19	1999	1.25	-860		-8.2	-5.4	d	-410		-3.9	-2.6	d
LP 19	1994	2.25	-680	-3700	-7.5	-5	d	-320	-1800	-3.6	-2.4	d
LP 19	1989	3.25	-790	-4300	-6.6	-4.4	d	-370	-2000	-3.2	-2.1	d
LP 19	1980	4.25	-780	-4200	-4.7	-3.1	d	-370	-2000	-2.2	-1.5	d
LP 19	1969	5.25	-710	-3900	-3.7	-2.5	d	-340	-1900	-1.8	-1.2	d
LP 19	1956	6.25	-690	-3700	-2.8	-1.9	d	-330	-1700	-1.4	-0.9	d
LP 19	1903	10.5	-380	-2200	-2.4	-1.6	d	-180	-1100	-1.1	-0.75	d
Hoh	2004	0.25	-520	-2600	-6.8	-2.2		-250	-1200	-3.2	-1	
Hoh	1998	1.25	-850	-4600	-7.7	-2.5	d	-410	-2200	-3.7	-1.2	d
Hoh	1990.5	2.25	-620	-4400	-6.8	-2.2	d	-300	-2100	-3.3	-1	d
Hoh	1983	3.25	-400	-3800	-5.7	-1.9	d	-190	-1800	-2.7	-0.88	d
Hoh	1973.5	4.25	-340	-3800	-5.2	-1.7	d	-160	-1800	-2.5	-0.79	d
Hoh	1963	5.25	-350	-3400	-4.7	-1.5	d	-170	-1600	-2.2	-0.72	d
Hoh	1952.5	6.25	-260	-3000	-5.1	-1.7	d	-130	-1400	-2.4	-0.79	d
Hoh	1901	12.75	-76	-920	-1.6	-0.52	d	-36	-440	-0.76	-0.25	d
PJ	2004.5	0.25	-1200	-7700	-35	-44		-590	-3700	-17	-21	d
PJ	1999	2.75	-710	-4400	-19	-25	d	-340	-2100	-9.1	-12	d
PJ	1992	4.75	-670	-4100	-16	-21	d	-320	-2000	-7.8	-10	d
PJ	1984	6.75	-350	-2300	-12	-15		-170	-1100	-5.5	-7	d
PJ	1977.5	8.75	-370	-2400	-20	-26	d	-180	-1200	-9.6	-12	d
PJ	1968	11.5	-140		-4	-5.2	d	-66		-1.9	-2.5	d
PJ	1963	12.5	-140	-930	-5.6	-7.1	d	-65	-440	-2.7	-3.4	d
PJ	1955	15.5	-110	-750	-11	-14	d	-53	-360	-5.1	-6.6	d
Oldman	2003.5	0.25	-160	-3000	-8.8	-1.9	d	-76	-1400	-4.2	-0.92	d
Oldman	1997	1.25	-170	-3400	-7.4	-1.6	d	-82	-1600	-3.5	-0.77	d
Oldman	1987	2.25	-160	-2900	-4.1	-0.9	d	-75	-1400	-2	-0.43	d
Oldman	1980.5	2.75	-140	-2800	-3.2	-0.71	d	-68	-1300	-1.5	-0.34	d
Oldman	1973	3.25	-130	-2700	-2.7	-0.58	d	-60	-1300	-1.3	-0.28	d
Oldman	1963.5	3.75	-140	-3100	-2.5	-0.54	d	-65	-1500	-1.2	-0.26	d
Oldman	1952	4.25	-120	-2800	-1.9	-0.42	d	-57	-1300	-0.91	-0.2	d
Oldman	1906.5	6.25	-100	-3000	-1.9	-0.42	d	-49	-1400	-0.91	-0.2	d

Snyder	2004	0.25	-890	-6800	-19	-14	d	-430	-3200	-8.9	-6.5	d
Snyder	2000	1.25	-570	-4700	-10	-7.5	d	-270	-2200	-4.9	-3.6	d
Snyder	1991.5	2.75	-510	-4600	-8	-5.8	d	-240	-2200	-3.8	-2.8	d
Snyder	1985	3.75	-500	-4800	-7.4	-5.4	d	-240	-2300	-3.5	-2.6	d
Snyder	1978	4.75	-450	-4600	-6.3	-4.6		-220	-2200	-3	-2.2	d
Snyder	1967.5	5.75	-390	-4200	-5.1	-3.7		-190	-2000	-2.4	-1.8	d
Snyder	1954.5	6.75	-400	-4000	-4.4	-3.2		-190	-1900	-2.1	-1.5	d
Snyder	1893	11.75	-170	-1900	-1.3	-0.97	d	-79	-910	-0.63	-0.46	d

Site	Average Year (y)	Average Depth (cm)	ETHN pg/g dw	ETHN pg/g TOC	ETHN Flux pg/cm2.y	ETHN Flux (FF) pg/cm2.y	ETHN FLAG	FLA pg/g dw	FLA pg/g TOC	FLA Flux pg/cm2.y	FLA Flux (FF) pg/cm2.y	FLA FLAG
Mills	2002	0.25	-120	-780	-3.6	-2.4	c,d	25000	154000	710	480	
Mills	2000	0.75	-160	-1100	-4.7	-3.1	c,d	24000	168000	690	470	
Mills	1996	1.75	-110	-750	-3.1	-2.1	d	26000	174000	720	490	
Mills	1990.5	2.75	-110	-810	-2.5	-1.7	c,d	25000	188000	580	390	
Mills	1987.5	3.25	-100	-820	-2	-1.4	d	30000	243000	590	400	
Mills	1974	4.75	-99	-910	-1.8	-1.2	c,d	33000	307000	620	420	
Mills	1970	5.25	-78	-710	-1.8	-1.2	d	30000	272000	690	460	
Mills	1963.5	6.25	-78	-640	-2.5	-1.7	c,d	28000	234000	910	620	
Mills	1953.5	7.75	-74	-650	-2.3	-1.5	d	44000	391000	1400	920	
Mills	1947	8.75	-76	-670	-1.9	-1.3	d	49000	433000	1200	830	
Mills	1937.5	9.75	-61	-560	-1.3	-0.9	c,d	39000	360000	860	580	
Mills	1905	17.5	-28	-230	-0.61	-0.41	c,d	5200	43000	110	78	
Lone Pine	2001	0.25	-97	-7	-1.5	-0.78	c,d	19000	1400	290	150	
Lone Pine	1997.5	0.75	-88	-6.8	-1.4	-0.75	c,d	17000	1300	270	140	
Lone Pine	1990	1.75	-97	-8.3	-1.6	-0.88	c,d	25000	2100	420	230	
Lone Pine	1986	2.25	-91	-7.5	-1.5	-0.83	d	21000	1700	360	190	
Lone Pine	1982	2.75	-98	-7.1	-1.7	-0.89		30000	2200	510	270	
Lone Pine	1972.5	3.75	-110	-7.8	-1.6	-0.87	c	37000	2700	560	300	
Lone Pine	1967	4.25	-120	-8.7	-1.8	-0.97	c	44000	3200	660	360	
Lone Pine	1961	4.75	-85	-7.5	-1.2	-0.64		36000	3200	510	270	
Lone Pine	1955	5.25	-88	-7.7	-1.1	-0.61	d	38000	3300	490	260	

Lone Pine	1949	5.75	-140	-12	-1.8	-0.95	d	74000	6500	960	520	
Lone Pine	1936	6.75	-96	-8.6	-1.2	-0.62		52000	4600	620	330	
Lone Pine	1920	7.75	-75	-7	-0.91	-0.48	d	48000	4400	580	310	
Lone Pine	1870	11.5	-32	-2.8	-0.38	-0.2	d	9300	820	110	59	
Pear	2002	0.25	-270	-1700	-3.2	-1.4		13000	85000	160	71	
Pear	2000	0.75	-200	-1500	-2.4	-1.1		11000	78000	130	57	
Pear	1997	1.25	-210	-1400	-2.5	-1.1		10000	68000	120	55	
Pear	1991	2.25	-240	-1700	-2.8	-1.3		15000	108000	180	79	
Pear	1980	3.75	-180	-1200	-2	-0.92		12000	82000	130	60	
Pear	1969	5.25	-170	-1300	-1.9	-0.84		22000	169000	250	110	
Pear	1961	6.25	-180	-1300	-2.5	-1.1		15000	111000	210	97	
Pear	1957	6.75	-130	-1100	-1.8	-0.81		11000	92000	150	67	
Pear	1926	10.5	-120	-1000	-0.95	-0.43		12000	108000	97	44	
Pear	1872	14.5					Z					Z
Emerald	2002	0.25	-100	-1200	-4.7	-1.3		5600	64000	260	69	e
Emerald	1997	1.75	-65	-720	-3	-0.8	d	3300	36000	150	40	
Emerald	1989	3.75	-59	-620	-2.7	-0.73		3400	35000	160	42	
Emerald	1980	5.75	-68	-720	-3.1	-0.83	d	5000	53000	230	61	
Emerald	1971.5	7.75	-71	-830	-3.3	-0.88	d	5000	58000	230	62	
Emerald	1961.5	9.75	-50	-480	-2.3	-0.61	d	4300	42000	200	54	e
Emerald	1958	10.5	-23	-290	-1.1	-0.28	d	5400	69000	250	67	
Emerald	1892	21.5	-14	-170	-0.81	-0.22		2400	28000	140	36	
Burial	2000	0.25	-3.2	-4800	-0.013	-0.014						X
Burial	1988	0.75	-2.3	-3900	-0.01	-0.011		35	59000	0.14	0.16	e
Burial	1974	1.25	-3.2	-5600	-0.015	-0.017		84	144000	0.38	0.44	e
Burial	1957	1.75	-2.5	-4700	-0.008	-0.009		52	96000	0.17	0.19	e
Burial	1933	2.25	-2.6	-5200	-0.008	-0.009		53	105000	0.17	0.19	e
Burial	1906	2.75	-2.7	-5200	-0.008	-0.009		47	92000	0.15	0.17	e
Burial	1879	3.25	-2.3	-4300	-0.007	-0.008		41	79000	0.13	0.15	e
Mcleod	2002	0.25	-500	-4100	-2.5	-0.97	d					X
Mcleod	1997	0.75	-220	-2000	-1.2	-0.48	d					X
Mcleod	1990	1.25	-140	-1400	-0.91	-0.35	d	820	8300	5.3	2	e

Mcleod	1982	1.75	-130	-1400	-1	-0.39	d					X
Mcleod	1975	2.25	-130	-1400	-1.3	-0.51	d	1100	12000	11	4.4	e
Mcleod	1969	2.75	-110	-1300	-1.3	-0.49	d					X
Mcleod	1962	3.25	-110	-1200	-0.89	-0.34	d	1200	12000	9.5	3.7	e
Mcleod	1952	3.75	-120	-1300	-0.73	-0.28	d					X
Mcleod	1907	6.25	-150	-1400	-0.84	-0.32	d					X
Matcharak	2001	0.25	-400		-1.6	-1.3	d	3300		14	11	
Matcharak	1993	0.75	-250	-2000	-1.1	-0.92	d	1400	11000	6.2	4.9	
Matcharak	1983	1.25	-210	-1700	-0.89	-0.71	d	1200	9600	5	4	
Matcharak	1971	1.75	-200	-1700	-0.67	-0.54	d	1100	9100	3.5	2.8	
Matcharak	1954	2.25	-190	-1700	-0.47	-0.38	d	1400	13000	3.6	2.8	
Matcharak	1937	2.75	-180	-1700	-0.37	-0.3	d	1000	9400	2.1	1.7	
Matcharak	1910	3.25	-160	-1500	-0.31	-0.25	d	980	9500	2	1.6	
Wonder	2000	0.25	-120	-1700	-0.9	-0.26	c,d	820	11000	6.1	1.7	e
Wonder	1992	0.75	-140	-2000	-1.1	-0.31	c,d	760	11000	5.7	1.6	e
Wonder	1985	1.25	-110	-1700	-0.8	-0.23	c,d	970	15000	7	2	e
Wonder	1977	1.75	-100	-1700	-0.68	-0.19	c,d	1100	18000	7.2	2.1	e
Wonder	1968	2.25	-120	-1900	-0.55	-0.16	c,d	1600	27000	7.7	2.2	e
Wonder	1949	2.75	-140	-2400	-0.46	-0.13	c,d	2300	38000	7.4	2.1	e
Wonder	1919	3.25	-80	-1500	-0.19	-0.053	c,d	760	14000	1.8	0.5	e
Golden	2002.5	0.25	-640		-0.86	-0.86	d	70000		94	94	e
Golden	1996.5	0.75	-430		-1.3	-1.3	d	113000		350	350	
Golden	1989.5	1.25	-250	-1500	-0.93	-0.93	d	69000	407000	260	260	
Golden	1981.5	1.75	-300	-1800	-1.1	-1.1	d	113000	666000	410	410	
Golden	1972.5	2.25	-290	-1200	-0.84	-0.84	d	224000	931000	660	660	
Golden	1962.5	2.75	-320	-1300	-0.78	-0.78	d	368000	1533000	900	900	
Golden	1951	3.25	-300	-1200	-0.64	-0.64	d	525000	2056000	1100	1100	b
Golden	1924	4.25	-280	-1100	-0.48	-0.48	d	526000	2049000	890	890	b
LP 19	2004	0.25	-520	-2800	-5.7	-3.8	c,d	33000	181000	370	240	
LP 19	1999	1.25	-280		-2.7	-1.8	c,d	43000		410	270	
LP 19	1994	2.25	-220	-1200	-2.4	-1.6	c,d	64000	350000	710	470	
LP 19	1989	3.25	-260	-1400	-2.2	-1.4	c,d	92000	499000	770	520	

LP 19	1980	4.25	-250	-1400	-1.5	-1	c,d	80000	433000	480	320	
LP 19	1969	5.25	-230	-1300	-1.2	-0.81	c,d	80000	442000	420	280	
LP 19	1956	6.25	-220	-1200	-0.93	-0.62	c,d	103000	550000	430	280	
LP 19	1903	10.5	-120	-730	-0.77	-0.51	c,d	30000	176000	190	120	
Hoh	2004	0.25	-170	-840	-2.2	-0.72	c	2400	12000	32	10	e
Hoh	1998	1.25	-280	-1500	-2.5	-0.81	c,d	6400	35000	58	19	e
Hoh	1990.5	2.25	-200	-1400	-2.2	-0.72	c,d	6300	44000	69	22	e
Hoh	1983	3.25	-130	-1200	-1.9	-0.6	c,d	8100	77000	120	38	e
Hoh	1973.5	4.25	-110	-1200	-1.7	-0.54	c,d	9000	100000	140	44	
Hoh	1963	5.25	-110	-1100	-1.5	-0.5	c,d	10000	99000	140	44	
Hoh	1952.5	6.25	-86	-990	-1.7	-0.54	c,d	8300	96000	160	52	
Hoh	1901	12.75	-25	-300	-0.52	-0.17	c,d	5700	69000	120	39	
PJ	2004.5	0.25	-400	-2500	-11	-14	c,d	9300	58000	260	330	e
PJ	1999	2.75	-230	-1400	-6.3	-8	c,d	7800	48000	210	270	e
PJ	1992	4.75	-220	-1300	-5.4	-6.9	c,d	9300	57000	230	290	e
PJ	1984	6.75	-120	-750	-3.8	-4.8	c,d	9200	60000	300	380	
PJ	1977.5	8.75	-120	-800	-6.6	-8.4	c,d					Z
PJ	1968	11.5	-46		-1.3	-1.7	c,d					Z
PJ	1963	12.5	-44	-300	-1.8	-2.3	c,d	9400	64000	380	490	
PJ	1955	15.5	-36	-240	-3.5	-4.5	c,d	-3.6	-24	-0.35	-0.45	
Oldman	2003.5	0.25	-52	-980	-2.9	-0.63	c,d	48000	907000	2600	580	
Oldman	1997	1.25	-56	-1100	-2.4	-0.53	c,d	68000	1369000	2900	650	
Oldman	1987	2.25	-52	-960	-1.3	-0.29	c,d	128000	2382000	3300	730	b
Oldman	1980.5	2.75	-47	-910	-1	-0.23	c,d	98000	1918000	2200	490	b
Oldman	1973	3.25	-41	-880	-0.87	-0.19	c,d	111000	2355000	2300	510	b
Oldman	1963.5	3.75	-45	-1000	-0.8	-0.18	d	92000	2061000	1700	360	b
Oldman	1952	4.25	-39	-920	-0.62	-0.14	c,d	91000	2169000	1500	320	b
Oldman	1906.5	6.25	-34	-980	-0.62	-0.14	c,d	31000	918000	580	130	
Snyder	2004	0.25	-290	-2200	-6.1	-4.5	c,d	150000	1141000	3200	2300	
Snyder	2000	1.25	-190	-1500	-3.4	-2.4	c,d	168000	1369000	3000	2200	
Snyder	1991.5	2.75	-170	-1500	-2.6	-1.9	c,d	231000	2083000	3600	2600	b
Snyder	1985	3.75	-160	-1600	-2.4	-1.8	c,d	293000	2822000	4400	3200	b

Snyder	1978	4.75	-150	-1500	-2.1	-1.5	c,d	319000	3253000	4500	3300	b
Snyder	1967.5	5.75	-130	-1400	-1.7	-1.2	c,d	444000	4750000	5800	4200	
Snyder	1954.5	6.75	-130	-1300	-1.4	-1	c,d	368000	3663000	4000	3000	
Snyder	1893	11.75	-54	-620	-0.43	-0.32	c,d	45000	519000	360	270	

Site	Average Year (y)	Average Depth (cm)	PYR pg/g dw	PYR pg/g TOC	PYR Flux pg/cm2.y	PYR Flux (FF) pg/cm2.y	PYR FLAG	Retene pg/g dw	Retene pg/g TOC	Retene Flux pg/cm2.y	Retene Flux (FF) pg/cm2.y	Retene FLAG
Mills	2002	0.25	18000	113000	520	350		461000	2888000	13000	9000	
Mills	2000	0.75	18000	126000	520	350		531000	3736000	15000	10000	
Mills	1996	1.75	18000	122000	510	340		880000	5952000	25000	17000	
Mills	1990.5	2.75	17000	134000	410	280		532000	4077000	13000	8500	
Mills	1987.5	3.25	21000	173000	420	280		1275000	1E+07	26000	17000	
Mills	1974	4.75	25000	226000	450	310		415000	3804000	7700	5200	
Mills	1970	5.25	22000	196000	500	340		1357000	1.2E+07	31000	21000	
Mills	1963.5	6.25	21000	172000	670	450		109000	893000	3500	2300	
Mills	1953.5	7.75	31000	275000	950	640		242000	2134000	7400	5000	
Mills	1947	8.75	35000	310000	880	590		134000	1180000	3300	2300	
Mills	1937.5	9.75	30000	271000	650	440		125000	1147000	2800	1900	
Mills	1905	17.5	3200	26000	70	48		141000	1161000	3100	2100	
Lone Pine	2001	0.25	14000	1000	210	110		104000	7500	1600	840	
Lone Pine	1997.5	0.75	12000	910	190	100		122000	9500	2000	1000	
Lone Pine	1990	1.75	17000	1500	300	160		526000	45000	8900	4800	
Lone Pine	1986	2.25	14000	1200	240	130		102000	8400	1700	930	
Lone Pine	1982	2.75	21000	1500	350	190		148000	11000	2500	1300	
Lone Pine	1972.5	3.75	25000	1800	380	200		84000	6000	1300	670	
Lone Pine	1967	4.25	29000	2100	440	240		121000	8800	1800	970	
Lone Pine	1961	4.75	25000	2200	350	190		68000	6000	950	510	
Lone Pine	1955	5.25	25000	2200	330	180		63000	5500	810	440	
Lone Pine	1949	5.75	50000	4400	650	350		125000	11000	1600	870	
Lone Pine	1936	6.75	35000	3200	420	230		63000	5700	760	410	
Lone Pine	1920	7.75	35000	3200	420	230		71000	6600	860	460	
Lone Pine	1870	11.5	6200	550	75	40		78000	6900	930	500	

Pear	2002	0.25	19000	124000	230	100	e	579000	3779000	6900	3100	c
Pear	2000	0.75	7500	56000	91	41	e	921000	6788000	11000	5000	c
Pear	1997	1.25	8000	53000	96	43	c,e	483000	3223000	5800	2600	
Pear	1991	2.25	11000	79000	130	57		435000	3225000	5200	2300	c
Pear	1980	3.75	8400	57000	93	42	e	680000	4563000	7500	3400	c
Pear	1969	5.25	17000	126000	180	83	e	1831000	1.4E+07	20000	9100	c
Pear	1961	6.25	13000	92000	180	80	e	304000	2210000	4300	1900	c
Pear	1957	6.75	8000	69000	110	50	e	254000	2193000	3600	1600	c
Pear	1926	10.5	9800	87000	78	35	e	564000	4989000	4500	2000	c
Pear	1872	14.5					Z					Z
Emerald	2002	0.25	4300	49000	200	53	e	153000	1750000	7100	1900	
Emerald	1997	1.75	2600	29000	120	32		179000	1993000	8200	2200	
Emerald	1989	3.75	2700	28000	120	33		232000	2438000	11000	2900	
Emerald	1980	5.75	3900	42000	180	48		143000	1528000	6600	1800	
Emerald	1971.5	7.75	3800	44000	170	47		160000	1854000	7400	2000	
Emerald	1961.5	9.75	3600	35000	170	44	e	507000	4898000	23000	6200	
Emerald	1958	10.5	3900	49000	180	48		112000	1419000	5200	1400	
Emerald	1892	21.5	1500	18000	86	23		190000	2265000	11000	2900	
Burial	2000	0.25	54	81000	0.21	0.24		36	54000	0.14	0.16	
Burial	1988	0.75	75	127000	0.31	0.35		23	39000	0.095	0.11	
Burial	1974	1.25	120	205000	0.55	0.62		33	57000	0.15	0.17	
Burial	1957	1.75	95	176000	0.31	0.36		35	64000	0.11	0.13	
Burial	1933	2.25	90	177000	0.28	0.32		36	71000	0.11	0.13	
Burial	1906	2.75	83	162000	0.26	0.29		32	63000	0.1	0.11	
Burial	1879	3.25	76	145000	0.24	0.27		29	55000	0.09	0.1	
Mcleod	2002	0.25					X					X
Mcleod	1997	0.75					X					X
Mcleod	1990	1.25					X					X
Mcleod	1982	1.75					X					X
Mcleod	1975	2.25					X					X
Mcleod	1969	2.75					X					X
Mcleod	1962	3.25					X	2300	24000	19	7.1	e
Mcleod	1952	3.75					X					X

Mcleod	1907	6.25					X					X
Matcharak	2001	0.25					X					X
Matcharak	1993	0.75					X					X
Matcharak	1983	1.25	2300	19000	10	8.1	e	10000	84000	44	35	e
Matcharak	1971	1.75					X					X
Matcharak	1954	2.25					X					X
Matcharak	1937	2.75					X	8500	80000	18	14	e
Matcharak	1910	3.25					X	-140	-1400	-0.28	-0.22	
Wonder	2000	0.25	-11	-160	-0.084	-0.024		2400	34000	18	5.1	e
Wonder	1992	0.75	-13	-190	-0.1	-0.029		1600	23000	12	3.5	e
Wonder	1985	1.25	-10	-160	-0.074	-0.021		2300	36000	16	4.7	e
Wonder	1977	1.75	-9.6	-160	-0.063	-0.018		1900	31000	12	3.5	e
Wonder	1968	2.25	-11	-180	-0.051	-0.015		1700	28000	8	2.3	e
Wonder	1949	2.75	-13	-220	-0.042	-0.012		3300	54000	10	3	e
Wonder	1919	3.25	-7.5	-140	-0.017	-0.005		1500	28000	3.4	0.96	e
Golden	2002.5	0.25	70000		94	94		1227000		1700	1700	b
Golden	1996.5	0.75	117000		360	360		1371000		4200	4200	b
Golden	1989.5	1.25	67000	398000	250	250		2231000	1.3E+07	8400	8400	b
Golden	1981.5	1.75	169000	997000	610	610		1052000	6221000	3800	3800	b
Golden	1972.5	2.25	216000	901000	640	640		2136000	8895000	6300	6300	b
Golden	1962.5	2.75	464000	1931000	1100	1100	b	672000	2796000	1600	1600	b
Golden	1951	3.25	598000	2343000	1300	1300	b	370000	1448000	790	790	
Golden	1924	4.25	478000	1864000	810	810	b	646000	2518000	1100	1100	b
LP 19	2004	0.25	57000	311000	630	420		231000	1257000	2500	1700	
LP 19	1999	1.25	166000		1600	1000		294000		2800	1900	
LP 19	1994	2.25	125000	679000	1400	910		5020000	2.7E+07	55000	37000	b
LP 19	1989	3.25	131000	713000	1100	740		162000	885000	1400	910	
LP 19	1980	4.25	80000	438000	490	320		434000	2362000	2600	1800	b
LP 19	1969	5.25	81000	447000	420	280		107000	589000	560	370	
LP 19	1956	6.25	107000	570000	440	300		135000	718000	560	370	
LP 19	1903	10.5	30000	175000	190	120		77000	451000	480	320	

Hoh	2004	0.25	2500	12000	33	11	e	104000	511000	1400	440	
Hoh	1998	1.25	5400	30000	49	16	e	143000	777000	1300	420	
Hoh	1990.5	2.25	6000	42000	66	21	e	139000	973000	1500	490	
Hoh	1983	3.25	7600	73000	110	36	e	202000	1922000	2900	950	
Hoh	1973.5	4.25	7100	78000	110	34		67000	735000	1000	320	
Hoh	1963	5.25	9900	98000	130	43		3302000	3.3E+07	45000	14000	
Hoh	1952.5	6.25	7100	82000	140	45		54000	619000	1000	340	
Hoh	1901	12.75	4400	53000	93	30		58000	698000	1200	390	
PJ	2004.5	0.25	28000	174000	780	1000	e	1067000	6671000	30000	38000	b
PJ	1999	2.75	35000	215000	950	1200		1360000	8337000	37000	47000	b
PJ	1992	4.75	47000	288000	1100	1500		3757000	2.3E+07	92000	118000	b
PJ	1984	6.75	-11	-70	-0.35	-0.45		6569000	4.3E+07	213000	274000	b
PJ	1977.5	8.75					Z					Z
PJ	1968	11.5					Z					Z
PJ	1963	12.5	36000	248000	1500	1900		2655000	1.8E+07	109000	140000	b
PJ	1955	15.5	-3.4	-23	-0.33	-0.42		-32	-220	-3.1	-4	b
Oldman	2003.5	0.25	21000	397000	1200	250		38000	722000	2100	460	
Oldman	1997	1.25	31000	612000	1300	290		471000	9459000	20000	4500	
Oldman	1987	2.25	57000	1058000	1500	330		123000	2277000	3200	700	b
Oldman	1980.5	2.75	43000	838000	970	210		70000	1365000	1600	350	b
Oldman	1973	3.25	48000	1011000	1000	220		60000	1271000	1300	280	b
Oldman	1963.5	3.75	42000	955000	760	170		37000	823000	660	140	
Oldman	1952	4.25	43000	1020000	690	150		35000	837000	560	120	
Oldman	1906.5	6.25	17000	490000	310	68		32000	949000	600	130	
Snyder	2004	0.25	93000	706000	2000	1400		185000	1402000	3900	2800	
Snyder	2000	1.25	100000	818000	1800	1300		73000	591000	1300	950	
Snyder	1991.5	2.75	135000	1217000	2100	1500		86000	778000	1300	980	
Snyder	1985	3.75	164000	1576000	2500	1800		3147000	3E+07	47000	34000	b
Snyder	1978	4.75	180000	1840000	2500	1800		404000	4123000	5700	4100	b
Snyder	1967.5	5.75	240000	2575000	3100	2300		239000	2557000	3100	2300	
Snyder	1954.5	6.75	-12	-120	-0.13	-0.097		632000	6289000	6900	5100	
Snyder	1893	11.75	26000	299000	210	150		358000	4097000	2900	2100	b

Site	Average Year (y)	Average Depth (cm)	op-DDE pg/g dw	op-DDE pg/g TOC	op-DDE Flux pg/cm2.y	op-DDE Flux (FF) pg/cm2.y	op-DDE FLAG	pp-DDE pg/g dw	pp-DDE pg/g TOC	pp-DDE Flux pg/cm2.y	pp-DDE Flux (FF) pg/cm2.y	pp-DDE FLAG
Mills	2002	0.25	-130	-810	-3.8	-2.5	c	4000	25000	120	78	
Mills	2000	0.75	-170	-1200	-4.9	-3.3	c	3500	25000	100	69	
Mills	1996	1.75	-120	-780	-3.2	-2.2		3600	24000	100	68	
Mills	1990.5	2.75	-110	-850	-2.6	-1.8	c	5000	38000	120	80	
Mills	1987.5	3.25	79	650	1.6	1.1		3600	29000	72	48	
Mills	1974	4.75	-100	-950	-1.9	-1.3	c	4500	42000	84	57	
Mills	1970	5.25	44	400	1	0.68		3300	30000	76	52	
Mills	1963.5	6.25	-81	-670	-2.6	-1.8	c	4200	35000	140	91	
Mills	1953.5	7.75	-78	-680	-2.4	-1.6		3800	33000	120	78	
Mills	1947	8.75	-79	-700	-2	-1.3		1700	15000	42	29	
Mills	1937.5	9.75	-63	-580	-1.4	-0.94	c	590	5400	13	8.8	
Mills	1905	17.5	-29	-240	-0.64	-0.43	c	-8.9	-73	-0.19	-0.13	
Lone Pine	2001	0.25	-100	-7.3	-1.5	-0.82		1700	120	26	14	
Lone Pine	1997.5	0.75	-92	-7.1	-1.5	-0.78		1900	140	30	16	
Lone Pine	1990	1.75	-100	-8.7	-1.7	-0.92	c	3100	270	52	28	
Lone Pine	1986	2.25	-95	-7.8	-1.6	-0.86		2400	200	41	22	
Lone Pine	1982	2.75	-100	-7.4	-1.7	-0.93		3600	260	60	32	
Lone Pine	1972.5	3.75	-110	-8.1	-1.7	-0.91		3300	240	50	27	
Lone Pine	1967	4.25	-130	-9.1	-1.9	-1		3900	280	58	31	
Lone Pine	1961	4.75	-89	-7.9	-1.3	-0.67		3500	300	49	26	
Lone Pine	1955	5.25	-92	-8	-1.2	-0.64		3700	320	48	25	
Lone Pine	1949	5.75	-140	-13	-1.9	-0.99		5700	500	74	40	
Lone Pine	1936	6.75	-100	-9	-1.2	-0.65		3300	290	39	21	
Lone Pine	1920	7.75	-79	-7.3	-0.95	-0.51		1600	150	20	11	
Lone Pine	1870	11.5	-33	-2.9	-0.4	-0.21		-10	-0.9	-0.12	-0.065	
Pear	2002	0.25	-280	-1800	-3.4	-1.5	a	13000	86000	160	71	
Pear	2000	0.75	900	6600	11	4.9		18000	134000	220	98	
Pear	1997	1.25	850	5600	10	4.6	a	18000	121000	220	98	
Pear	1991	2.25	2700	20000	32	14		33000	248000	400	180	
Pear	1980	3.75	5000	34000	55	25		44000	297000	490	220	

Pear	1969	5.25	5800	44000	64	29		84000	638000	930	420	
Pear	1961	6.25	7000	51000	99	44		112000	811000	1600	700	
Pear	1957	6.75	4900	43000	69	31		76000	659000	1100	480	
Pear	1926	10.5	220	1900	1.8	0.79	a	2700	24000	22	9.7	
Pear	1872	14.5					Z					Z
Emerald	2002	0.25	-110	-1200	-4.9	-1.3		17000	197000	790	210	
Emerald	1997	1.75	-68	-750	-3.1	-0.83		11000	124000	510	140	
Emerald	1989	3.75	-62	-650	-2.9	-0.77		11000	115000	510	140	
Emerald	1980	5.75	870	9200	40	11		21000	224000	960	260	
Emerald	1971.5	7.75	930	11000	43	11		21000	243000	960	260	
Emerald	1961.5	9.75	1200	11000	54	15		28000	268000	1300	340	
Emerald	1958	10.5	1000	13000	47	13		25000	311000	1100	300	
Emerald	1892	21.5	-15	-180	-0.84	-0.23		-4.5	-54	-0.26	-0.069	
Burial	2000	0.25	-3.3	-5000	-0.013	-0.015		-1	-1500	-0.004	-0.005	
Burial	1988	0.75	-2.4	-4100	-0.01	-0.011		-0.74	-1300	-0.003	-0.003	
Burial	1974	1.25	-3.4	-5800	-0.016	-0.018		-1	-1800	-0.005	-0.005	
Burial	1957	1.75	-2.6	-4900	-0.009	-0.01		-0.81	-1500	-0.003	-0.003	
Burial	1933	2.25	-2.8	-5400	-0.009	-0.01		-0.84	-1700	-0.003	-0.003	
Burial	1906	2.75	-2.8	-5400	-0.009	-0.01		-0.85	-1700	-0.003	-0.003	
Burial	1879	3.25	-2.4	-4500	-0.007	-0.008		-0.72	-1400	-0.002	-0.003	
Mcleod	2002	0.25	-520	-4300	-2.6	-1		-160	-1300	-0.81	-0.31	
Mcleod	1997	0.75	-230	-2000	-1.3	-0.5		-71	-620	-0.4	-0.15	
Mcleod	1990	1.25	-150	-1500	-0.95	-0.36		-45	-460	-0.29	-0.11	
Mcleod	1982	1.75	-130	-1400	-1.1	-0.41		-40	-440	-0.33	-0.13	
Mcleod	1975	2.25	-130	-1500	-1.4	-0.54		-41	-460	-0.43	-0.16	
Mcleod	1969	2.75	-120	-1300	-1.3	-0.51		-37	-410	-0.41	-0.16	
Mcleod	1962	3.25	-110	-1200	-0.93	-0.36		-35	-370	-0.28	-0.11	
Mcleod	1952	3.75	-120	-1300	-0.76	-0.29		-37	-410	-0.23	-0.089	
Mcleod	1907	6.25	-150	-1400	-0.88	-0.34		-47	-430	-0.27	-0.1	
Matcharak	2001	0.25	-420		-1.7	-1.4		-130		-0.52	-0.42	
Matcharak	1993	0.75	-270	-2100	-1.2	-0.96		-81	-640	-0.37	-0.29	
Matcharak	1983	1.25	-220	-1800	-0.93	-0.74		-66	-540	-0.28	-0.23	

Matcharak	1971	1.75	-210	-1800	-0.7	-0.56		-65	-550	-0.21	-0.17	
Matcharak	1954	2.25	-200	-1800	-0.49	-0.39		-60	-540	-0.15	-0.12	
Matcharak	1937	2.75	-190	-1800	-0.39	-0.31		-57	-540	-0.12	-0.096	
Matcharak	1910	3.25	-160	-1600	-0.33	-0.26		-50	-490	-0.1	-0.08	
Wonder	2000	0.25	-130	-1800	-0.94	-0.27		-39	-540	-0.29	-0.082	
Wonder	1992	0.75	-150	-2100	-1.1	-0.33		-46	-640	-0.35	-0.099	
Wonder	1985	1.25	-120	-1800	-0.84	-0.24		-35	-550	-0.26	-0.073	
Wonder	1977	1.75	-110	-1800	-0.71	-0.2		-33	-550	-0.22	-0.062	
Wonder	1968	2.25	-120	-2000	-0.57	-0.16		-37	-620	-0.18	-0.05	
Wonder	1949	2.75	-150	-2500	-0.48	-0.14		-46	-760	-0.15	-0.042	
Wonder	1919	3.25	-84	-1600	-0.19	-0.055		-26	-490	-0.059	-0.017	
Golden	2002.5	0.25	-670		-0.9	-0.9		-200		-0.28	-0.28	
Golden	1996.5	0.75	-450		-1.4	-1.4		-140		-0.43	-0.43	
Golden	1989.5	1.25	-260	-1500	-0.98	-0.98		2500	15000	9.4	9.4	
Golden	1981.5	1.75	-310	-1800	-1.1	-1.1		4600	27000	17	17	
Golden	1972.5	2.25	-300	-1200	-0.88	-0.88		8000	33000	24	24	
Golden	1962.5	2.75	-330	-1400	-0.81	-0.81		9300	39000	23	23	
Golden	1951	3.25	-310	-1200	-0.67	-0.67		6300	25000	14	14	
Golden	1924	4.25	-300	-1200	-0.5	-0.5		-91	-350	-0.15	-0.15	
LP 19	2004	0.25	-540	-3000	-6	-4		3300	18000	36	24	
LP 19	1999	1.25	-290		-2.8	-1.9		4100		39	26	
LP 19	1994	2.25	-230	-1300	-2.5	-1.7		3900	21000	43	28	
LP 19	1989	3.25	-270	-1500	-2.3	-1.5		5500	30000	46	31	
LP 19	1980	4.25	-270	-1400	-1.6	-1.1		5000	27000	30	20	
LP 19	1969	5.25	-240	-1300	-1.3	-0.84		5900	32000	30	20	
LP 19	1956	6.25	-230	-1200	-0.97	-0.65		5600	30000	23	15	
LP 19	1903	10.5	-130	-760	-0.81	-0.54		-40	-230	-0.25	-0.16	
Hoh	2004	0.25	-180	-880	-2.3	-0.75		-55	-270	-0.71	-0.23	
Hoh	1998	1.25	-290	-1600	-2.6	-0.85		-89	-480	-0.8	-0.26	
Hoh	1990.5	2.25	-210	-1500	-2.3	-0.75		-65	-450	-0.71	-0.23	
Hoh	1983	3.25	-140	-1300	-2	-0.63		-41	-390	-0.6	-0.19	
Hoh	1973.5	4.25	-120	-1300	-1.8	-0.57		-36	-400	-0.54	-0.17	

Site	Average Year (y)	Average Depth (cm)	op-DDD pg/g dw	op-DDD pg/g TOC	op-DDD Flux pg/cm2.y	op-DDD Flux (FF) pg/cm2.y	op-DDD FLAG	pp-DDD pg/g dw	pp-DDD pg/g TOC	pp-DDD Flux pg/cm2.y	pp-DDD Flux (FF) pg/cm2.y	pp-DDD FLAG
Hoh	1963	5.25	-120	-1200	-1.6	-0.52		-36	-360	-0.49	-0.16	
Hoh	1952.5	6.25	-90	-1000	-1.8	-0.57		480	5500	9.3	3	
Hoh	1901	12.75	-26	-310	-0.55	-0.18		-8	-96	-0.17	-0.054	
PJ	2004.5	0.25	-420	-2600	-12	-15		-130	-810	-3.6	-4.6	
PJ	1999	2.75	-240	-1500	-6.5	-8.4		-74	-450	-2	-2.6	
PJ	1992	4.75	-230	-1400	-5.6	-7.2		-70	-430	-1.7	-2.2	
PJ	1984	6.75	-120	-790	-3.9	-5		-37	-240	-1.2	-1.5	
PJ	1977.5	8.75	-130	-830	-6.9	-8.8		-38	-250	-2.1	-2.7	
PJ	1968	11.5	-48		-1.4	-1.8		-15		-0.42	-0.54	
PJ	1963	12.5	-46	-320	-1.9	-2.4		390	2700	16	21	
PJ	1955	15.5	-38	-260	-3.7	-4.7		-12	-78	-1.1	-1.4	
Oldman	2003.5	0.25	-55	-1000	-3	-0.66		1600	30000	87	19	
Oldman	1997	1.25	-59	-1200	-2.5	-0.55		2200	43000	93	20	
Oldman	1987	2.25	-54	-1000	-1.4	-0.31		4100	75000	110	23	
Oldman	1980.5	2.75	-49	-950	-1.1	-0.24		3100	60000	69	15	
Oldman	1973	3.25	-43	-920	-0.91	-0.2		3900	83000	82	18	
Oldman	1963.5	3.75	-47	-1000	-0.84	-0.18		3800	85000	68	15	
Oldman	1952	4.25	-41	-970	-0.65	-0.14		4200	99000	67	15	
Oldman	1906.5	6.25	-35	-1000	-0.65	-0.14		440	13000	8.1	1.8	
Snyder	2004	0.25	-310	-2300	-6.4	-4.7		1700	13000	35	26	
Snyder	2000	1.25	-190	-1600	-3.5	-2.6		1500	12000	26	19	
Snyder	1991.5	2.75	-180	-1600	-2.7	-2		1800	17000	29	21	
Snyder	1985	3.75	-170	-1600	-2.5	-1.9		2300	23000	35	26	
Snyder	1978	4.75	-150	-1600	-2.2	-1.6		2500	26000	35	26	
Snyder	1967.5	5.75	-130	-1400	-1.7	-1.3		3900	42000	50	37	
Snyder	1954.5	6.75	-140	-1400	-1.5	-1.1		4600	45000	50	37	
Snyder	1893	11.75	-57	-650	-0.46	-0.33		-17	-200	-0.14	-0.1	
Mills	2002	0.25	-50	-310	-1.4	-0.98		6400	40000	190	130	

Mills	2000	0.75	-65	-450	-1.9	-1.3		6100	43000	180	120	
Mills	1996	1.75	-45	-300	-1.3	-0.84		5700	38000	160	110	
Mills	1990.5	2.75	-42	-330	-1	-0.67		10000	77000	240	160	
Mills	1987.5	3.25	-40	-330	-0.81	-0.54		6700	55000	130	91	
Mills	1974	4.75	-40	-370	-0.74	-0.5		10000	93000	190	130	
Mills	1970	5.25	790	7200	18	12		6300	57000	150	98	
Mills	1963.5	6.25	-31	-260	-1	-0.68		11000	92000	360	240	
Mills	1953.5	7.75	-30	-260	-0.91	-0.62		9000	79000	280	190	
Mills	1947	8.75	-31	-270	-0.76	-0.52		4300	38000	110	73	
Mills	1937.5	9.75	-24	-220	-0.54	-0.36		2100	19000	47	32	
Mills	1905	17.5	-11	-92	-0.25	-0.17		-43	-350	-0.94	-0.63	
Lone Pine	2001	0.25	-39	-2.8	-0.59	-0.31		2400	180	37	20	
Lone Pine	1997.5	0.75	-35	-2.7	-0.57	-0.3		2800	210	44	24	
Lone Pine	1990	1.75	-39	-3.4	-0.66	-0.36		5100	440	87	47	
Lone Pine	1986	2.25	-37	-3	-0.62	-0.33		3600	300	62	33	
Lone Pine	1982	2.75	-40	-2.9	-0.67	-0.36		6100	440	100	55	
Lone Pine	1972.5	3.75	-43	-3.1	-0.65	-0.35		5800	410	86	46	
Lone Pine	1967	4.25	-49	-3.5	-0.73	-0.39		6400	460	95	51	
Lone Pine	1961	4.75	-34	-3	-0.48	-0.26		6000	530	84	45	
Lone Pine	1955	5.25	-35	-3.1	-0.46	-0.25		4900	430	63	34	
Lone Pine	1949	5.75	-55	-4.8	-0.71	-0.38		7800	680	100	54	
Lone Pine	1936	6.75	-39	-3.5	-0.47	-0.25		7200	650	87	46	
Lone Pine	1920	7.75	-30	-2.8	-0.36	-0.2		4500	410	54	29	
Lone Pine	1870	11.5	-13	-1.1	-0.15	-0.082		-49	-4.3	-0.58	-0.31	
Pear	2002	0.25	-110	-700	-1.3	-0.58	c	-410	-2700	-4.9	-2.2	c
Pear	2000	0.75	2200	17000	27	12	c	18000	132000	210	97	c
Pear	1997	1.25	-84	-560	-1	-0.45		11000	72000	130	59	
Pear	1991	2.25	3500	26000	41	19	c	26000	194000	310	140	c
Pear	1980	3.75	4900	33000	54	24	c	46000	310000	510	230	c
Pear	1969	5.25	15000	113000	160	74	c	127000	964000	1400	630	c
Pear	1961	6.25	23000	168000	320	150	c	242000	1758000	3400	1500	c
Pear	1957	6.75	20000	170000	270	120	c	170000	1472000	2400	1100	c
Pear	1926	10.5	-48	-420	-0.38	-0.17	c	10000	93000	84	38	c
Pear	1872	14.5					Z					Z

Emerald	2002	0.25	-41	-470	-1.9	-0.51		7300	83000	340	90	
Emerald	1997	1.75	-26	-290	-1.2	-0.32		5100	57000	230	62	
Emerald	1989	3.75	-24	-250	-1.1	-0.3		4800	50000	220	59	
Emerald	1980	5.75	140	1500	6.3	1.7		9600	102000	440	120	
Emerald	1971.5	7.75	2600	30000	120	32		18000	205000	810	220	
Emerald	1961.5	9.75	4400	42000	200	54		28000	275000	1300	350	
Emerald	1958	10.5	6400	81000	290	79		26000	335000	1200	330	
Emerald	1892	21.5	-5.7	-68	-0.33	-0.087		-22	-260	-1.2	-0.33	
Burial	2000	0.25	-1.3	-1900	-0.005	-0.006		-4.9	-7400	-0.019	-0.022	
Burial	1988	0.75	-0.94	-1600	-0.004	-0.004		-3.6	-6000	-0.015	-0.017	
Burial	1974	1.25	-1.3	-2200	-0.006	-0.007		-5	-8600	-0.023	-0.026	
Burial	1957	1.75	-1	-1900	-0.003	-0.004		-3.9	-7200	-0.013	-0.015	
Burial	1933	2.25	-1.1	-2100	-0.003	-0.004		-4	-7900	-0.013	-0.014	
Burial	1906	2.75	-1.1	-2100	-0.003	-0.004		-4.1	-7900	-0.013	-0.014	
Burial	1879	3.25	-0.91	-1700	-0.003	-0.003		-3.5	-6600	-0.011	-0.012	
Mcleod	2002	0.25	-200	-1600	-1	-0.39		-760	-6300	-3.9	-1.5	
Mcleod	1997	0.75	-90	-790	-0.5	-0.19		-340	-3000	-1.9	-0.74	
Mcleod	1990	1.25	-57	-580	-0.37	-0.14		-220	-2200	-1.4	-0.53	
Mcleod	1982	1.75	-51	-550	-0.41	-0.16		-190	-2100	-1.6	-0.6	
Mcleod	1975	2.25	-52	-580	-0.54	-0.21		-200	-2200	-2.1	-0.79	
Mcleod	1969	2.75	-46	-520	-0.52	-0.2		-180	-2000	-2	-0.76	
Mcleod	1962	3.25	-44	-470	-0.36	-0.14		-170	-1800	-1.4	-0.52	
Mcleod	1952	3.75	-47	-510	-0.29	-0.11		-180	-2000	-1.1	-0.43	
Mcleod	1907	6.25	-59	-550	-0.34	-0.13		-230	-2100	-1.3	-0.5	
Matcharak	2001	0.25	-160		-0.66	-0.53		-610		-2.5	-2	
Matcharak	1993	0.75	-100	-810	-0.46	-0.37		-390	-3100	-1.8	-1.4	
Matcharak	1983	1.25	-83	-680	-0.36	-0.29		-320	-2600	-1.4	-1.1	
Matcharak	1971	1.75	-82	-700	-0.27	-0.22		-310	-2700	-1	-0.82	
Matcharak	1954	2.25	-76	-670	-0.19	-0.15		-290	-2600	-0.72	-0.58	
Matcharak	1937	2.75	-72	-680	-0.15	-0.12		-270	-2600	-0.58	-0.46	
Matcharak	1910	3.25	-63	-620	-0.13	-0.1		-240	-2300	-0.48	-0.38	

Wonder	2000	0.25	-49	-680	-0.36	-0.1		-190	-2600	-1.4	-0.39	
Wonder	1992	0.75	-58	-810	-0.44	-0.13		-220	-3100	-1.7	-0.48	
Wonder	1985	1.25	-45	-700	-0.32	-0.092		-170	-2600	-1.2	-0.35	
Wonder	1977	1.75	-42	-700	-0.27	-0.078		-160	-2600	-1	-0.3	
Wonder	1968	2.25	-47	-780	-0.22	-0.063		-180	-3000	-0.84	-0.24	
Wonder	1949	2.75	-57	-950	-0.18	-0.053		-220	-3600	-0.7	-0.2	
Wonder	1919	3.25	-32	-610	-0.075	-0.021		-120	-2300	-0.28	-0.081	
Golden	2002.5	0.25	-260		-0.35	-0.35		-980		-1.3	-1.3	
Golden	1996.5	0.75	-170		-0.54	-0.54		-670		-2.1	-2.1	
Golden	1989.5	1.25	-100	-590	-0.38	-0.38		-380	-2300	-1.4	-1.4	
Golden	1981.5	1.75	-120	-710	-0.43	-0.43		-460	-2700	-1.6	-1.6	
Golden	1972.5	2.25	-110	-480	-0.34	-0.34		36000	150000	110	110	
Golden	1962.5	2.75	-130	-530	-0.31	-0.31		52000	219000	130	130	
Golden	1951	3.25	-120	-470	-0.26	-0.26		44000	170000	94	94	
Golden	1924	4.25	-110	-450	-0.19	-0.19		-440	-1700	-0.74	-0.74	
LP 19	2004	0.25	-210	-1100	-2.3	-1.5		-800	-4300	-8.8	-5.8	
LP 19	1999	1.25	-110		-1.1	-0.72		-430		-4.1	-2.7	
LP 19	1994	2.25	-89	-490	-0.98	-0.65		-340	-1900	-3.7	-2.5	
LP 19	1989	3.25	-100	-560	-0.87	-0.58		-390	-2100	-3.3	-2.2	
LP 19	1980	4.25	-100	-560	-0.62	-0.41		-390	-2100	-2.4	-1.6	
LP 19	1969	5.25	-94	-510	-0.49	-0.32		-360	-2000	-1.9	-1.2	
LP 19	1956	6.25	-90	-480	-0.37	-0.25		-340	-1800	-1.4	-0.95	
LP 19	1903	10.5	-50	-290	-0.31	-0.21		-190	-1100	-1.2	-0.79	
Hoh	2004	0.25	-69	-340	-0.9	-0.29		-260	-1300	-3.4	-1.1	
Hoh	1998	1.25	-110	-610	-1	-0.33		-430	-2300	-3.8	-1.2	
Hoh	1990.5	2.25	-82	-570	-0.9	-0.29		-310	-2200	-3.4	-1.1	
Hoh	1983	3.25	-52	-490	-0.75	-0.24		-200	-1900	-2.9	-0.93	
Hoh	1973.5	4.25	-45	-500	-0.68	-0.22		-170	-1900	-2.6	-0.83	
Hoh	1963	5.25	-46	-450	-0.62	-0.2		-170	-1700	-2.4	-0.76	
Hoh	1952.5	6.25	-35	-400	-0.68	-0.22		-130	-1500	-2.6	-0.83	
Hoh	1901	12.75	-10	-120	-0.21	-0.068		-38	-460	-0.8	-0.26	
PJ	2004.5	0.25	-160	-1000	-4.6	-5.8		-620	-3900	-17	-22	c

PJ	1999	2.75	-93	-570	-2.5	-3.2		-360	-2200	-9.6	-12	c
PJ	1992	4.75	-88	-540	-2.2	-2.8		-340	-2100	-8.2	-11	c
PJ	1984	6.75	-46	-300	-1.5	-1.9		-180	-1200	-5.8	-7.4	c
PJ	1977.5	8.75	-48	-320	-2.6	-3.4		-180	-1200	-10	-13	c
PJ	1968	11.5	-18		-0.53	-0.68		-70		-2	-2.6	c
PJ	1963	12.5	-18	-120	-0.73	-0.94		-68	-470	-2.8	-3.6	c
PJ	1955	15.5	-15	-98	-1.4	-1.8		-55	-370	-5.4	-6.9	c
Oldman	2003.5	0.25	-21	-400	-1.2	-0.25		-80	-1500	-4.4	-0.97	
Oldman	1997	1.25	-23	-450	-0.97	-0.21		-86	-1700	-3.7	-0.81	
Oldman	1987	2.25	-21	-390	-0.54	-0.12		-79	-1500	-2.1	-0.45	
Oldman	1980.5	2.75	-19	-370	-0.42	-0.093		-72	-1400	-1.6	-0.35	
Oldman	1973	3.25	-17	-350	-0.35	-0.077		-63	-1300	-1.3	-0.29	
Oldman	1963.5	3.75	-18	-400	-0.32	-0.071		-68	-1500	-1.2	-0.27	
Oldman	1952	4.25	-16	-370	-0.25	-0.055		3300	78000	52	12	
Oldman	1906.5	6.25	-14	-400	-0.25	-0.055		-52	-1500	-0.95	-0.21	
Snyder	2004	0.25	-120	-890	-2.5	-1.8		-450	-3400	-9.4	-6.9	
Snyder	2000	1.25	-75	-610	-1.4	-0.99		-290	-2300	-5.1	-3.8	
Snyder	1991.5	2.75	-67	-610	-1	-0.76		-260	-2300	-4	-2.9	
Snyder	1985	3.75	-65	-630	-0.98	-0.71		-250	-2400	-3.7	-2.7	
Snyder	1978	4.75	-60	-610	-0.83	-0.61		1900	19000	26	19	
Snyder	1967.5	5.75	-52	-550	-0.67	-0.49		3900	42000	51	37	
Snyder	1954.5	6.75	-52	-520	-0.57	-0.42		7700	77000	85	62	
Snyder	1893	11.75	-22	-250	-0.18	-0.13		-83	-950	-0.67	-0.49	

Site	Average Year (y)	Average Depth (cm)	op-DDT pg/g dw	op-DDT pg/g TOC	op-DDT Flux pg/cm2.y	op-DDT Flux (FF) pg/cm2.y	op-DDT FLAG	pp-DDT pg/g dw	pp-DDT pg/g TOC	pp-DDT Flux pg/cm2.y	pp-DDT Flux (FF) pg/cm2.y	pp-DDT FLAG
Mills	2002	0.25	-270	-1700	-7.9	-5.3		12000	77000	360	240	
Mills	2000	0.75	-350	-2500	-10	-6.9		7300	52000	210	140	
Mills	1996	1.75	-240	-1600	-6.8	-4.6	d	-390	-2600	-11	-7.4	d
Mills	1990.5	2.75	-230	-1800	-5.4	-3.7		28000	212000	650	440	
Mills	1987.5	3.25	-220	-1800	-4.4	-3		-350	-2900	-7	-4.8	
Mills	1974	4.75	-220	-2000	-4	-2.7		14000	133000	270	180	

Mills	1970	5.25	-170	-1600	-3.9	-2.7		-270	-2500	-6.3	-4.3	
Mills	1963.5	6.25	-170	-1400	-5.4	-3.7		11000	94000	370	250	
Mills	1953.5	7.75	-160	-1400	-5	-3.3		-260	-2300	-8	-5.4	
Mills	1947	8.75	-170	-1500	-4.1	-2.8		-270	-2400	-6.7	-4.5	
Mills	1937.5	9.75	-130	-1200	-2.9	-2		7800	71000	170	120	
Mills	1905	17.5	-61	-500	-1.3	-0.9	d	-98	-800	-2.1	-1.5	d
Lone Pine	2001	0.25	-210	-15	-3.2	-1.7		1400	100	21	11	
Lone Pine	1997.5	0.75	-190	-15	-3.1	-1.6		920	71	15	7.9	
Lone Pine	1990	1.75	-210	-18	-3.6	-1.9		3400	290	58	31	
Lone Pine	1986	2.25	-200	-16	-3.4	-1.8		-320	-26	-5.4	-2.9	
Lone Pine	1982	2.75	-220	-16	-3.7	-2		2700	200	46	25	
Lone Pine	1972.5	3.75	-240	-17	-3.5	-1.9		-380	-27	-5.7	-3.1	
Lone Pine	1967	4.25	-270	-19	-4	-2.1		-430	-31	-6.4	-3.4	
Lone Pine	1961	4.75	-190	-16	-2.6	-1.4		1900	170	27	14	
Lone Pine	1955	5.25	-190	-17	-2.5	-1.3		-310	-27	-4	-2.1	
Lone Pine	1949	5.75	-300	-26	-3.9	-2.1		-480	-42	-6.3	-3.3	
Lone Pine	1936	6.75	-210	-19	-2.5	-1.4		2600	240	32	17	
Lone Pine	1920	7.75	-170	-15	-2	-1.1		1100	99	13	6.9	
Lone Pine	1870	11.5	-69	-6.1	-0.83	-0.44		1500	130	18	9.6	
Pear	2002	0.25	-590	-3800	-7	-3.2	d	-940	-6200	-11	-5.1	d
Pear	2000	0.75	-440	-3300	-5.3	-2.4	d	-710	-5300	-8.6	-3.9	d
Pear	1997	1.25	-460	-3000	-5.5	-2.5		-730	-4900	-8.8	-4	
Pear	1991	2.25	-520	-3800	-6.2	-2.8		-830	-6200	-10	-4.5	
Pear	1980	3.75	-400	-2700	-4.5	-2		-650	-4400	-7.2	-3.2	
Pear	1969	5.25	-370	-2800	-4.1	-1.8		-600	-4500	-6.5	-3	
Pear	1961	6.25	-390	-2800	-5.4	-2.4		-620	-4500	-8.7	-3.9	
Pear	1957	6.75	-280	-2400	-4	-1.8		-450	-3900	-6.4	-2.9	
Pear	1926	10.5	-260	-2300	-2.1	-0.94		-420	-3700	-3.3	-1.5	
Pear	1872	14.5					Z					Z
Emerald	2002	0.25	-220	-2600	-10	-2.8	d	-360	-4100	-17	-4.5	d
Emerald	1997	1.75	-140	-1600	-6.5	-1.7		-230	-2500	-10	-2.8	
Emerald	1989	3.75	-130	-1400	-6	-1.6		-210	-2200	-9.6	-2.6	
Emerald	1980	5.75	-150	-1600	-6.8	-1.8		-240	-2500	-11	-2.9	

Emerald	1971.5	7.75	-160	-1800	-7.2	-1.9		-250	-2900	-12	-3.1	
Emerald	1961.5	9.75	-110	-1100	-5	-1.3		-180	-1700	-8.1	-2.2	
Emerald	1958	10.5	-50	-640	-2.3	-0.62		-81	-1000	-3.7	-1	
Emerald	1892	21.5	-31	-370	-1.8	-0.47		-50	-600	-2.8	-0.76	
Burial	2000	0.25	-7	-10000	-0.028	-0.032		-11	-17000	-0.045	-0.051	
Burial	1988	0.75	-5.1	-8600	-0.021	-0.024		-8.2	-14000	-0.034	-0.038	
Burial	1974	1.25	-7.1	-12000	-0.033	-0.037		-11	-20000	-0.052	-0.059	
Burial	1957	1.75	-5.5	-10000	-0.018	-0.021		-8.9	-17000	-0.029	-0.033	
Burial	1933	2.25	-5.8	-11000	-0.018	-0.02		-9.3	-18000	-0.029	-0.033	
Burial	1906	2.75	-5.8	-11000	-0.018	-0.02		-9.3	-18000	-0.029	-0.033	
Burial	1879	3.25	4.9	9300	0.015	0.017		-7.9	-15000	-0.025	-0.028	
Mcleod	2002	0.25	-1100	-9000	-5.5	-2.1	d	-1700	-14000	-8.9	-3.4	d
Mcleod	1997	0.75	-490	-4300	-2.7	-1.1	d	-790	-6900	-4.4	-1.7	d
Mcleod	1990	1.25	-310	-3100	-2	-0.76	d	-500	-5000	-3.2	-1.2	d
Mcleod	1982	1.75	-280	-3000	-2.2	-0.86	d	-450	-4800	-3.6	-1.4	d
Mcleod	1975	2.25	-280	-3100	-2.9	-1.1	d	-450	-5000	-4.7	-1.8	d
Mcleod	1969	2.75	-250	-2800	-2.8	-1.1	d	-400	-4500	-4.5	-1.7	d
Mcleod	1962	3.25	-240	-2500	-1.9	-0.75	d	-390	-4100	-3.1	-1.2	d
Mcleod	1952	3.75	-250	-2800	-1.6	-0.61	d	-410	-4500	-2.6	-0.99	d
Mcleod	1907	6.25	-320	-3000	-1.8	-0.71	d	-520	-4800	-3	-1.1	d
Matcharak	2001	0.25	-880		-3.6	-2.9	d	-1400		-5.8	-4.6	d
Matcharak	1993	0.75	-560	-4400	-2.5	-2	d	-900	-7100	-4	-3.2	d
Matcharak	1983	1.25	-450	-3700	-1.9	-1.6	d	-730	-5900	-3.1	-2.5	d
Matcharak	1971	1.75	-450	-3800	-1.5	-1.2	d	-720	-6100	-2.4	-1.9	d
Matcharak	1954	2.25	-410	-3700	-1	-0.83	d	-660	-5900	-1.7	-1.3	d
Matcharak	1937	2.75	-390	-3700	-0.82	-0.66	d	-630	-5900	-1.3	-1.1	d
Matcharak	1910	3.25	-340	-3400	-0.69	-0.55		-550	-5400	-1.1	-0.88	
Wonder	2000	0.25	-270	-3700	-2	-0.56		-430	-5900	-3.2	-0.9	
Wonder	1992	0.75	-320	-4400	-2.4	-0.68		-510	-7100	-3.8	-1.1	
Wonder	1985	1.25	-240	-3800	-1.8	-0.5		-390	-6100	-2.8	-0.81	
Wonder	1977	1.75	-230	-3800	-1.5	-0.43		-360	-6100	-2.4	-0.69	
Wonder	1968	2.25	-260	-4300	-1.2	-0.34		-410	-6800	-1.9	-0.55	

Wonder	1949	2.75	-310	-5200	-1	-0.29		-500	-8300	-1.6	-0.46	
Wonder	1919	3.25	-180	-3300	-0.41	-0.12		-280	-5400	-0.65	-0.19	
Golden	2002.5	0.25	-1400		-1.9	-1.9		-2300		-3	-3	
Golden	1996.5	0.75	-950		-2.9	-2.9		-1500		-4.7	-4.7	
Golden	1989.5	1.25	-540	-3200	-2	-2		-880	-5200	-3.3	-3.3	
Golden	1981.5	1.75	-650	-3900	-2.4	-2.4		4000	24000	14	14	
Golden	1972.5	2.25	-620	-2600	-1.8	-1.8	d	-1000	-4200	-3	-3	d
Golden	1962.5	2.75	-690	-2900	-1.7	-1.7		-1100	-4600	-2.7	-2.7	
Golden	1951	3.25	-660	-2600	-1.4	-1.4	d	-1100	-4100	-2.3	-2.3	d
Golden	1924	4.25	-620	-2400	-1.1	-1.1	d	-1000	-3900	-1.7	-1.7	d
LP 19	2004	0.25	-1100	-6200	-13	-8.3		-1800	-10000	-20	-13	
LP 19	1999	1.25	-610		-5.8	-3.9		-990		-9.4	-6.3	
LP 19	1994	2.25	-490	-2600	-5.3	-3.6		-780	-4200	-8.6	-5.7	
LP 19	1989	3.25	-560	-3100	-4.7	-3.2		-900	-4900	-7.6	-5.1	
LP 19	1980	4.25	-560	-3000	-3.4	-2.2	d	-890	-4900	-5.4	-3.6	d
LP 19	1969	5.25	-510	-2800	-2.6	-1.8		-820	-4500	-4.3	-2.8	
LP 19	1956	6.25	-490	-2600	-2	-1.4		-790	-4200	-3.3	-2.2	
LP 19	1903	10.5	-270	-1600	-1.7	-1.1	d	-440	-2600	-2.7	-1.8	d
Hoh	2004	0.25	-370	-1800	-4.9	-1.6		-600	-3000	-7.8	-2.5	
Hoh	1998	1.25	-610	-3300	-5.5	-1.8		-980	-5300	-8.8	-2.8	
Hoh	1990.5	2.25	-440	-3100	-4.9	-1.6		-710	-5000	-7.8	-2.5	
Hoh	1983	3.25	-280	-2700	-4.1	-1.3	d	-450	-4300	-6.6	-2.1	d
Hoh	1973.5	4.25	-250	-2700	-3.7	-1.2	d	-400	-4400	-5.9	-1.9	d
Hoh	1963	5.25	-250	-2500	-3.4	-1.1	d	-400	-4000	-5.4	-1.7	d
Hoh	1952.5	6.25	-190	-2200	-3.7	-1.2	d	-300	-3500	-5.9	-1.9	d
Hoh	1901	12.75	-55	-660	-1.1	-0.37	d	-88	-1100	-1.8	-0.59	d
PJ	2004.5	0.25	-880	-5500	-25	-32	c	-1400	-8900	-40	-51	
PJ	1999	2.75	-510	-3100	-14	-18	c	-820	-5000	-22	-28	
PJ	1992	4.75	-480	-3000	-12	-15	c	-770	-4800	-19	-24	
PJ	1984	6.75	-250	-1700	-8.2	-11	c	-410	-2700	-13	-17	
PJ	1977.5	8.75	-260	-1700	-14	-18	c	-420	-2800	-23	-30	
PJ	1968	11.5	-100		-2.9	-3.7	c	-160		-4.6	-6	

PJ	1963	12.5	-97	-670	-4	-5.1	c	-160	-1100	-6.4	-8.2	
PJ	1955	15.5	-79	-530	-7.7	-9.8	c	-130	-860	-12	-16	
Oldman	2003.5	0.25	-110	-2200	-6.3	-1.4		-180	-3500	-10	-2.2	
Oldman	1997	1.25	-120	-2500	-5.3	-1.2	d	-200	-4000	-8.5	-1.9	d
Oldman	1987	2.25	-110	-2100	-2.9	-0.65	d	-180	-3400	-4.7	-1	d
Oldman	1980.5	2.75	-100	-2000	-2.3	-0.5	d	-160	-3200	-3.7	-0.81	d
Oldman	1973	3.25	-91	-1900	-1.9	-0.42	d	-150	-3100	-3.1	-0.67	d
Oldman	1963.5	3.75	-98	-2200	-1.8	-0.39	d	-160	-3500	-2.8	-0.62	d
Oldman	1952	4.25	-85	-2000	-1.4	-0.3	d	-140	-3300	-2.2	-0.48	d
Oldman	1906.5	6.25	-74	-2100	-1.4	-0.3	d	-120	-3500	-2.2	-0.48	d
Snyder	2004	0.25	-640	-4900	-13	-9.8		-1000	-7800	-22	-16	
Snyder	2000	1.25	-410	-3300	-7.3	-5.4		-660	-5300	-12	-8.6	
Snyder	1991.5	2.75	-370	-3300	-5.7	-4.1		-590	-5300	-9.1	-6.7	
Snyder	1985	3.75	-350	-3400	-5.3	-3.9		-570	-5500	-8.6	-6.2	
Snyder	1978	4.75	-320	-3300	-4.5	-3.3		-520	-5300	-7.3	-5.3	
Snyder	1967.5	5.75	-280	-3000	-3.7	-2.7	d	-450	-4800	-5.9	-4.3	d
Snyder	1954.5	6.75	-280	-2800	-3.1	-2.3	d	-460	-4500	-5	-3.7	d
Snyder	1893	11.75	-120	-1400	-0.95	-0.7		-190	-2200	-1.5	-1.1	

Site	Average Year (y)	Average Depth (cm)	MXCLR pg/g dw	MXCLR pg/g TOC	MXCLR Flux pg/cm2.y	MXCLR Flux (FF) pg/cm2.y	MXCLR FLAG	B[a]A pg/g dw	B[a]A pg/g TOC	B[a]A Flux pg/cm2.y	B[a]A Flux (FF) pg/cm2.y	B[a]A FLAGv
Mills	2002	0.25	-210	-1300	-6.2	-4.2		11000	69000	320	220	
Mills	2000	0.75	-280	-2000	-8.1	-5.4		12000	83000	340	230	
Mills	1996	1.75	-190	-1300	-5.4	-3.6	d	6600	44000	180	120	
Mills	1990.5	2.75	-180	-1400	-4.3	-2.9		11000	87000	270	180	
Mills	1987.5	3.25	2500	21000	51	34		8500	70000	170	110	
Mills	1974	4.75	-170	-1600	-3.2	-2.1		15000	141000	280	190	
Mills	1970	5.25	4200	38000	96	65		8000	72000	180	120	
Mills	1963.5	6.25	-130	-1100	-4.3	-2.9		12000	98000	380	260	
Mills	1953.5	7.75	-130	-1100	-3.9	-2.6		12000	104000	360	240	c
Mills	1947	8.75	-130	-1200	-3.3	-2.2		12000	105000	300	200	c
Mills	1937.5	9.75	-100	-960	-2.3	-1.6		17000	154000	370	250	

Mills	1905	17.5	-48	-390	-1.1	-0.71	d	-29	-240	-0.65	-0.44	
Lone Pine	2001	0.25	-170	-12	-2.5	-1.3		8800	630	130	71	
Lone Pine	1997.5	0.75	-150	-12	-2.4	-1.3		7500	580	120	64	
Lone Pine	1990	1.75	-170	-14	-2.9	-1.5		12000	1000	200	110	
Lone Pine	1986	2.25	250	20	4.2	2.2		6200	510	100	56	c
Lone Pine	1982	2.75	-170	-12	-2.9	-1.5		10000	750	180	94	
Lone Pine	1972.5	3.75	4600	330	68	37		11000	810	170	90	
Lone Pine	1967	4.25	4500	320	67	36		13000	970	200	110	
Lone Pine	1961	4.75	-150	-13	-2.1	-1.1		11000	970	160	83	
Lone Pine	1955	5.25	-150	-13	-2	-1.1		9100	800	120	64	
Lone Pine	1949	5.75	-240	-21	-3.1	-1.6		18000	1600	240	130	
Lone Pine	1936	6.75	-170	-15	-2	-1.1		16000	1400	190	100	
Lone Pine	1920	7.75	-130	-12	-1.6	-0.84		16000	1500	190	100	
Lone Pine	1870	11.5	-55	-4.8	-0.66	-0.35		2800	250	33	18	
Pear	2002	0.25	-460	-3000	-5.6	-2.5	d	-280	-1900	-3.4	-1.5	c
Pear	2000	0.75	-350	-2600	-4.2	-1.9	d	13000	94000	150	69	c
Pear	1997	1.25	-360	-2400	-4.3	-1.9		5900	39000	71	32	
Pear	1991	2.25	91000	677000	1100	490		16000	120000	190	88	c
Pear	1980	3.75	17000	117000	190	86		13000	86000	140	63	c
Pear	1969	5.25	14000	104000	150	68		17000	127000	180	83	c
Pear	1961	6.25	-310	-2200	-4.3	-1.9		14000	102000	200	88	c
Pear	1957	6.75	-220	-1900	-3.1	-1.4		9700	84000	140	61	c
Pear	1926	10.5	-200	-1800	-1.6	-0.74		8400	74000	67	30	c
Pear	1872	14.5					Z					Z
Emerald	2002	0.25	-180	-2000	-8.2	-2.2	d	2100	24000	96	26	
Emerald	1997	1.75	-110	-1200	-5.1	-1.4		1200	13000	54	15	
Emerald	1989	3.75	-100	-1100	-4.7	-1.3		1300	14000	60	16	
Emerald	1980	5.75	-120	-1200	-5.4	-1.4		1900	21000	90	24	
Emerald	1971.5	7.75	-120	-1400	-5.7	-1.5		1800	21000	83	22	
Emerald	1961.5	9.75	-86	-830	-4	-1.1		-53	-510	-2.4	-0.65	
Emerald	1958	10.5	-40	-500	-1.8	-0.49		1100	14000	52	14	d
Emerald	1892	21.5	-25	-290	-1.4	-0.37		-15	-180	-0.86	-0.23	

Burial	2000	0.25	-5.5	-8300	-0.022	-0.025		18	27000	0.072	0.082	
Burial	1988	0.75	-4	-6800	-0.017	-0.019		20	33000	0.081	0.092	
Burial	1974	1.25	-5.6	-9700	-0.026	-0.029		27	47000	0.13	0.14	
Burial	1957	1.75	33	62000	0.11	0.12		23	43000	0.077	0.087	
Burial	1933	2.25	160	314000	0.49	0.56		24	48000	0.075	0.086	
Burial	1906	2.75	42	83000	0.13	0.15		23	44000	0.07	0.079	
Burial	1879	3.25	88	167000	0.27	0.31		20	39000	0.063	0.072	
Mcleod	2002	0.25	-860	-7100	-4.4	-1.7	d	-530	-4400	-2.7	-1	c
Mcleod	1997	0.75	-390	-3400	-2.2	-0.83	d	-240	-2100	-1.3	-0.51	c
Mcleod	1990	1.25	-240	-2500	-1.6	-0.6	d	-150	-1500	-0.96	-0.37	c
Mcleod	1982	1.75	-220	-2400	-1.8	-0.68	d	-130	-1400	-1.1	-0.42	c
Mcleod	1975	2.25	-220	-2500	-2.3	-0.89	d	-140	-1500	-1.4	-0.55	c
Mcleod	1969	2.75	-200	-2200	-2.2	-0.85	d	-120	-1400	-1.4	-0.52	c
Mcleod	1962	3.25	-190	-2000	-1.5	-0.59	d	-120	-1200	-0.94	-0.36	c
Mcleod	1952	3.75	-200	-2200	-1.3	-0.48	d	-120	-1400	-0.77	-0.3	c
Mcleod	1907	6.25	-260	-2300	-1.5	-0.56	d	-160	-1400	-0.9	-0.34	c
Matcharak	2001	0.25	-690		-2.8	-2.3	d	-420		-1.7	-1.4	c
Matcharak	1993	0.75	-440	-3500	-2	-1.6	d	-270	-2100	-1.2	-0.97	c
Matcharak	1983	1.25	-360	-2900	-1.5	-1.2	d	-220	-1800	-0.94	-0.76	c
Matcharak	1971	1.75	-350	-3000	-1.2	-0.93	d	-220	-1800	-0.71	-0.57	c
Matcharak	1954	2.25	-330	-2900	-0.81	-0.65	d	-200	-1800	-0.5	-0.4	c
Matcharak	1937	2.75	-310	-2900	-0.65	-0.52	d	-190	-1800	-0.4	-0.32	c
Matcharak	1910	3.25	-270	-2600	-0.54	-0.43		-170	-1600	-0.33	-0.27	c
Wonder	2000	0.25	-210	-2900	-1.5	-0.44		550	7700	4.1	1.2	
Wonder	1992	0.75	-250	-3500	-1.9	-0.54		580	8100	4.4	1.2	
Wonder	1985	1.25	-190	-3000	-1.4	-0.4		500	7800	3.6	1	
Wonder	1977	1.75	-180	-3000	-1.2	-0.34		530	8800	3.5	0.99	
Wonder	1968	2.25	-200	-3400	-0.95	-0.27		530	8900	2.5	0.72	
Wonder	1949	2.75	-250	-4100	-0.79	-0.23		750	12000	2.4	0.69	
Wonder	1919	3.25	-140	-2600	-0.32	-0.092		420	7900	0.96	0.27	
Golden	2002.5	0.25	-1100		-1.5	-1.5		-680		-0.92	-0.92	
Golden	1996.5	0.75	-750		-2.3	-2.3		37000		110	110	

Golden	1989.5	1.25	-430	-2500	-1.6	-1.6		15000	88000	56	56	
Golden	1981.5	1.75	-520	-3100	-1.9	-1.9		36000	213000	130	130	
Golden	1972.5	2.25	-490	-2100	-1.5	-1.5	d	59000	247000	180	180	
Golden	1962.5	2.75	-550	-2300	-1.3	-1.3		121000	506000	300	300	
Golden	1951	3.25	-520	-2000	-1.1	-1.1	d	143000	559000	310	310	
Golden	1924	4.25	-490	-1900	-0.83	-0.83	d	174000	676000	300	300	
LP 19	2004	0.25	-900	-4900	-9.9	-6.6		18000	100000	200	140	
LP 19	1999	1.25	-480		-4.6	-3.1		12000		110	76	
LP 19	1994	2.25	-380	-2100	-4.2	-2.8		17000	95000	190	130	
LP 19	1989	3.25	-440	-2400	-3.7	-2.5		23000	124000	190	130	
LP 19	1980	4.25	-440	-2400	-2.7	-1.8	d	23000	124000	140	92	
LP 19	1969	5.25	-400	-2200	-2.1	-1.4		22000	121000	110	77	
LP 19	1956	6.25	-390	-2100	-1.6	-1.1		28000	148000	110	76	
LP 19	1903	10.5	-220	-1300	-1.3	-0.89	d	6700	39000	41	28	
Hoh	2004	0.25	-300	-1500	-3.8	-1.2						X
Hoh	1998	1.25	-480	-2600	-4.3	-1.4		2600	14000	23	7.5	e
Hoh	1990.5	2.25	-350	-2500	-3.9	-1.2		1600	11000	17	5.5	e
Hoh	1983	3.25	-220	-2100	-3.2	-1	d	2100	20000	30	9.7	e
Hoh	1973.5	4.25	-190	-2100	-2.9	-0.94	d	2900	32000	44	14	e
Hoh	1963	5.25	-200	-1900	-2.7	-0.86	d	2200	21000	29	9.5	e
Hoh	1952.5	6.25	-150	-1700	-2.9	-0.94	d	2100	24000	41	13	e
Hoh	1901	12.75	-43	-520	-0.9	-0.29	d	1100	13000	22	7.1	e
PJ	2004.5	0.25	-700	-4400	-20	-25	c	2600	16000	72	92	e
PJ	1999	2.75	-400	-2500	-11	-14	c	2000	12000	53	68	e
PJ	1992	4.75	-380	-2300	-9.3	-12	c	2500	15000	61	79	e
PJ	1984	6.75	-200	-1300	-6.5	-8.3	c	3300	22000	110	140	e
PJ	1977.5	8.75	-210	-1400	-11	-15	c	2200	15000	120	150	e
PJ	1968	11.5	-79		-2.3	-2.9	c	-48		-1.4	-1.8	
PJ	1963	12.5	-77	-530	-3.1	-4	c	-47	-320	-1.9	-2.5	
PJ	1955	15.5	-62	-420	-6.1	-7.8	c	-38	-260	-3.7	-4.8	
Oldman	2003.5	0.25	-90	-1700	-5	-1.1		9200	173000	500	110	
Oldman	1997	1.25	-97	-1900	-4.2	-0.92	d	13000	257000	550	120	

Oldman	1987	2.25	-89	-1700	-2.3	-0.51	d	23000	427000	600	130	
Oldman	1980.5	2.75	-81	-1600	-1.8	-0.4	d	17000	340000	390	86	
Oldman	1973	3.25	-71	-1500	-1.5	-0.33	d	19000	395000	390	86	
Oldman	1963.5	3.75	-77	-1700	-1.4	-0.3	d	16000	364000	290	64	
Oldman	1952	4.25	-67	-1600	-1.1	-0.24	d	15000	360000	240	53	
Oldman	1906.5	6.25	-58	-1700	-1.1	-0.24	d	7400	217000	140	30	
Snyder	2004	0.25	-500	-3800	-11	-7.7	c	40000	306000	850	620	
Snyder	2000	1.25	4500	37000	81	59	c	43000	346000	770	560	
Snyder	1991.5	2.75	8100	73000	130	92	c	53000	480000	830	600	
Snyder	1985	3.75	9900	95000	150	110	c	62000	594000	930	680	
Snyder	1978	4.75	13000	135000	190	140	c	61000	622000	850	620	
Snyder	1967.5	5.75	37000	400000	480	350	c,d	85000	913000	1100	810	
Snyder	1954.5	6.75	-220	-2200	-2.5	-1.8	d	60000	593000	650	480	
Snyder	1893	11.75	22000	255000	180	130	c	7900	91000	63	46	

Site	Average Year (y)	Average Depth (cm)	CHR/TRI pg/g dw	CHR/TRI pg/g TOC	CHR/TRI Flux pg/cm2.y	CHR/TRI Flux (FF) pg/cm2.y	CHR/TRI FLAG	B[b]F pg/g dw	B[b]F pg/g TOC	B[b]F Flux pg/cm2.y	B[b]F Flux (FF) pg/cm2.y	B[b]F FLAG
Mills	2002	0.25	8800	55000	250	170		34000	212000	980	660	
Mills	2000	0.75	8800	62000	260	170		32000	226000	930	630	
Mills	1996	1.75	7500	51000	210	140		29000	195000	810	550	
Mills	1990.5	2.75	9100	70000	210	140		34000	264000	810	550	
Mills	1987.5	3.25	8600	71000	170	120		33000	273000	660	450	
Mills	1974	4.75	12000	110000	220	150		45000	417000	840	570	
Mills	1970	5.25	8400	76000	190	130		34000	309000	780	530	
Mills	1963.5	6.25	9800	80000	310	210		38000	310000	1200	820	
Mills	1953.5	7.75	5200	46000	160	110		12000	105000	360	250	
Mills	1947	8.75	13000	117000	330	220		47000	419000	1200	800	
Mills	1937.5	9.75	13000	123000	290	200		50000	463000	1100	750	
Mills	1905	17.5	-2	-16	-0.044	-0.03		-10	-84	-0.23	-0.15	
Lone Pine	2001	0.25	7300	520	110	58		26000	1800	380	210	
Lone Pine	1997.5	0.75	6200	480	99	53		24000	1800	380	200	
Lone Pine	1990	1.75	9800	840	170	89		36000	3100	620	330	

Lone Pine	1986	2.25	6400	530	110	58		27000	2200	460	250	
Lone Pine	1982	2.75	10000	720	170	91		42000	3000	710	380	
Lone Pine	1972.5	3.75	11000	800	170	89		49000	3500	740	390	
Lone Pine	1967	4.25	13000	950	200	110		56000	4000	840	450	
Lone Pine	1961	4.75	11000	970	160	83		48000	4200	670	360	
Lone Pine	1955	5.25	12000	1000	150	80		42000	3700	550	290	
Lone Pine	1949	5.75	22000	2000	290	160		81000	7200	1100	570	
Lone Pine	1936	6.75	17000	1500	200	110		69000	6100	830	440	
Lone Pine	1920	7.75	15000	1400	180	97		68000	6300	820	440	
Lone Pine	1870	11.5	3100	280	38	20		9400	840	110	61	
Pear	2002	0.25	-19	-130	-0.23	-0.1		-99	-650	-1.2	-0.54	c
Pear	2000	0.75	7500	56000	90	41		20000	149000	240	110	c
Pear	1997	1.25	4000	27000	48	22		11000	70000	130	57	
Pear	1991	2.25	9600	71000	120	52		31000	231000	370	170	c
Pear	1980	3.75	7200	48000	79	36		24000	163000	270	120	c
Pear	1969	5.25	10000	77000	110	51		42000	315000	460	210	c
Pear	1961	6.25	8200	60000	120	52		29000	211000	410	180	c
Pear	1957	6.75	6000	52000	84	38		22000	188000	310	140	c
Pear	1926	10.5	5200	46000	42	19		23000	207000	190	84	c
Pear	1872	14.5	-4	-36	-0.024	-0.011		-21	-180	-0.12	-0.056	c
Emerald	2002	0.25	3100	35000	140	38		7900	90000	360	97	
Emerald	1997	1.75	1700	19000	80	21		-24	-270	-1.1	-0.3	
Emerald	1989	3.75	1900	19000	85	23		4500	48000	210	56	
Emerald	1980	5.75	2600	28000	120	32		7100	76000	330	88	
Emerald	1971.5	7.75	2400	27000	110	29		6800	79000	310	84	
Emerald	1961.5	9.75	1600	16000	76	20		5600	54000	260	69	
Emerald	1958	10.5	2600	32000	120	32	d	5700	73000	260	71	d
Emerald	1892	21.5	540	6400	31	8.2		-5.3	-63	-0.3	-0.08	
Burial	2000	0.25	56	85000	0.23	0.26		130	202000	0.53	0.61	
Burial	1988	0.75	90	153000	0.37	0.42		200	331000	0.8	0.91	
Burial	1974	1.25	110	194000	0.52	0.59		240	420000	1.1	1.3	
Burial	1957	1.75	130	245000	0.44	0.49		290	532000	0.95	1.1	
Burial	1933	2.25	120	242000	0.38	0.43		270	524000	0.82	0.94	

Burial	1906	2.75	120	229000	0.36	0.41		260	507000	0.81	0.92	
Burial	1879	3.25	110	205000	0.34	0.38		230	436000	0.71	0.81	
Mcleod	2002	0.25	-36	-290	-0.18	-0.07		-180	-1500	-0.94	-0.36	
Mcleod	1997	0.75	-16	-140	-0.09	-0.034		-83	-720	-0.46	-0.18	
Mcleod	1990	1.25	-10	-100	-0.065	-0.025		-52	-530	-0.34	-0.13	
Mcleod	1982	1.75	-9.1	-98	-0.073	-0.028		-47	-510	-0.38	-0.15	
Mcleod	1975	2.25	-9.2	-100	-0.096	-0.037		-48	-530	-0.5	-0.19	
Mcleod	1969	2.75	-8.2	-92	-0.092	-0.035		-42	-470	-0.47	-0.18	
Mcleod	1962	3.25	-7.8	-83	-0.063	-0.024		-41	-430	-0.33	-0.13	
Mcleod	1952	3.75	-8.3	-91	-0.052	-0.02		-43	-470	-0.27	-0.1	
Mcleod	1907	6.25	-11	-97	-0.06	-0.023		-55	-500	-0.31	-0.12	
Matcharak	2001	0.25	-29		-0.12	-0.094		-150		-0.61	-0.49	c
Matcharak	1993	0.75	-18	-140	-0.082	-0.066		-94	-740	-0.42	-0.34	c
Matcharak	1983	1.25	-15	-120	-0.064	-0.051		-77	-630	-0.33	-0.26	c
Matcharak	1971	1.75	-15	-120	-0.048	-0.038		-75	-640	-0.25	-0.2	c
Matcharak	1954	2.25	-14	-120	-0.034	-0.027		-70	-620	-0.17	-0.14	c
Matcharak	1937	2.75	-13	-120	-0.027	-0.022		-66	-620	-0.14	-0.11	c
Matcharak	1910	3.25	-11	-110	-0.022	-0.018		-58	-570	-0.12	-0.093	c
Wonder	2000	0.25	990	14000	7.3	2.1		1500	21000	11	3.3	
Wonder	1992	0.75	820	11000	6.2	1.8						
Wonder	1985	1.25	740	12000	5.3	1.5						
Wonder	1977	1.75	950	16000	6.3	1.8		1300	21000	8.4	2.4	
Wonder	1968	2.25	950	16000	4.5	1.3		1400	24000	6.7	1.9	
Wonder	1949	2.75	1500	26000	4.9	1.4						
Wonder	1919	3.25	830	16000	1.9	0.55		1100	20000	2.5	0.71	
Golden	2002.5	0.25	47000		64	64		131000		180	180	
Golden	1996.5	0.75	80000		250	250		219000		680	680	
Golden	1989.5	1.25	45000	264000	170	170		131000	775000	490	490	
Golden	1981.5	1.75	77000	453000	280	280		228000	1349000	820	820	
Golden	1972.5	2.25	135000	561000	400	400		432000	1797000	1300	1300	b
Golden	1962.5	2.75	207000	862000	510	510		712000	2966000	1700	1700	b
Golden	1951	3.25	234000	917000	500	500		843000	3303000	1800	1800	b

Golden	1924	4.25	228000	890000	390	390		1093000	4260000	1900	1900	b
LP 19	2004	0.25	18000	98000	200	130		66000	359000	730	480	
LP 19	1999	1.25	22000		210	140		95000		900	600	
LP 19	1994	2.25	30000	162000	330	220		118000	642000	1300	860	
LP 19	1989	3.25	38000	207000	320	210		167000	912000	1400	940	
LP 19	1980	4.25	35000	191000	210	140		168000	912000	1000	680	
LP 19	1969	5.25	33000	183000	170	120		164000	899000	850	570	
LP 19	1956	6.25	40000	215000	170	110		210000	1124000	870	580	
LP 19	1903	10.5	8800	51000	54	36		52000	305000	320	220	
Hoh	2004	0.25	1200	6000	16	5.1		4500	22000	59	19	
Hoh	1998	1.25	3800	21000	34	11		13000	73000	120	39	
Hoh	1990.5	2.25	3300	23000	36	12		-75	-530	-0.83	-0.27	
Hoh	1983	3.25	3700	35000	54	17		11000	108000	170	53	
Hoh	1973.5	4.25	4000	44000	60	19		12000	131000	180	58	
Hoh	1963	5.25	4000	40000	54	18		15000	150000	210	66	
Hoh	1952.5	6.25	3200	37000	62	20		12000	136000	230	74	
Hoh	1901	12.75	1600	19000	33	11		7200	87000	150	49	
PJ	2004.5	0.25	2600	16000	73	94		11000	66000	300	380	
PJ	1999	2.75	2500	15000	67	85		8200	50000	220	280	
PJ	1992	4.75	3200	20000	78	100		9500	58000	230	300	
PJ	1984	6.75	3800	25000	120	160		8000	52000	260	330	
PJ	1977.5	8.75	3700	24000	200	260		10000	67000	550	710	
PJ	1968	11.5	3100		91	120		8200		240	300	
PJ	1963	12.5	3400	23000	140	180		8900	61000	370	470	
PJ	1955	15.5	3400	23000	330	420		9400	64000	910	1200	
Oldman	2003.5	0.25	24000	448000	1300	290		56000	1054000	3100	680	
Oldman	1997	1.25	32000	637000	1400	300		75000	1503000	3200	710	
Oldman	1987	2.25	59000	1088000	1500	330		136000	2530000	3500	780	b
Oldman	1980.5	2.75	44000	856000	990	220		101000	1969000	2300	500	b
Oldman	1973	3.25	51000	1075000	1100	230		118000	2497000	2500	540	b
Oldman	1963.5	3.75	40000	892000	710	160		88000	1985000	1600	350	b
Oldman	1952	4.25	39000	920000	620	140		90000	2140000	1400	320	b

Oldman	1906.5	6.25	11000	308000	200	43		34000	984000	620	140	
Snyder	2004	0.25	93000	706000	2000	1400		265000	2012000	5600	4100	
Snyder	2000	1.25	95000	771000	1700	1200		261000	2129000	4700	3400	b
Snyder	1991.5	2.75	135000	1216000	2100	1500		364000	3280000	5600	4100	b
Snyder	1985	3.75	182000	1748000	2700	2000		466000	4481000	7000	5100	b
Snyder	1978	4.75	203000	2066000	2800	2100	b	512000	5220000	7200	5200	b
Snyder	1967.5	5.75	355000	3801000	4600	3400	b	913000	9779000	12000	8700	b
Snyder	1954.5	6.75	210000	2090000	2300	1700		461000	4588000	5100	3700	
Snyder	1893	11.75	19000	213000	150	110		55000	634000	440	320	

Site	Average Year (y)	Average Depth (cm)	B[k]F pg/g dw	B[k]F pg/g TOC	B[k]F Flux pg/cm2.y	B[k]F Flux (FF) pg/cm2.y	B[k]F FLAG	B[e]P pg/g dw	B[e]P pg/g TOC	B[e]P Flux pg/cm2.y	B[e]P Flux (FF) pg/cm2.y	B[e]P FLAG
Mills	2002	0.25	8100	51000	230	160		17000	108000	500	340	
Mills	2000	0.75	7200	51000	210	140		15000	105000	430	290	
Mills	1996	1.75	14000	94000	390	260		13000	90000	370	250	
Mills	1990.5	2.75	7700	59000	180	120		16000	126000	390	260	
Mills	1987.5	3.25	15000	125000	300	210		15000	123000	300	200	
Mills	1974	4.75	12000	106000	210	140		22000	199000	400	270	
Mills	1970	5.25	15000	135000	340	230		15000	135000	340	230	
Mills	1963.5	6.25	10000	82000	320	220		18000	146000	570	390	
Mills	1953.5	7.75	12000	108000	380	250		19000	170000	590	400	
Mills	1947	8.75	14000	124000	350	240		21000	186000	530	360	
Mills	1937.5	9.75	15000	140000	340	230		23000	209000	500	340	
Mills	1905	17.5	-8.4	-69	-0.18	-0.12		3200	26000	70	47	e
Lone Pine	2001	0.25	6400	460	95	51		13000	960	200	110	
Lone Pine	1997.5	0.75	5300	410	85	45		12000	900	190	99	
Lone Pine	1990	1.75	8900	770	150	81		18000	1600	310	170	
Lone Pine	1986	2.25	9800	810	170	90		12000	1000	210	110	
Lone Pine	1982	2.75	12000	890	210	110		23000	1700	390	210	
Lone Pine	1972.5	3.75	17000	1200	260	140		22000	1600	330	170	
Lone Pine	1967	4.25	19000	1400	290	150		25000	1800	370	200	
Lone Pine	1961	4.75	14000	1200	200	110		25000	2200	360	190	

Lone Pine	1955	5.25	12000	1100	160	85		20000	1700	260	140	
Lone Pine	1949	5.75	23000	2000	300	160		38000	3300	490	260	
Lone Pine	1936	6.75	21000	1800	250	130		35000	3100	420	220	
Lone Pine	1920	7.75	20000	1800	240	130		33000	3000	390	210	
Lone Pine	1870	11.5	3000	260	36	19		4700	420	56	30	
Pear	2002	0.25	-81	-530	-0.97	-0.44		-160	-1100	-1.9	-0.87	c
Pear	2000	0.75	3500	26000	42	19		11000	85000	140	62	c
Pear	1997	1.25	2700	18000	32	14		6100	40000	73	33	
Pear	1991	2.25	5500	41000	66	30		18000	135000	220	98	c
Pear	1980	3.75	4000	27000	45	20		14000	94000	150	69	c
Pear	1969	5.25	7200	55000	80	36		25000	187000	270	120	c
Pear	1961	6.25	5400	39000	75	34		16000	117000	230	100	c
Pear	1957	6.75	3900	33000	54	24		14000	121000	200	88	c
Pear	1926	10.5	3400	30000	27	12		12000	110000	99	45	c
Pear	1872	14.5	-17	-150	-0.1	-0.046		-34	-300	-0.2	-0.091	c
Emerald	2002	0.25	-31	-350	-1.4	-0.38		3700	42000	170	46	
Emerald	1997	1.75	-20	-220	-0.9	-0.24		2000	23000	94	25	
Emerald	1989	3.75	-18	-190	-0.83	-0.22		2100	22000	95	25	
Emerald	1980	5.75	-20	-220	-0.94	-0.25		3100	34000	140	39	
Emerald	1971.5	7.75	-22	-250	-0.99	-0.27		3400	39000	150	41	
Emerald	1961.5	9.75	-15	-140	-0.69	-0.18		2800	27000	130	35	
Emerald	1958	10.5	1400	17000	63	17	d	2800	35000	130	34	d
Emerald	1892	21.5	-4.3	-51	-0.24	-0.065		-8.6	-100	-0.49	-0.13	
Burial	2000	0.25	-0.96	-1400	-0.004	-0.004		76	115000	0.3	0.35	
Burial	1988	0.75	-0.7	-1200	-0.003	-0.003		120	200000	0.49	0.55	
Burial	1974	1.25	-0.98	-1700	-0.004	-0.005		140	249000	0.66	0.75	
Burial	1957	1.75	-0.76	-1400	-0.003	-0.003		170	318000	0.57	0.64	
Burial	1933	2.25	-0.79	-1600	-0.002	-0.003		150	295000	0.46	0.53	
Burial	1906	2.75	-0.8	-1600	-0.002	-0.003		150	294000	0.47	0.53	
Burial	1879	3.25	1.1	2000	0.003	0.004		130	245000	0.4	0.46	
Mcleod	2002	0.25	-150	-1200	-0.76	-0.29		-300	-2500	-1.5	-0.59	
Mcleod	1997	0.75	-67	-590	-0.38	-0.15		-130	-1200	-0.76	-0.29	

Mcleod	1990	1.25	-43	-430	-0.27	-0.11		-86	-870	-0.55	-0.21	
Mcleod	1982	1.75	-38	-410	-0.31	-0.12		-76	-820	-0.62	-0.24	
Mcleod	1975	2.25	-39	-430	-0.4	-0.16		-78	-860	-0.81	-0.31	
Mcleod	1969	2.75	-35	-390	-0.39	-0.15		-69	-770	-0.77	-0.3	
Mcleod	1962	3.25	-33	-350	-0.27	-0.1		-66	-700	-0.54	-0.21	
Mcleod	1952	3.75	-35	-380	-0.22	-0.085		-70	-770	-0.44	-0.17	
Mcleod	1907	6.25	-45	-410	-0.25	-0.098		-89	-820	-0.51	-0.2	
Matcharak	2001	0.25	-120		-0.49	-0.4		-240		-0.99	-0.79	
Matcharak	1993	0.75	-77	-600	-0.35	-0.28		-150	-1200	-0.69	-0.55	
Matcharak	1983	1.25	-62	-510	-0.27	-0.21		-120	-1000	-0.54	-0.43	
Matcharak	1971	1.75	-61	-520	-0.2	-0.16		-120	-1000	-0.41	-0.32	
Matcharak	1954	2.25	-57	-510	-0.14	-0.11		-110	-1000	-0.28	-0.23	
Matcharak	1937	2.75	-54	-510	-0.11	-0.091		-110	-1000	-0.23	-0.18	
Matcharak	1910	3.25	-47	-460	-0.095	-0.076		-95	-930	-0.19	-0.15	
Wonder	2000	0.25	-37	-510	-0.27	-0.078		-73	-1000	-0.54	-0.16	
Wonder	1992	0.75	-44	-610	-0.33	-0.094		-88	-1200	-0.66	-0.19	
Wonder	1985	1.25	-34	-520	-0.24	-0.069		-67	-1000	-0.48	-0.14	
Wonder	1977	1.75	-31	-520	-0.21	-0.059		-62	-1000	-0.41	-0.12	
Wonder	1968	2.25	-35	-590	-0.17	-0.048		1100	18000	5	1.4	
Wonder	1949	2.75	-43	-710	-0.14	-0.039		1400	24000	4.6	1.3	
Wonder	1919	3.25	-24	-460	-0.056	-0.016		-49	-920	-0.11	-0.032	
Golden	2002.5	0.25	28000		37	37		55000		75	75	
Golden	1996.5	0.75	44000		140	140		95000		290	290	
Golden	1989.5	1.25	27000	158000	100	100		58000	341000	220	220	
Golden	1981.5	1.75	47000	276000	170	170		104000	616000	370	370	
Golden	1972.5	2.25	97000	405000	290	290		212000	881000	620	620	
Golden	1962.5	2.75	182000	757000	450	450		351000	1460000	860	860	
Golden	1951	3.25	210000	824000	450	450		411000	1610000	880	880	b
Golden	1924	4.25	292000	1139000	500	500		468000	1825000	800	800	b
LP 19	2004	0.25	16000	86000	170	120		35000	189000	380	260	
LP 19	1999	1.25	22000		210	140		51000		480	320	
LP 19	1994	2.25	27000	146000	300	200		64000	351000	710	470	

LP 19	1989	3.25	40000	218000	340	220		89000	486000	750	500	
LP 19	1980	4.25	41000	222000	250	160		90000	489000	540	360	
LP 19	1969	5.25	42000	229000	220	140		88000	483000	460	300	
LP 19	1956	6.25	53000	285000	220	150		111000	593000	460	310	
LP 19	1903	10.5	13000	75000	79	53		25000	144000	150	100	
Hoh	2004	0.25	1500	7600	20	6.5		-100	-510	-1.3	-0.43	
Hoh	1998	1.25	4100	22000	37	12		6000	33000	54	17	
Hoh	1990.5	2.25	2500	18000	28	9		5200	36000	57	18	
Hoh	1983	3.25	2800	26000	40	13		5400	51000	78	25	
Hoh	1973.5	4.25	3000	33000	45	14		5800	65000	88	28	
Hoh	1963	5.25	3800	38000	51	17		7800	77000	110	34	
Hoh	1952.5	6.25	3200	37000	62	20		6000	69000	120	38	
Hoh	1901	12.75	1900	23000	40	13		3900	46000	81	26	
PJ	2004.5	0.25	3200	20000	89	110		5400	34000	150	190	
PJ	1999	2.75	2600	16000	70	90		4600	28000	120	160	
PJ	1992	4.75	2800	17000	68	87		5400	33000	130	170	
PJ	1984	6.75	2400	16000	80	100		4200	27000	140	170	
PJ	1977.5	8.75	3000	20000	160	210		5300	35000	290	370	
PJ	1968	11.5	2000		59	75		4800		140	180	
PJ	1963	12.5	2100	14000	86	110		5300	36000	220	280	
PJ	1955	15.5	2400	16000	230	300		5300	36000	520	660	
Oldman	2003.5	0.25	14000	262000	770	170		28000	533000	1600	340	
Oldman	1997	1.25	19000	373000	800	180		36000	727000	1600	340	
Oldman	1987	2.25	33000	606000	850	190		63000	1173000	1600	360	
Oldman	1980.5	2.75	24000	473000	550	120		47000	923000	1100	230	
Oldman	1973	3.25	28000	594000	590	130		53000	1128000	1100	250	
Oldman	1963.5	3.75	23000	506000	410	89		43000	964000	770	170	
Oldman	1952	4.25	23000	534000	360	79		42000	996000	670	150	
Oldman	1906.5	6.25	9800	287000	180	40		15000	438000	280	61	
Snyder	2004	0.25	57000	434000	1200	880		157000	1189000	3300	2400	
Snyder	2000	1.25	58000	477000	1100	770		154000	1252000	2800	2000	
Snyder	1991.5	2.75	79000	714000	1200	900		198000	1784000	3100	2200	

Snyder	1985	3.75	100000	960000	1500	1100		241000	2324000	3600	2600	b
Snyder	1978	4.75	110000	1127000	1500	1100		257000	2617000	3600	2600	b
Snyder	1967.5	5.75	178000	1906000	2300	1700	b	388000	4152000	5000	3700	b
Snyder	1954.5	6.75	100000	992000	1100	800		220000	2186000	2400	1800	
Snyder	1893	11.75	12000	134000	94	69		27000	304000	210	160	

Site	Average Year (y)	Average Depth (cm)	B[a]P pg/g dw	B[a]P pg/g TOC	B[a]P Flux pg/cm2.y	B[a]P Flux (FF) pg/cm2.y	B[a]P FLAG	I[1,2,3-cd]p pg/g dw	I[1,2,3-cd]p pg/g TOC	I[1,2,3-cd]p Flux pg/cm2.y	I[1,2,3-cd]p Flux (FF) pg/cm2.y	I[1,2,3-cd]p FLAG
Mills	2002	0.25	9700	61000	280	190		36000	224000	1000	700	
Mills	2000	0.75	8800	62000	260	170		30000	214000	880	600	
Mills	1996	1.75	8500	58000	240	160		25000	171000	710	480	
Mills	1990.5	2.75	9500	73000	220	150		30000	233000	720	480	
Mills	1987.5	3.25	9700	80000	190	130		30000	248000	600	410	
Mills	1974	4.75	14000	129000	260	180		38000	350000	710	480	
Mills	1970	5.25	11000	96000	240	160		30000	275000	700	470	
Mills	1963.5	6.25	12000	95000	370	250		38000	314000	1200	830	
Mills	1953.5	7.75	18000	157000	540	370		-200	-1800	-6.1	-4.1	
Mills	1947	8.75	20000	178000	500	340		-200	-1800	-5.1	-3.4	d
Mills	1937.5	9.75	18000	165000	390	270		49000	453000	1100	730	
Mills	1905	17.5	1700	14000	38	26		-75	-610	-1.6	-1.1	
Lone Pine	2001	0.25	7600	540	110	61		-260	-19	-3.9	-2.1	
Lone Pine	1997.5	0.75	6000	460	96	51		23000	1800	370	200	
Lone Pine	1990	1.75	10000	870	170	92		-260	-22	-4.4	-2.4	
Lone Pine	1986	2.25	7000	580	120	64		23000	1900	390	210	
Lone Pine	1982	2.75	10000	730	170	93		12000	880	210	110	
Lone Pine	1972.5	3.75	14000	980	200	110		41000	2900	610	320	
Lone Pine	1967	4.25	15000	1100	230	120		46000	3300	690	370	
Lone Pine	1961	4.75	14000	1200	190	100		46000	4000	640	340	
Lone Pine	1955	5.25	15000	1300	190	100		28000	2500	360	200	
Lone Pine	1949	5.75	29000	2600	380	200		52000	4600	680	360	
Lone Pine	1936	6.75	19000	1700	230	120		66000	5900	800	430	
Lone Pine	1920	7.75	20000	1900	240	130		61000	5700	740	390	

Lone Pine	1870	11.5	-6.3	-0.56	-0.076	-0.04		-85	-7.5	-1	-0.55	
Pear	2002	0.25	-53	-350	-0.64	-0.29		-720	-4700	-8.6	-3.9	c
Pear	2000	0.75	2900	21000	35	16						Z
Pear	1997	1.25	2800	19000	33	15						Z
Pear	1991	2.25	4600	34000	55	25						Z
Pear	1980	3.75	3900	26000	43	19						Z
Pear	1969	5.25	7700	58000	84	38						Z
Pear	1961	6.25	5300	39000	75	34						Z
Pear	1957	6.75	3000	26000	42	19						Z
Pear	1926	10.5	3600	32000	29	13		21000	181000	160	74	c
Pear	1872	14.5	-11	-99	-0.067	-0.03		-150	-1300	-0.9	-0.41	c
Emerald	2002	0.25	2600	29000	120	32		-280	-3100	-13	-3.4	d
Emerald	1997	1.75	1600	18000	72	19		-170	-1900	-8	-2.1	d
Emerald	1989	3.75	1300	13000	59	16		-160	-1700	-7.4	-2	
Emerald	1980	5.75	2200	23000	100	27		-180	-1900	-8.4	-2.2	d
Emerald	1971.5	7.75	2000	24000	93	25		-190	-2200	-8.8	-2.4	d
Emerald	1961.5	9.75	1600	16000	76	20		-130	-1300	-6.1	-1.6	
Emerald	1958	10.5	1500	18000	67	18		-62	-780	-2.8	-0.76	
Emerald	1892	21.5	-2.8	-34	-0.16	-0.043		-38	-460	-2.2	-0.58	
Burial	2000	0.25	-0.63	-950	-0.003	-0.003		-8.5	-13000	-0.034	-0.039	
Burial	1988	0.75	-0.46	-780	-0.002	-0.002		35	59000	0.14	0.16	
Burial	1974	1.25	-0.64	-1100	-0.003	-0.003		42	72000	0.19	0.22	
Burial	1957	1.75	-0.5	-930	-0.002	-0.002		40	75000	0.13	0.15	
Burial	1933	2.25	-0.52	-1000	-0.002	-0.002		38	74000	0.12	0.13	
Burial	1906	2.75	-0.53	-1000	-0.002	-0.002		36	70000	0.11	0.13	
Burial	1879	3.25	-0.45	-850	-0.001	-0.002		31	59000	0.096	0.11	
Mcleod	2002	0.25	-99	-810	-0.5	-0.19		-1300	-11000	-6.8	-2.6	
Mcleod	1997	0.75	-44	-390	-0.25	-0.096		-600	-5300	-3.4	-1.3	
Mcleod	1990	1.25	-28	-290	-0.18	-0.069		-380	-3900	-2.4	-0.94	
Mcleod	1982	1.75	-25	-270	-0.2	-0.078		-340	-3700	-2.8	-1.1	
Mcleod	1975	2.25	-26	-280	-0.27	-0.1		-350	-3800	-3.6	-1.4	
Mcleod	1969	2.75	-23	-250	-0.25	-0.098		-310	-3400	-3.4	-1.3	

Mcleod	1962	3.25	-22	-230	-0.18	-0.068		-290	-3100	-2.4	-0.92	
Mcleod	1952	3.75	-23	-250	-0.14	-0.056		-310	-3400	-2	-0.75	
Mcleod	1907	6.25	-29	-270	-0.17	-0.064		-400	-3700	-2.3	-0.87	
Matcharak	2001	0.25	-79		-0.33	-0.26		-1100		-4.4	-3.5	
Matcharak	1993	0.75	-51	-400	-0.23	-0.18		-680	-5400	-3.1	-2.5	
Matcharak	1983	1.25	-41	-340	-0.18	-0.14		-560	-4500	-2.4	-1.9	
Matcharak	1971	1.75	-40	-340	-0.13	-0.11		-550	-4700	-1.8	-1.4	
Matcharak	1954	2.25	-37	-330	-0.094	-0.075		-510	-4500	-1.3	-1	
Matcharak	1937	2.75	-36	-330	-0.075	-0.06		-480	-4500	-1	-0.81	
Matcharak	1910	3.25	-31	-300	-0.062	-0.05		-420	-4100	-0.84	-0.67	
Wonder	2000	0.25	-24	-340	-0.18	-0.051		-330	-4500	-2.4	-0.69	
Wonder	1992	0.75	-29	-400	-0.22	-0.062		-390	-5400	-2.9	-0.84	
Wonder	1985	1.25	-22	-340	-0.16	-0.046		-300	-4600	-2.1	-0.62	
Wonder	1977	1.75	-20	-340	-0.14	-0.039		-280	-4600	-1.8	-0.52	
Wonder	1968	2.25	-23	-390	-0.11	-0.031		-310	-5200	-1.5	-0.42	
Wonder	1949	2.75	-28	-470	-0.091	-0.026		-380	-6400	-1.2	-0.35	
Wonder	1919	3.25	-16	-300	-0.037	-0.011		-220	-4100	-0.5	-0.14	
Golden	2002.5	0.25	23000		31	31		-1700		-2.3	-2.3	
Golden	1996.5	0.75	43000		130	130		78000		240	240	
Golden	1989.5	1.25	24000	141000	89	89		80000	472000	300	300	
Golden	1981.5	1.75	39000	228000	140	140		171000	1011000	620	620	d
Golden	1972.5	2.25	121000	502000	360	360		317000	1318000	930	930	
Golden	1962.5	2.75	247000	1027000	600	600		687000	2860000	1700	1700	b,d
Golden	1951	3.25	344000	1350000	740	740		634000	2484000	1400	1400	b,d
Golden	1924	4.25	486000	1895000	830	830	b	1052000	4101000	1800	1800	b
LP 19	2004	0.25	17000	95000	190	130		64000	350000	710	470	
LP 19	1999	1.25	24000		230	150		-750		-7.2	-4.8	
LP 19	1994	2.25	33000	177000	360	240		93000	505000	1000	680	
LP 19	1989	3.25	53000	288000	450	300		133000	726000	1100	750	
LP 19	1980	4.25	51000	279000	310	210		141000	766000	850	570	
LP 19	1969	5.25	55000	302000	290	190		132000	727000	690	460	
LP 19	1956	6.25	74000	394000	310	200		188000	1006000	780	520	

LP 19	1903	10.5	18000	106000	110	75		49000	284000	300	200	
Hoh	2004	0.25	-34	-170	-0.44	-0.14		-460	-2300	-6	-1.9	
Hoh	1998	1.25	-55	-300	-0.5	-0.16		-750	-4100	-6.7	-2.2	
Hoh	1990.5	2.25	-40	-280	-0.44	-0.14		-540	-3800	-6	-1.9	
Hoh	1983	3.25	2700	26000	39	13	e	-350	-3300	-5	-1.6	d
Hoh	1973.5	4.25	2600	29000	39	13	e	-300	-3300	-4.5	-1.5	
Hoh	1963	5.25	3500	34000	47	15	e	-310	-3000	-4.1	-1.3	
Hoh	1952.5	6.25	3000	34000	58	19	e	-230	-2700	-4.5	-1.5	
Hoh	1901	12.75	2100	25000	43	14		-67	-800	-1.4	-0.45	
PJ	2004.5	0.25	3200	20000	91	120		-1100	-6800	-30	-39	
PJ	1999	2.75	3000	19000	82	100		-620	-3800	-17	-22	
PJ	1992	4.75	3400	21000	82	110		-590	-3600	-14	-18	
PJ	1984	6.75	4200	27000	140	170		-310	-2000	-10	-13	
PJ	1977.5	8.75	3700	24000	200	260		-320	-2100	-18	-23	
PJ	1968	11.5	4000		120	150		-120		-3.6	-4.6	
PJ	1963	12.5	4400	30000	180	230		-120	-820	-4.9	-6.3	
PJ	1955	15.5	4300	29000	410	530		12000	84000	1200	1500	
Oldman	2003.5	0.25	14000	264000	770	170		23000	440000	1300	280	
Oldman	1997	1.25	20000	396000	850	190		-150	-3000	-6.5	-1.4	
Oldman	1987	2.25	38000	697000	980	210		-140	-2600	-3.6	-0.79	
Oldman	1980.5	2.75	26000	512000	590	130		-130	-2400	-2.8	-0.62	
Oldman	1973	3.25	30000	633000	630	140		-110	-2400	-2.3	-0.51	d
Oldman	1963.5	3.75	26000	574000	460	100		-120	-2700	-2.2	-0.47	d
Oldman	1952	4.25	25000	597000	400	88		-100	-2500	-1.7	-0.37	
Oldman	1906.5	6.25	13000	375000	240	52		29000	857000	540	120	
Snyder	2004	0.25	71000	537000	1500	1100		98000	745000	2100	1500	
Snyder	2000	1.25	72000	583000	1300	940		97000	787000	1700	1300	
Snyder	1991.5	2.75	91000	817000	1400	1000		124000	1119000	1900	1400	
Snyder	1985	3.75	102000	978000	1500	1100		142000	1363000	2100	1600	
Snyder	1978	4.75	104000	1059000	1500	1100		144000	1465000	2000	1500	
Snyder	1967.5	5.75	160000	1718000	2100	1500		118000	1260000	1500	1100	
Snyder	1954.5	6.75	87000	867000	960	700		117000	1167000	1300	940	

Snyder	1893	11.75	13000	144000	100	73		26000	296000	210	150	

Site	Average Year (y)	Average Depth (cm)	D[ah]A pg/g dw	D[ah]A pg/g TOC	D[ah]A Flux pg/cm2.y	D[ah]A Flux (FF) pg/cm2.y	D[ah]A FLAG	B[ghi]P pg/g dw	B[ghi]P pg/g TOC	B[ghi]P Flux pg/cm2.y	B[ghi]P Flux (FF) pg/cm2.y	B[ghi]P FLAG
Mills	2002	0.25	4300	27000	120	84		24000	151000	700	470	
Mills	2000	0.75	4000	28000	120	78		31000	221000	910	610	
Mills	1996	1.75	2300	16000	65	44		18000	120000	500	330	
Mills	1990.5	2.75	3300	25000	78	53		10000	77000	240	160	
Mills	1987.5	3.25	2400	20000	49	33		23000	191000	460	310	
Mills	1974	4.75	4000	36000	73	50		18000	169000	340	230	
Mills	1970	5.25	2400	22000	56	38		20000	184000	470	320	
Mills	1963.5	6.25	3800	32000	120	83		26000	217000	850	570	
Mills	1953.5	7.75	-160	-1400	-5	-3.4		-35	-310	-1.1	-0.72	
Mills	1947	8.75	-170	-1500	-4.2	-2.8	d	-36	-310	-0.89	-0.6	d
Mills	1937.5	9.75	5100	47000	110	76		41000	380000	910	620	
Mills	1905	17.5	-61	-500	-1.3	-0.91		-13	-110	-0.29	-0.19	
Lone Pine	2001	0.25	-210	-15	-3.2	-1.7		-46	-3.3	-0.69	-0.37	
Lone Pine	1997.5	0.75	2800	220	45	24		-41	-3.2	-0.66	-0.35	
Lone Pine	1990	1.75	-210	-18	-3.6	-1.9		-46	-3.9	-0.78	-0.42	
Lone Pine	1986	2.25	2200	180	38	20		19000	1600	330	180	
Lone Pine	1982	2.75	-220	-16	-3.7	-2		31000	2200	530	280	
Lone Pine	1972.5	3.75	4400	310	65	35		38000	2700	570	310	
Lone Pine	1967	4.25	5000	360	76	40		43000	3100	650	350	
Lone Pine	1961	4.75	5100	450	72	38		47000	4200	660	360	
Lone Pine	1955	5.25	2700	240	36	19		30000	2600	390	210	
Lone Pine	1949	5.75	5100	450	66	35		56000	4900	720	390	
Lone Pine	1936	6.75	6900	610	82	44		-45	-4	-0.54	-0.29	
Lone Pine	1920	7.75	-170	-15	-2	-1.1		57000	5200	680	360	
Lone Pine	1870	11.5	-70	-6.2	-0.83	-0.45		7600	670	91	49	
Pear	2002	0.25	-590	-3800	-7.1	-3.2	c	-130	-820	-1.5	-0.68	
Pear	2000	0.75					Z					Z
Pear	1997	1.25					Z					Z

Pear	1991	2.25					Z					Z
Pear	1980	3.75					Z					Z
Pear	1969	5.25					Z					Z
Pear	1961	6.25					Z					Z
Pear	1957	6.75					Z					Z
Pear	1926	10.5	-260	-2300	-2.1	-0.94	c	13000	113000	100	46	
Pear	1872	14.5	-120	-1100	-0.74	-0.33	c	-26	-230	-0.16	-0.071	
Emerald	2002	0.25	-230	-2600	-10	-2.8	d	-48	-550	-2.2	-0.6	d
Emerald	1997	1.75	-140	-1600	-6.5	-1.8	d	-30	-340	-1.4	-0.38	d
Emerald	1989	3.75	-130	-1400	-6	-1.6		-28	-290	-1.3	-0.35	
Emerald	1980	5.75	-150	-1600	-6.8	-1.8	d	-32	-340	-1.5	-0.39	d
Emerald	1971.5	7.75	-160	-1800	-7.2	-1.9	d	-34	-390	-1.5	-0.41	d
Emerald	1961.5	9.75	-110	-1100	-5	-1.3		-23	-230	-1.1	-0.29	
Emerald	1958	10.5	-50	-640	-2.3	-0.62		-11	-140	-0.5	-0.13	
Emerald	1892	21.5	-31	-370	-1.8	-0.48		-6.7	-80	-0.38	-0.1	
Burial	2000	0.25	17	26000	0.069	0.078		43	64000	0.17	0.19	
Burial	1988	0.75	22	37000	0.09	0.1		93	156000	0.38	0.43	
Burial	1974	1.25	29	50000	0.13	0.15		110	195000	0.52	0.59	
Burial	1957	1.75	30	55000	0.098	0.11		140	261000	0.46	0.53	
Burial	1933	2.25	27	53000	0.083	0.095		81	159000	0.25	0.28	
Burial	1906	2.75	28	55000	0.088	0.1		130	254000	0.4	0.46	
Burial	1879	3.25	22	43000	0.069	0.079		120	228000	0.37	0.42	
Mcleod	2002	0.25	-1100	-9000	-5.6	-2.1		-230	-1900	-1.2	-0.46	
Mcleod	1997	0.75	-490	-4300	-2.7	-1.1		-110	-920	-0.59	-0.23	
Mcleod	1990	1.25	-310	-3100	-2	-0.77		-67	-670	-0.43	-0.16	
Mcleod	1982	1.75	-280	-3000	-2.2	-0.86		-59	-640	-0.48	-0.19	
Mcleod	1975	2.25	-280	-3100	-2.9	-1.1		-61	-670	-0.63	-0.24	
Mcleod	1969	2.75	-250	-2800	-2.8	-1.1		-54	-600	-0.6	-0.23	
Mcleod	1962	3.25	-240	-2500	-1.9	-0.75		-51	-550	-0.42	-0.16	
Mcleod	1952	3.75	-250	-2800	-1.6	-0.62		-54	-600	-0.34	-0.13	
Mcleod	1907	6.25	-320	-3000	-1.8	-0.71		-70	-640	-0.4	-0.15	
Matcharak	2001	0.25	-880		-3.6	-2.9		-190		-0.77	-0.62	

Matcharak	1993	0.75	-560	-4400	-2.5	-2		-120	-940	-0.54	-0.43	
Matcharak	1983	1.25	-450	-3700	-2	-1.6		-97	-790	-0.42	-0.33	
Matcharak	1971	1.75	-450	-3800	-1.5	-1.2		-96	-820	-0.32	-0.25	
Matcharak	1954	2.25	-410	-3700	-1	-0.83		-89	-790	-0.22	-0.18	
Matcharak	1937	2.75	-390	-3700	-0.82	-0.66		-84	-790	-0.18	-0.14	
Matcharak	1910	3.25	-340	-3400	-0.69	-0.55		-74	-720	-0.15	-0.12	
Wonder	2000	0.25	-270	-3700	-2	-0.56		-57	-790	-0.42	-0.12	
Wonder	1992	0.75	-320	-4400	-2.4	-0.68		-68	-950	-0.51	-0.15	
Wonder	1985	1.25	-240	-3800	-1.8	-0.5		-52	-810	-0.38	-0.11	
Wonder	1977	1.75	-230	-3800	-1.5	-0.43		-49	-810	-0.32	-0.092	
Wonder	1968	2.25	-260	-4300	-1.2	-0.35		-55	-910	-0.26	-0.074	
Wonder	1949	2.75	-310	-5200	-1	-0.29		-67	-1100	-0.21	-0.061	
Wonder	1919	3.25	-180	-3300	-0.41	-0.12		-38	-720	-0.087	-0.025	
Golden	2002.5	0.25	-1400		-1.9	-1.9		-300		-0.41	-0.41	
Golden	1996.5	0.75	-950		-3	-3		-200		-0.63	-0.63	
Golden	1989.5	1.25	-550	-3200	-2.1	-2.1		-120	-690	-0.44	-0.44	
Golden	1981.5	1.75	-660	-3900	-2.4	-2.4	d	-140	-830	-0.51	-0.51	d
Golden	1972.5	2.25	-630	-2600	-1.8	-1.8		-130	-560	-0.4	-0.4	
Golden	1962.5	2.75	-700	-2900	-1.7	-1.7	d	617000	2568000	1500	1500	b,d
Golden	1951	3.25	-660	-2600	-1.4	-1.4	d	-140	-550	-0.3	-0.3	d
Golden	1924	4.25	-620	-2400	-1.1	-1.1		1849000	7208000	3100	3100	b
LP 19	2004	0.25	-1100	-6200	-13	-8.4		-240	-1300	-2.7	-1.8	
LP 19	1999	1.25	-620		-5.9	-3.9		205000		1900	1300	
LP 19	1994	2.25	-490	-2700	-5.4	-3.6		-100	-570	-1.1	-0.76	
LP 19	1989	3.25	-560	-3100	-4.8	-3.2		-120	-660	-1	-0.68	
LP 19	1980	4.25	-560	-3000	-3.4	-2.3		-120	-650	-0.72	-0.48	
LP 19	1969	5.25	-510	-2800	-2.7	-1.8		-110	-600	-0.57	-0.38	
LP 19	1956	6.25	-490	-2600	-2	-1.4		-110	-560	-0.44	-0.29	
LP 19	1903	10.5	-270	-1600	-1.7	-1.1		-59	-340	-0.36	-0.24	
Hoh	2004	0.25	-380	-1800	-4.9	-1.6		-81	-400	-1	-0.34	
Hoh	1998	1.25	-610	-3300	-5.5	-1.8		-130	-710	-1.2	-0.38	
Hoh	1990.5	2.25	-440	-3100	-4.9	-1.6		-95	-670	-1	-0.34	

Site	Average Year (y)	Average Depth (cm)	BDE #10 pg/g dw	BDE #10 pg/g TOC	BDE #10 Flux pg/cm2.y	BDE #10 Flux (FF)	BDE #10 FLAG	BDE #7 pg/g dw	BDE #7 pg/g TOC	BDE #7 Flux pg/cm2.y	BDE #7 Flux (FF)	BDE #7 FLAG
Hoh	1983	3.25	-280	-2700	-4.1	-1.3	d	-61	-580	-0.88	-0.28	d
Hoh	1973.5	4.25	-250	-2700	-3.7	-1.2		-53	-590	-0.79	-0.26	
Hoh	1963	5.25	-250	-2500	-3.4	-1.1		-54	-530	-0.72	-0.23	
Hoh	1952.5	6.25	-190	-2200	-3.7	-1.2		-41	-470	-0.79	-0.25	
Hoh	1901	12.75	-55	-660	-1.1	-0.37		-12	-140	-0.25	-0.079	
PJ	2004.5	0.25	-890	-5500	-25	-32		-190	-1200	-5.3	-6.8	
PJ	1999	2.75	-510	-3100	-14	-18		-110	-670	-2.9	-3.8	
PJ	1992	4.75	-480	-3000	-12	-15		-100	-630	-2.5	-3.2	
PJ	1984	6.75	-250	-1700	-8.2	-11		-54	-350	-1.8	-2.3	
PJ	1977.5	8.75	-260	-1800	-14	-18		-57	-380	-3.1	-4	
PJ	1968	11.5	-100		-2.9	-3.7		-21		-0.62	-0.8	
PJ	1963	12.5	-97	-670	-4	-5.1		-21	-140	-0.86	-1.1	
PJ	1955	15.5	-79	-540	-7.7	-9.9		-17	-110	-1.7	-2.1	
Oldman	2003.5	0.25	3000	57000	170	37		22000	422000	1200	270	
Oldman	1997	1.25	-120	-2500	-5.3	-1.2		-26	-530	-1.1	-0.25	
Oldman	1987	2.25	-110	-2100	-2.9	-0.65		-24	-450	-0.63	-0.14	
Oldman	1980.5	2.75	-100	-2000	-2.3	-0.51		-22	-430	-0.49	-0.11	
Oldman	1973	3.25	-91	-1900	-1.9	-0.42	d	-19	-410	-0.41	-0.09	d
Oldman	1963.5	3.75	-98	-2200	-1.8	-0.39	d	-21	-470	-0.38	-0.083	d
Oldman	1952	4.25	-85	-2000	-1.4	-0.3		-18	-430	-0.29	-0.064	
Oldman	1906.5	6.25	2700	78000	49	11		30000	881000	560	120	
Snyder	2004	0.25	17000	127000	350	260		99000	750000	2100	1500	
Snyder	2000	1.25	17000	135000	300	220		100000	811000	1800	1300	
Snyder	1991.5	2.75	21000	187000	320	240		118000	1066000	1800	1300	
Snyder	1985	3.75	24000	231000	360	260		138000	1331000	2100	1500	
Snyder	1978	4.75	23000	238000	330	240		146000	1494000	2100	1500	
Snyder	1967.5	5.75	35000	380000	460	340		203000	2176000	2600	1900	b
Snyder	1954.5	6.75	20000	194000	210	160		127000	1264000	1400	1000	
Snyder	1893	11.75	-120	-1400	-0.96	-0.7		21000	243000	170	120	

						pg/cm2.y					pg/cm2.y	
Mills	2002	0.25	-0.024	-0.15	-0.001	-0.00046	c	-0.16	-1	-0.005	-0.003	
Mills	2000	0.75	-0.024	-0.17	-0.001	-0.00046	c	-0.16	-1.2	-0.005	-0.003	
Mills	1991	2.75	-0.024	-0.18	-0.001	-0.00038	c	-0.16	-1.3	-0.004	-0.003	
Mills	1974	4.75	-0.024	-0.22	-0.00045	-0.0003	c	-0.16	-1.5	-0.003	-0.002	
Mills	1964	6.25	-0.024	-0.19	-0.001	-0.001		-0.16	-1.3	-0.005	-0.004	
Mills	1947	8.75	-0.024	-0.21	-0.001	-0.0004		-0.16	-1.4	-0.004	-0.003	
Mills	1905	17.5	-0.024	-0.19	-0.001	-0.00035	d	-0.16	-1.3	-0.004	-0.002	d
Lone Pine	2001	0.25	-0.024	-0.17	-0.00035	-0.00024	c	-0.16	-1.2	-0.002	-0.002	
Lone Pine	1998	0.75	-0.024	-0.18	-0.00035	-0.00024	c	-0.16	-1.3	-0.002	-0.002	
Lone Pine	1990	1.75	-0.024	-0.2	-0.0004	-0.00027	c	-0.16	-1.4	-0.003	-0.002	
Lone Pine	1982	2.75	-0.024	-0.19	-0.0004	-0.00027	c	-0.16	-1.3	-0.003	-0.002	
Lone Pine	1961	4.75	-0.024	-0.21	-0.00033	-0.00022		-0.16	-1.4	-0.002	-0.002	
Lone Pine	1936	6.75	-0.024	-0.21	-0.00028	-0.00019		-0.16	-1.5	-0.002	-0.001	
Lone Pine	1920	7.75	-0.024	-0.22	-0.00028	-0.00019		-0.16	-1.5	-0.002	-0.001	
Lone Pine	1870	11.5	-0.024	-0.21	-0.00028	-0.00019		-0.16	-1.4	-0.002	-0.001	
Emerald	2002	0.25	-0.024	-0.27	-0.001	-0.00029		-0.16	-1.9	-0.008	-0.002	
Emerald	1997	1.75	-0.024	-0.26	-0.001	-0.00029		-0.16	-1.8	-0.008	-0.002	
Emerald	1989	3.75	-0.024	-0.25	-0.001	-0.00029		-0.16	-1.7	-0.008	-0.002	
Emerald	1980	5.75	-0.024	-0.25	-0.001	-0.00029		-0.16	-1.8	-0.008	-0.002	
Emerald	1971.5	7.75	-0.024	-0.27	-0.001	-0.00029		-0.16	-1.9	-0.008	-0.002	
Emerald	1961.5	9.75	-0.024	-0.23	-0.001	-0.00029		-0.16	-1.6	-0.008	-0.002	
Emerald	1958	10.5	-0.024	-0.3	-0.001	-0.00029		-0.16	-2.1	-0.008	-0.002	
Emerald	1892	21.5	-0.024	-0.28	-0.001	-0.00036		-0.16	-2	-0.009	-0.003	
Burial	2000	0.25	-0.024	-0.36	-9.5E-05	-0.00011	c	-0.16	-2.5	-0.001	-0.001	
Burial	1988	0.75	-0.024	-0.4	-9.7E-05	-0.00011	c	-0.16	-2.8	-0.001	-0.001	
Burial	1974	1.25	-0.024	-0.41	-0.00011	-0.00012	c	-0.16	-2.8	-0.001	-0.001	
Burial	1957	1.75	-0.024	-0.44	-7.8E-05	-8.9E-05	c	-0.16	-3	-0.001	-0.001	
Burial	1933	2.25	-0.024	-0.47	-7.3E-05	-8.3E-05	c	-0.16	-3.2	-0.001	-0.001	
Burial	1906	2.75	-0.024	-0.46	-7.3E-05	-8.3E-05	c	-0.16	-3.2	-0.001	-0.001	
Burial	1879	3.25	-0.024	-0.45	-7.3E-05	-8.3E-05	c	-0.16	-3.1	-0.001	-0.001	
Mcleod	2002	0.25	-0.024	-0.19	-0.00012	-4.6E-05		-0.16	-1.4	-0.001	-0.00032	

Mcleod	1997	0.75	-0.024	-0.21	-0.00013	-5.1E-05		-0.16	-1.4	-0.001	-0.00035	
Mcleod	1990	1.25	-0.024	-0.24	-0.00015	-5.8E-05		-0.16	-1.7	-0.001	-0.0004	
Mcleod	1982	1.75	-0.024	-0.26	-0.00019	-7.4E-05		-0.16	-1.8	-0.001	-0.001	
Mcleod	1975	2.25	-0.024	-0.26	-0.00025	-9.5E-05		-0.16	-1.8	-0.002	-0.001	
Mcleod	1969	2.75	-0.024	-0.26	-0.00026	-0.0001		-0.16	-1.8	-0.002	-0.001	
Mcleod	1962	3.25	-0.024	-0.25	-0.00019	-7.4E-05		-0.16	-1.7	-0.001	-0.001	
Mcleod	1952	3.75	-0.024	-0.26	-0.00015	-5.7E-05		-0.16	-1.8	-0.001	-0.0004	
Mcleod	1907	6.25	-0.024	-0.22	-0.00013	-5.2E-05		-0.16	-1.5	-0.001	-0.00036	
Matcharak	2001	0.25	-0.024		-9.7E-05	-7.8E-05		-0.16		-0.001	-0.001	
Matcharak	1993	0.75	-0.024	-0.19	-0.00011	-8.5E-05		-0.16	-1.3	-0.001	-0.001	
Matcharak	1983	1.25	-0.024	-0.19	-0.0001	-8.1E-05		-0.16	-1.3	-0.001	-0.001	
Matcharak	1971	1.75	-0.024	-0.2	-7.8E-05	-6.2E-05		-0.16	-1.4	-0.001	-0.00043	
Matcharak	1954	2.25	-0.024	-0.21	-5.9E-05	-4.7E-05		-0.16	-1.5	-0.00041	-0.00033	
Matcharak	1937	2.75	-0.024	-0.22	-5E-05	-4E-05		-0.16	-1.5	-0.00034	-0.00028	
Matcharak	1910	3.25	-0.024	-0.23	-4.7E-05	-3.8E-05	d	-0.16	-1.6	-0.00033	-0.00026	d
Wonder	2000	0.25	-0.024	-0.33	-0.00018	-5E-05		-0.16	-2.3	-0.001	-0.00035	
Wonder	1992	0.75	-0.024	-0.33	-0.00018	-5.1E-05		-0.16	-2.3	-0.001	-0.00035	
Wonder	1985	1.25	-0.024	-0.37	-0.00017	-4.9E-05		-0.16	-2.6	-0.001	-0.00034	
Wonder	1977	1.75	-0.024	-0.4	-0.00016	-4.5E-05		-0.16	-2.8	-0.001	-0.00031	
Wonder	1968	2.25	-0.024	-0.39	-0.00011	-3.2E-05		-0.16	-2.7	-0.001	-0.00022	
Wonder	1949	2.75	-0.024	-0.39	-7.6E-05	-2.2E-05		-0.16	-2.7	-0.001	-0.00015	
Wonder	1919	3.25	-0.024	-0.45	-5.4E-05	-1.6E-05		-0.16	-3.1	-0.00038	-0.00011	
Golden	2002.5	0.25	-0.024		-3.2E-05	-3.2E-05	c	-0.16		-0.00022	-0.00022	
Golden	1996.5	0.75	-0.024		-7.3E-05	-7.3E-05	c	-0.16		-0.001	-0.001	
Golden	1989.5	1.25	-0.024	-0.14	-8.9E-05	-8.9E-05	c	-0.16	-0.97	-0.001	-0.001	
Golden	1981.5	1.75	-0.024	-0.14	-8.5E-05	-8.5E-05	c	-0.16	-0.97	-0.001	-0.001	
Golden	1972.5	2.25	-0.024	-0.098	-7E-05	-7E-05	c	-0.16	-0.68	-0.00048	-0.00048	
Golden	1962.5	2.75	-0.024	-0.098	-5.8E-05	-5.8E-05	c	-0.16	-0.68	-0.0004	-0.0004	
Golden	1951	3.25	-0.024	-0.093	-5.1E-05	-5.1E-05	c	-0.16	-0.64	-0.00035	-0.00035	
Golden	1924	4.25	-0.024	-0.092	-4E-05	-4E-05	c	-0.16	-0.64	-0.00028	-0.00028	
LP 19	2004	0.25	-0.024	-0.13	-0.00026	-0.00017		-0.16	-0.89	-0.002	-0.001	
LP 19	1999	1.25	-0.024		-0.00022	-0.00015		-0.16		-0.002	-0.001	

LP 19	1994	2.25	-0.024	-0.13	-0.00026	-0.00017		-0.16	-0.89	-0.002	-0.001	
LP 19	1989	3.25	-0.024	-0.13	-0.0002	-0.00013		-0.16	-0.9	-0.001	-0.001	
LP 19	1980	4.25	-0.024	-0.13	-0.00014	-9.5E-05		-0.16	-0.89	-0.001	-0.001	
LP 19	1969	5.25	-0.024	-0.13	-0.00012	-8.2E-05		-0.16	-0.9	-0.001	-0.001	
LP 19	1956	6.25	-0.024	-0.13	-9.8E-05	-6.5E-05		-0.16	-0.88	-0.001	-0.00045	
LP 19	1903	10.5	-0.024	-0.14	-0.00015	-9.8E-05		-0.16	-0.96	-0.001	-0.001	
Hoh	2004	0.25	-0.024	-0.12	-0.00031	-9.9E-05	c,d	-0.16	-0.81	-0.002	-0.001	d
Hoh	1998	1.25	-0.024	-0.13	-0.00021	-6.9E-05	c	-0.16	-0.89	-0.001	-0.00048	
Hoh	1990.5	2.25	-0.024	-0.17	-0.00026	-8.4E-05	c	-0.16	-1.2	-0.002	-0.001	
Hoh	1983	3.25	-0.024	-0.23	-0.00034	-0.00011	c,d	-0.16	-1.6	-0.002	-0.001	d
Hoh	1973.5	4.25	-0.024	-0.26	-0.00035	-0.00011	c	-0.16	-1.8	-0.002	-0.001	
Hoh	1963	5.25	-0.024	-0.23	-0.00032	-0.0001	c	-0.16	-1.6	-0.002	-0.001	
Hoh	1952.5	6.25	-0.024	-0.27	-0.00046	-0.00015	c	-0.16	-1.9	-0.003	-0.001	
Hoh	1901	12.75	-0.024	-0.28	-0.0005	-0.00016	c	-0.16	-2	-0.003	-0.001	
PJ	2004.5	0.25	-0.024	-0.15	-0.001	-0.00085	c	-0.16	-1	-0.005	-0.006	
PJ	1999	2.75	-0.024	-0.15	-0.001	-0.00082	c	-0.16	-1	-0.004	-0.006	
PJ	1992	4.75	-0.024	-0.15	-0.001	-0.00074	c	-0.16	-1	-0.004	-0.005	
PJ	1984	6.75	-0.024	-0.15	-0.001	-0.00099	c	-0.16	-1.1	-0.005	-0.007	
PJ	1977.5	8.75	-0.024	-0.16	-0.001	-0.00165	c	-0.16	-1.1	-0.009	-0.011	
PJ	1968	11.5	-0.024		-0.001	-0.00088	c	-0.16		-0.005	-0.006	
PJ	1963	12.5	-0.024	-0.16	-0.001	-0.00124	c	-0.16	-1.1	-0.007	-0.009	
PJ	1955	15.5	-0.024	-0.16	-0.002	-0.00294	c	-0.16	-1.1	-0.016	-0.02	
Oldman	2003.5	0.25	-0.024	-0.45	-0.001	-0.00029	c	-0.16	-3.1	-0.009	-0.002	c
Oldman	1997	1.25	-0.024	-0.47	-0.001	-0.00022	c	-0.16	-3.3	-0.007	-0.002	c
Oldman	1987	2.25	-0.024	-0.44	-0.001	-0.00014	c	-0.16	-3.1	-0.004	-0.001	c
Oldman	1980.5	2.75	-0.024	-0.46	-0.001	-0.00012	c	-0.16	-3.2	-0.004	-0.001	c
Oldman	1973	3.25	-0.024	-0.5	-0.0005	-0.00011	c	-0.16	-3.5	-0.003	-0.001	c
Oldman	1963.5	3.75	-0.024	-0.53	-0.00043	-9.4E-05	c	-0.16	-3.7	-0.003	-0.001	c
Oldman	1952	4.25	-0.024	-0.56	-0.00038	-8.3E-05	c	-0.16	-3.9	-0.003	-0.001	c
Oldman	1906.5	6.25	-0.024	-0.69	-0.00044	-9.6E-05	c	-0.16	-4.8	-0.003	-0.001	
Snyder	2004	0.25	-0.024	-0.18	-0.0005	-0.00036	c	-0.16	-1.2	-0.003	-0.003	
Snyder	2000	1.25	-0.024	-0.19	-0.00043	-0.00031	c	-0.16	-1.3	-0.003	-0.002	

Snyder	1991.5	2.75	-0.024	-0.21	-0.00037	-0.00027	c	-0.16	-1.5	-0.003	-0.002	
Snyder	1985	3.75	-0.024	-0.23	-0.00035	-0.00026	c	-0.16	-1.6	-0.002	-0.002	
Snyder	1978	4.75	-0.024	-0.24	-0.00033	-0.00024	c	-0.16	-1.7	-0.002	-0.002	
Snyder	1967.5	5.75	-0.024	-0.25	-0.00031	-0.00022	c	-0.16	-1.8	-0.002	-0.002	
Snyder	1954.5	6.75	-0.024	-0.24	-0.00026	-0.00019	c	-0.16	-1.6	-0.002	-0.001	
Snyder	1893	11.75	-0.024	-0.27	-0.00019	-0.00014	c	-0.16	-1.9	-0.001	-0.001	

Site	Average Year (y)	Average Depth (cm)	BDE #8 pg/g dw	BDE #8 pg/g TOC	BDE #8 Flux pg/cm2.y	BDE #8 Flux (FF) pg/cm2.y	BDE #8 FLAG	BDE #32 pg/g dw	BDE #32 pg/g TOC	BDE #32 Flux pg/cm2.y	BDE #32 Flux (FF) pg/cm2.y	BDE #32 FLAG
Mills	2002	0.25	-0.12	-0.78	-0.004	-0.002		-0.67	-4.2	-0.019	-0.013	
Mills	2000	0.75	-0.12	-0.87	-0.004	-0.002		-0.67	-4.7	-0.019	-0.013	
Mills	1991	2.75	-0.12	-0.95	-0.003	-0.002		-0.67	-5.1	-0.016	-0.011	
Mills	1974	4.75	-0.12	-1.1	-0.002	-0.002		-0.67	-6.1	-0.013	-0.009	
Mills	1964	6.25	-0.12	-1	-0.004	-0.003		-0.67	-5.5	-0.021	-0.014	
Mills	1947	8.75	-0.12	-1.1	-0.003	-0.002		-0.67	-5.9	-0.017	-0.011	
Mills	1905	17.5	-0.12	-1	-0.003	-0.002	d	-0.67	-5.5	-0.015	-0.01	d
Lone Pine	2001	0.25	-0.12	-0.89	-0.002	-0.001		-0.67	-4.8	-0.01	-0.007	
Lone Pine	1998	0.75	-0.12	-0.96	-0.002	-0.001		-0.67	-5.2	-0.01	-0.007	
Lone Pine	1990	1.75	-0.12	-1.1	-0.002	-0.001		-0.67	-5.8	-0.011	-0.008	
Lone Pine	1982	2.75	-0.12	-1	-0.002	-0.001		-0.67	-5.5	-0.011	-0.008	
Lone Pine	1961	4.75	-0.12	-1.1	-0.002	-0.001		-0.67	-5.9	-0.009	-0.006	
Lone Pine	1936	6.75	-0.12	-1.1	-0.001	-0.001		-0.67	-6	-0.008	-0.005	
Lone Pine	1920	7.75	-0.12	-1.1	-0.001	-0.001		-0.67	-6.2	-0.008	-0.005	
Lone Pine	1870	11.5	-0.12	-1.1	-0.001	-0.001		-0.67	-5.8	-0.008	-0.005	
Emerald	2002	0.25	-0.12	-1.4	-0.006	-0.002		-0.67	-7.6	-0.031	-0.008	
Emerald	1997	1.75	-0.12	-1.4	-0.006	-0.002		-0.67	-7.5	-0.031	-0.008	
Emerald	1989	3.75	-0.12	-1.3	-0.006	-0.002		-0.67	-7	-0.031	-0.008	
Emerald	1980	5.75	-0.12	-1.3	-0.006	-0.002		-0.67	-7.2	-0.031	-0.008	
Emerald	1971.5	7.75	-0.12	-1.4	-0.006	-0.002		-0.67	-7.8	-0.031	-0.008	
Emerald	1961.5	9.75	-0.12	-1.2	-0.006	-0.002		-0.67	-6.5	-0.031	-0.008	
Emerald	1958	10.5	-0.12	-1.6	-0.006	-0.002		-0.67	-8.5	-0.031	-0.008	
Emerald	1892	21.5	-0.12	-1.5	-0.007	-0.002		-0.67	-8	-0.038	-0.01	

Burial	2000	0.25	-0.12	-1.9	-0.0005	-0.001		-0.67	-10	-0.003	-0.003	
Burial	1988	0.75	-0.12	-2.1	-0.001	-0.001		-0.67	-11	-0.003	-0.003	
Burial	1974	1.25	-0.12	-2.1	-0.001	-0.001		-0.67	-12	-0.003	-0.004	
Burial	1957	1.75	-0.12	-2.3	-0.00041	-0.00046		-0.67	-12	-0.002	-0.003	
Burial	1933	2.25	-0.12	-2.4	-0.00038	-0.00044		-0.67	-13	-0.002	-0.002	
Burial	1906	2.75	-0.12	-2.4	-0.00038	-0.00044		-0.67	-13	-0.002	-0.002	
Burial	1879	3.25	-0.12	-2.4	-0.00038	-0.00044		-0.67	-13	-0.002	-0.002	
Mcleod	2002	0.25	-0.12	-1	-0.001	-0.00024		-0.67	-5.5	-0.003	-0.001	
Mcleod	1997	0.75	-0.12	-1.1	-0.001	-0.00027		-0.67	-5.9	-0.004	-0.001	
Mcleod	1990	1.25	-0.12	-1.3	-0.001	-0.00031		-0.67	-6.8	-0.004	-0.002	
Mcleod	1982	1.75	-0.12	-1.3	-0.001	-0.00039		-0.67	-7.2	-0.005	-0.002	
Mcleod	1975	2.25	-0.12	-1.4	-0.001	-0.0005		-0.67	-7.4	-0.007	-0.003	
Mcleod	1969	2.75	-0.12	-1.4	-0.001	-0.001		-0.67	-7.5	-0.008	-0.003	
Mcleod	1962	3.25	-0.12	-1.3	-0.001	-0.00039		-0.67	-7.1	-0.005	-0.002	
Mcleod	1952	3.75	-0.12	-1.4	-0.001	-0.0003		-0.67	-7.4	-0.004	-0.002	
Mcleod	1907	6.25	-0.12	-1.1	-0.001	-0.00027		-0.67	-6.2	-0.004	-0.001	
Matcharak	2001	0.25	-0.12		-0.001	-0.00041		-0.67		-0.003	-0.002	
Matcharak	1993	0.75	-0.12	-0.98	-0.001	-0.00045		-0.67	-5.3	-0.003	-0.002	
Matcharak	1983	1.25	-0.12	-1	-0.001	-0.00043		-0.67	-5.5	-0.003	-0.002	
Matcharak	1971	1.75	-0.12	-1.1	-0.00041	-0.00033		-0.67	-5.7	-0.002	-0.002	
Matcharak	1954	2.25	-0.12	-1.1	-0.00031	-0.00025		-0.67	-6	-0.002	-0.001	
Matcharak	1937	2.75	-0.12	-1.2	-0.00026	-0.00021		-0.67	-6.3	-0.001	-0.001	
Matcharak	1910	3.25	-0.12	-1.2	-0.00025	-0.0002	d	-0.67	-6.5	-0.001	-0.001	d
Wonder	2000	0.25	-0.12	-1.7	-0.001	-0.00026		-0.67	-9.3	-0.005	-0.001	
Wonder	1992	0.75	-0.12	-1.7	-0.001	-0.00027		-0.67	-9.3	-0.005	-0.001	
Wonder	1985	1.25	-0.12	-1.9	-0.001	-0.00026		-0.67	-10	-0.005	-0.001	
Wonder	1977	1.75	-0.12	-2.1	-0.001	-0.00023		-0.67	-11	-0.004	-0.001	
Wonder	1968	2.25	-0.12	-2.1	-0.001	-0.00017		-0.67	-11	-0.003	-0.001	
Wonder	1949	2.75	-0.12	-2.1	-0.0004	-0.00011		-0.67	-11	-0.002	-0.001	
Wonder	1919	3.25	-0.12	-2.3	-0.00029	-8.2E-05		-0.67	-13	-0.002	-0.00044	
Golden	2002.5	0.25	-0.12		-0.00017	-0.00017		-0.67		-0.001	-0.001	

Golden	1996.5	0.75	-0.12		-0.00038	-0.00038		-0.67		-0.002	-0.002	
Golden	1989.5	1.25	-0.12	-0.73	-0.00046	-0.00046		-0.67	-4	-0.003	-0.003	
Golden	1981.5	1.75	-0.12	-0.73	-0.00045	-0.00045		-0.67	-4	-0.002	-0.002	
Golden	1972.5	2.25	-0.12	-0.52	-0.00037	-0.00037		-0.67	-2.8	-0.002	-0.002	
Golden	1962.5	2.75	-0.12	-0.52	-0.0003	-0.0003		-0.67	-2.8	-0.002	-0.002	
Golden	1951	3.25	-0.12	-0.49	-0.00027	-0.00027		-0.67	-2.6	-0.001	-0.001	
Golden	1924	4.25	-0.12	-0.48	-0.00021	-0.00021		-0.67	-2.6	-0.001	-0.001	
LP 19	2004	0.25	-0.12	-0.67	-0.001	-0.001		-0.67	-3.6	-0.007	-0.005	
LP 19	1999	1.25	-0.12		-0.001	-0.001		-0.67		-0.006	-0.004	
LP 19	1994	2.25	-0.12	-0.68	-0.001	-0.001		-0.67	-3.6	-0.007	-0.005	
LP 19	1989	3.25	-0.12	-0.68	-0.001	-0.001		-0.67	-3.7	-0.006	-0.004	
LP 19	1980	4.25	-0.12	-0.67	-0.001	-0.001		-0.67	-3.6	-0.004	-0.003	
LP 19	1969	5.25	-0.12	-0.68	-0.001	-0.00043		-0.67	-3.7	-0.003	-0.002	
LP 19	1956	6.25	-0.12	-0.66	-0.001	-0.00034		-0.67	-3.6	-0.003	-0.002	
LP 19	1903	10.5	-0.12	-0.72	-0.001	-0.001		-0.67	-3.9	-0.004	-0.003	
Hoh	2004	0.25	-0.12	-0.61	-0.002	-0.001	c,d	-0.67	-3.3	-0.009	-0.003	d
Hoh	1998	1.25	-0.12	-0.67	-0.001	-0.00036	c	-0.67	-3.6	-0.006	-0.002	
Hoh	1990.5	2.25	-0.12	-0.87	-0.001	-0.00044	c	-0.67	-4.7	-0.007	-0.002	
Hoh	1983	3.25	-0.12	-1.2	-0.002	-0.001	c,d	-0.67	-6.4	-0.01	-0.003	d
Hoh	1973.5	4.25	-0.12	-1.4	-0.002	-0.001	c	-0.67	-7.4	-0.01	-0.003	
Hoh	1963	5.25	-0.12	-1.2	-0.002	-0.001	c	-0.67	-6.6	-0.009	-0.003	
Hoh	1952.5	6.25	-0.12	-1.4	-0.002	-0.001	c	-0.67	-7.7	-0.013	-0.004	
Hoh	1901	12.75	-0.12	-1.5	-0.003	-0.001	c	-0.67	-8.1	-0.014	-0.005	
PJ	2004.5	0.25	-0.12	-0.78	-0.003	-0.004	c	-0.67	-4.2	-0.019	-0.024	
PJ	1999	2.75	-0.12	-0.76	-0.003	-0.004	c	-0.67	-4.1	-0.018	-0.023	
PJ	1992	4.75	-0.12	-0.76	-0.003	-0.004	c	-0.67	-4.1	-0.016	-0.021	
PJ	1984	6.75	-0.12	-0.81	-0.004	-0.005	c	-0.67	-4.4	-0.022	-0.028	
PJ	1977.5	8.75	-0.12	-0.82	-0.007	-0.009	c	-0.67	-4.4	-0.037	-0.047	
PJ	1968	11.5	-0.12		-0.004	-0.005	c	-0.67		-0.019	-0.025	
PJ	1963	12.5	-0.12	-0.85	-0.005	-0.007	c	-0.67	-4.6	-0.027	-0.035	
PJ	1955	15.5	-0.12	-0.84	-0.012	-0.015	c	-0.67	-4.5	-0.065	-0.083	
Oldman	2003.5	0.25	-0.12	-2.3	-0.007	-0.001	c	-0.67	-13	-0.037	-0.008	c

Oldman	1997	1.25	-0.12	-2.5	-0.005	-0.001	c	-0.67	-13	-0.029	-0.006	c
Oldman	1987	2.25	-0.12	-2.3	-0.003	-0.001	c	-0.67	-12	-0.017	-0.004	c
Oldman	1980.5	2.75	-0.12	-2.4	-0.003	-0.001	c	-0.67	-13	-0.015	-0.003	c
Oldman	1973	3.25	-0.12	-2.6	-0.003	-0.001	c	-0.67	-14	-0.014	-0.003	c
Oldman	1963.5	3.75	-0.12	-2.8	-0.002	-0.00049	c	-0.67	-15	-0.012	-0.003	c
Oldman	1952	4.25	-0.12	-2.9	-0.002	-0.00044	c	-0.67	-16	-0.011	-0.002	c
Oldman	1906.5	6.25	-0.12	-3.6	-0.002	-0.001	c	-0.67	-20	-0.012	-0.003	c
Snyder	2004	0.25	-0.12	-0.94	-0.003	-0.002		-0.67	-5.1	-0.014	-0.01	
Snyder	2000	1.25	-0.12	-1	-0.002	-0.002		-0.67	-5.5	-0.012	-0.009	
Snyder	1991.5	2.75	-0.12	-1.1	-0.002	-0.001		-0.67	-6	-0.01	-0.008	
Snyder	1985	3.75	-0.12	-1.2	-0.002	-0.001		-0.67	-6.5	-0.01	-0.007	
Snyder	1978	4.75	-0.12	-1.3	-0.002	-0.001		-0.67	-6.8	-0.009	-0.007	
Snyder	1967.5	5.75	-0.12	-1.3	-0.002	-0.001		-0.67	-7.2	-0.009	-0.006	
Snyder	1954.5	6.75	-0.12	-1.2	-0.001	-0.001		-0.67	-6.7	-0.007	-0.005	
Snyder	1893	11.75	-0.12	-1.4	-0.001	-0.001		-0.67	-7.7	-0.005	-0.004	

Site	Average Year (y)	Average Depth (cm)	BDE #17 pg/g dw	BDE #17 pg/g TOC	BDE #17 Flux pg/cm2.y	BDE #17 Flux (FF) pg/cm2.y	BDE #17 FLAG	BDE #25 pg/g dw	BDE #25 pg/g TOC	BDE #25 Flux pg/cm2.y	BDE #25 Flux (FF) pg/cm2.y	BDE #25 FLAG
Mills	2002	0.25	-0.38	-2.4	-0.011	-0.007		-0.84	-5.2	-0.024	-0.016	
Mills	2000	0.75	-0.38	-2.7	-0.011	-0.007		-0.84	-5.9	-0.024	-0.016	
Mills	1991	2.75	-0.38	-2.9	-0.009	-0.006		-0.84	-6.4	-0.02	-0.014	
Mills	1974	4.75	-0.38	-3.5	-0.007	-0.005		-0.84	-7.7	-0.016	-0.011	
Mills	1964	6.25	-0.38	-3.1	-0.012	-0.008		-0.84	-6.9	-0.027	-0.018	
Mills	1947	8.75	-0.38	-3.4	-0.01	-0.006		-0.84	-7.4	-0.021	-0.014	
Mills	1905	17.5	-0.38	-3.1	-0.008	-0.006	d	-0.84	-6.9	-0.018	-0.012	d
Lone Pine	2001	0.25	-0.38	-2.7	-0.006	-0.004		-0.84	-6	-0.013	-0.008	
Lone Pine	1998	0.75	-0.38	-2.9	-0.006	-0.004		-0.84	-6.5	-0.013	-0.008	
Lone Pine	1990	1.75	-0.38	-3.3	-0.006	-0.004		-0.84	-7.2	-0.014	-0.01	
Lone Pine	1982	2.75	-0.38	-3.1	-0.006	-0.004		-0.84	-6.9	-0.014	-0.01	
Lone Pine	1961	4.75	-0.38	-3.3	-0.005	-0.004		-0.84	-7.3	-0.012	-0.008	
Lone Pine	1936	6.75	-0.38	-3.4	-0.005	-0.003		-0.84	-7.5	-0.01	-0.007	
Lone Pine	1920	7.75	-0.38	-3.5	-0.005	-0.003		-0.84	-7.7	-0.01	-0.007	

Lone Pine	1870	11.5	-0.38	-3.3	-0.005	-0.003		-0.84	-7.3	-0.01	-0.007	
Emerald	2002	0.25	-0.38	-4.3	-0.017	-0.005		-0.84	-9.5	-0.038	-0.01	
Emerald	1997	1.75	-0.38	-4.2	-0.017	-0.005		-0.84	-9.3	-0.038	-0.01	
Emerald	1989	3.75	-0.38	-4	-0.017	-0.005		-0.84	-8.8	-0.038	-0.01	
Emerald	1980	5.75	-0.38	-4.1	-0.017	-0.005		-0.84	-8.9	-0.038	-0.01	
Emerald	1971.5	7.75	-0.38	-4.4	-0.017	-0.005		-0.84	-9.7	-0.038	-0.01	
Emerald	1961.5	9.75	-0.38	-3.7	-0.017	-0.005		-0.84	-8.1	-0.038	-0.01	
Emerald	1958	10.5	-0.38	-4.8	-0.017	-0.005		-0.84	-11	-0.038	-0.01	
Emerald	1892	21.5	-0.38	-4.5	-0.022	-0.006		-0.84	-10	-0.048	-0.013	
Burial	2000	0.25	-0.38	-5.7	-0.002	-0.002		-0.84	-13	-0.003	-0.004	
Burial	1988	0.75	-0.38	-6.4	-0.002	-0.002		-0.84	-14	-0.003	-0.004	
Burial	1974	1.25	-0.38	-6.6	-0.002	-0.002		-0.84	-14	-0.004	-0.004	
Burial	1957	1.75	-0.38	-7.1	-0.001	-0.001		-0.84	-16	-0.003	-0.003	
Burial	1933	2.25	-0.38	-7.5	-0.001	-0.001		-0.84	-16	-0.003	-0.003	
Burial	1906	2.75	-0.38	-7.4	-0.001	-0.001		-0.84	-16	-0.003	-0.003	
Burial	1879	3.25	-0.38	-7.2	-0.001	-0.001		-0.84	-16	-0.003	-0.003	
Mcleod	2002	0.25	-0.38	-3.1	-0.002	-0.001		-0.84	-6.9	-0.004	-0.002	
Mcleod	1997	0.75	-0.38	-3.3	-0.002	-0.001		-0.84	-7.3	-0.005	-0.002	
Mcleod	1990	1.25	-0.38	-3.8	-0.002	-0.001		-0.84	-8.5	-0.005	-0.002	
Mcleod	1982	1.75	-0.38	-4.1	-0.003	-0.001		-0.84	-9	-0.007	-0.003	
Mcleod	1975	2.25	-0.38	-4.2	-0.004	-0.002		-0.84	-9.3	-0.009	-0.003	
Mcleod	1969	2.75	-0.38	-4.3	-0.004	-0.002		-0.84	-9.4	-0.009	-0.004	
Mcleod	1962	3.25	-0.38	-4	-0.003	-0.001		-0.84	-8.9	-0.007	-0.003	
Mcleod	1952	3.75	-0.38	-4.2	-0.002	-0.001		-0.84	-9.2	-0.005	-0.002	
Mcleod	1907	6.25	-0.38	-3.5	-0.002	-0.001		-0.84	-7.7	-0.005	-0.002	
Matcharak	2001	0.25	-0.38		-0.002	-0.001		-0.84		-0.003	-0.003	
Matcharak	1993	0.75	-0.38	-3	-0.002	-0.001		-0.84	-6.6	-0.004	-0.003	
Matcharak	1983	1.25	-0.38	-3.1	-0.002	-0.001		-0.84	-6.8	-0.004	-0.003	
Matcharak	1971	1.75	-0.38	-3.2	-0.001	-0.001		-0.84	-7.1	-0.003	-0.002	
Matcharak	1954	2.25	-0.38	-3.4	-0.001	-0.001		-0.84	-7.4	-0.002	-0.002	
Matcharak	1937	2.75	-0.38	-3.6	-0.001	-0.001		-0.84	-7.9	-0.002	-0.001	
Matcharak	1910	3.25	-0.38	-3.7	-0.001	-0.001	d	-0.84	-8.2	-0.002	-0.001	d

Wonder	2000	0.25	-0.38	-5.3	-0.003	-0.001		-0.84	-12	-0.006	-0.002	
Wonder	1992	0.75	-0.38	-5.3	-0.003	-0.001		-0.84	-12	-0.006	-0.002	
Wonder	1985	1.25	-0.38	-5.9	-0.003	-0.001		-0.84	-13	-0.006	-0.002	
Wonder	1977	1.75	-0.38	-6.4	-0.003	-0.001		-0.84	-14	-0.006	-0.002	
Wonder	1968	2.25	-0.38	-6.3	-0.002	-0.001		-0.84	-14	-0.004	-0.001	
Wonder	1949	2.75	-0.38	-6.3	-0.001	-0.00035		-0.84	-14	-0.003	-0.001	
Wonder	1919	3.25	-0.38	-7.2	-0.001	-0.00025		-0.84	-16	-0.002	-0.001	
Golden	2002.5	0.25	-0.38		-0.001	-0.001		-0.84		-0.001	-0.001	
Golden	1996.5	0.75	-0.38		-0.001	-0.001		-0.84		-0.003	-0.003	
Golden	1989.5	1.25	-0.38	-2.2	-0.001	-0.001		-0.84	-4.9	-0.003	-0.003	
Golden	1981.5	1.75	-0.38	-2.2	-0.001	-0.001		-0.84	-4.9	-0.003	-0.003	
Golden	1972.5	2.25	-0.38	-1.6	-0.001	-0.001		-0.84	-3.5	-0.002	-0.002	
Golden	1962.5	2.75	-0.38	-1.6	-0.001	-0.001		-0.84	-3.5	-0.002	-0.002	
Golden	1951	3.25	-0.38	-1.5	-0.001	-0.001		-0.84	-3.3	-0.002	-0.002	
Golden	1924	4.25	-0.38	-1.5	-0.001	-0.001		-0.84	-3.3	-0.001	-0.001	
LP 19	2004	0.25	-0.38	-2.1	-0.004	-0.003		-0.84	-4.6	-0.009	-0.006	
LP 19	1999	1.25	-0.38		-0.004	-0.002		-0.84		-0.008	-0.005	
LP 19	1994	2.25	-0.38	-2.1	-0.004	-0.003		-0.84	-4.6	-0.009	-0.006	
LP 19	1989	3.25	-0.38	-2.1	-0.003	-0.002		-0.84	-4.6	-0.007	-0.005	
LP 19	1980	4.25	-0.38	-2.1	-0.002	-0.002		-0.84	-4.6	-0.005	-0.003	
LP 19	1969	5.25	-0.38	-2.1	-0.002	-0.001		-0.84	-4.6	-0.004	-0.003	
LP 19	1956	6.25	-0.38	-2	-0.002	-0.001		-0.84	-4.5	-0.003	-0.002	
LP 19	1903	10.5	-0.38	-2.2	-0.002	-0.002		-0.84	-4.9	-0.005	-0.003	
Hoh	2004	0.25	-0.38	-1.9	-0.005	-0.002	d	-0.84	-4.1	-0.011	-0.004	d
Hoh	1998	1.25	-0.38	-2.1	-0.003	-0.001		-0.84	-4.5	-0.008	-0.002	
Hoh	1990.5	2.25	-0.38	-2.7	-0.004	-0.001		-0.84	-5.9	-0.009	-0.003	
Hoh	1983	3.25	-0.38	-3.6	-0.006	-0.002	d	-0.84	-8	-0.012	-0.004	d
Hoh	1973.5	4.25	-0.38	-4.2	-0.006	-0.002		-0.84	-9.2	-0.013	-0.004	
Hoh	1963	5.25	-0.38	-3.7	-0.005	-0.002		-0.84	-8.2	-0.011	-0.004	
Hoh	1952.5	6.25	-0.38	-4.4	-0.007	-0.002		-0.84	-9.7	-0.016	-0.005	
Hoh	1901	12.75	-0.38	-4.6	-0.008	-0.003		-0.84	-10	-0.018	-0.006	

PJ	2004.5	0.25	-0.38	-2.4	-0.011	-0.014		-0.84	-5.2	-0.023	-0.03	
PJ	1999	2.75	-0.38	-2.3	-0.01	-0.013		-0.84	-5.1	-0.023	-0.029	
PJ	1992	4.75	-0.38	-2.3	-0.009	-0.012		-0.84	-5.2	-0.02	-0.026	
PJ	1984	6.75	-0.38	-2.5	-0.012	-0.016		-0.84	-5.5	-0.027	-0.035	
PJ	1977.5	8.75	-0.38	-2.5	-0.021	-0.027		-0.84	-5.5	-0.046	-0.058	
PJ	1968	11.5	-0.38		-0.011	-0.014		-0.84		-0.024	-0.031	
PJ	1963	12.5	-0.38	-2.6	-0.016	-0.02		-0.84	-5.7	-0.034	-0.044	
PJ	1955	15.5	-0.38	-2.6	-0.037	-0.047		-0.84	-5.6	-0.081	-0.1	
Oldman	2003.5	0.25	-0.38	-7.2	-0.021	-0.005		-0.84	-16	-0.046	-0.01	
Oldman	1997	1.25	-0.38	-7.6	-0.016	-0.004		-0.84	-17	-0.036	-0.008	
Oldman	1987	2.25	-0.38	-7.1	-0.01	-0.002		-0.84	-16	-0.022	-0.005	
Oldman	1980.5	2.75	-0.38	-7.4	-0.009	-0.002		-0.84	-16	-0.019	-0.004	
Oldman	1973	3.25	-0.38	-8.1	-0.008	-0.002		-0.84	-18	-0.018	-0.004	
Oldman	1963.5	3.75	-0.38	-8.5	-0.007	-0.002		-0.84	-19	-0.015	-0.003	
Oldman	1952	4.25	-0.38	-9	-0.006	-0.001		-0.84	-20	-0.013	-0.003	
Oldman	1906.5	6.25	-0.38	-11	-0.007	-0.002		-0.84	-24	-0.015	-0.003	
Snyder	2004	0.25	-0.38	-2.9	-0.008	-0.006		-0.84	-6.4	-0.018	-0.013	
Snyder	2000	1.25	-0.38	-3.1	-0.007	-0.005		-0.84	-6.8	-0.015	-0.011	
Snyder	1991.5	2.75	-0.38	-3.4	-0.006	-0.004		-0.84	-7.5	-0.013	-0.009	
Snyder	1985	3.75	-0.38	-3.7	-0.006	-0.004		-0.84	-8.1	-0.013	-0.009	
Snyder	1978	4.75	-0.38	-3.9	-0.005	-0.004		-0.84	-8.5	-0.012	-0.009	
Snyder	1967.5	5.75	-0.38	-4.1	-0.005	-0.004		-0.84	-9	-0.011	-0.008	
Snyder	1954.5	6.75	-0.38	-3.8	-0.004	-0.003		-0.84	-8.3	-0.009	-0.007	
Snyder	1893	11.75	-0.38	-4.4	-0.003	-0.002		-0.84	-9.6	-0.007	-0.005	

Site	Average Year (y)	Average Depth (cm)	BDE #28 pg/g dw	BDE #28 pg/g TOC	BDE #28 Flux pg/cm2.y	BDE #28 Flux (FF) pg/cm2.y	BDE #28 FLAG	BDE #35 pg/g dw	BDE #35 pg/g TOC	BDE #35 Flux pg/cm2.y	BDE #35 Flux (FF) pg/cm2.y	BDE #35 FLAG
Mills	2002	0.25	-2.1	-13	-0.06	-0.04		-0.67	-4.2	-0.019	-0.013	
Mills	2000	0.75	-2.1	-14	-0.06	-0.04		-0.67	-4.7	-0.019	-0.013	
Mills	1991	2.75	-2.1	-16	-0.049	-0.033		-0.67	-5.1	-0.016	-0.011	
Mills	1974	4.75	-2.1	-19	-0.039	-0.026		-0.67	-6.1	-0.013	-0.009	
Mills	1964	6.25	-2.1	-17	-0.066	-0.045		-0.67	-5.5	-0.021	-0.014	

Mills	1947	8.75	-2.1	-18	-0.052	-0.035		-0.67	-5.9	-0.017	-0.011	
Mills	1905	17.5	-2.1	-17	-0.045	-0.031	d	-0.67	-5.5	-0.015	-0.01	d
Lone Pine	2001	0.25	-2.1	-15	-0.031	-0.021		-0.67	-4.8	-0.01	-0.007	
Lone Pine	1998	0.75	-2.1	-16	-0.031	-0.021		-0.67	-5.2	-0.01	-0.007	
Lone Pine	1990	1.75	-2.1	-18	-0.035	-0.024		-0.67	-5.8	-0.011	-0.008	
Lone Pine	1982	2.75	-2.1	-17	-0.035	-0.024		-0.67	-5.5	-0.011	-0.008	
Lone Pine	1961	4.75	-2.1	-18	-0.029	-0.019		-0.67	-5.9	-0.009	-0.006	
Lone Pine	1936	6.75	-2.1	-18	-0.025	-0.017		-0.67	-6	-0.008	-0.005	
Lone Pine	1920	7.75	-2.1	-19	-0.025	-0.017		-0.67	-6.2	-0.008	-0.005	
Lone Pine	1870	11.5	-2.1	-18	-0.025	-0.017		-0.67	-5.8	-0.008	-0.005	
Emerald	2002	0.25	-2.1	-24	-0.095	-0.025		-0.67	-7.6	-0.031	-0.008	
Emerald	1997	1.75	-2.1	-23	-0.095	-0.025		-0.67	-7.5	-0.031	-0.008	
Emerald	1989	3.75	-2.1	-22	-0.095	-0.025		-0.67	-7	-0.031	-0.008	
Emerald	1980	5.75	-2.1	-22	-0.095	-0.025		-0.67	-7.2	-0.031	-0.008	
Emerald	1971.5	7.75	-2.1	-24	-0.095	-0.025		-0.67	-7.8	-0.031	-0.008	
Emerald	1961.5	9.75	-2.1	-20	-0.095	-0.025		-0.67	-6.5	-0.031	-0.008	
Emerald	1958	10.5	-2.1	-26	-0.095	-0.025		-0.67	-8.5	-0.031	-0.008	
Emerald	1892	21.5	-2.1	-25	-0.12	-0.031		-0.67	-8	-0.038	-0.01	
Burial	2000	0.25	-2.1	-31	-0.008	-0.009		-0.67	-10	-0.003	-0.003	
Burial	1988	0.75	-2.1	-35	-0.008	-0.01		-0.67	-11	-0.003	-0.003	
Burial	1974	1.25	-2.1	-36	-0.009	-0.011		-0.67	-12	-0.003	-0.004	
Burial	1957	1.75	-2.1	-38	-0.007	-0.008		-0.67	-12	-0.002	-0.003	
Burial	1933	2.25	-2.1	-41	-0.006	-0.007		-0.67	-13	-0.002	-0.002	
Burial	1906	2.75	-2.1	-40	-0.006	-0.007		-0.67	-13	-0.002	-0.002	
Burial	1879	3.25	-2.1	-39	-0.006	-0.007		-0.67	-13	-0.002	-0.002	
Mcleod	2002	0.25	-2.1	-17	-0.011	-0.004		-0.67	-5.5	-0.003	-0.001	
Mcleod	1997	0.75	-2.1	-18	-0.012	-0.004		-0.67	-5.9	-0.004	-0.001	
Mcleod	1990	1.25	-2.1	-21	-0.013	-0.005		-0.67	-6.8	-0.004	-0.002	
Mcleod	1982	1.75	-2.1	-22	-0.017	-0.006		-0.67	-7.2	-0.005	-0.002	
Mcleod	1975	2.25	-2.1	-23	-0.021	-0.008		-0.67	-7.4	-0.007	-0.003	
Mcleod	1969	2.75	-2.1	-23	-0.023	-0.009		-0.67	-7.5	-0.008	-0.003	
Mcleod	1962	3.25	-2.1	-22	-0.017	-0.006		-0.67	-7.1	-0.005	-0.002	

Mcleod	1952	3.75	-2.1	-23	-0.013	-0.005		-0.67	-7.4	-0.004	-0.002	
Mcleod	1907	6.25	-2.1	-19	-0.012	-0.005		-0.67	-6.2	-0.004	-0.001	
Matcharak	2001	0.25	-2.1		-0.008	-0.007		-0.67		-0.003	-0.002	
Matcharak	1993	0.75	-2.1	-16	-0.009	-0.007		-0.67	-5.3	-0.003	-0.002	
Matcharak	1983	1.25	-2.1	-17	-0.009	-0.007		-0.67	-5.5	-0.003	-0.002	
Matcharak	1971	1.75	-2.1	-18	-0.007	-0.005		-0.67	-5.7	-0.002	-0.002	
Matcharak	1954	2.25	-2.1	-18	-0.005	-0.004		-0.67	-6	-0.002	-0.001	
Matcharak	1937	2.75	-2.1	-19	-0.004	-0.003		-0.67	-6.3	-0.001	-0.001	
Matcharak	1910	3.25	-2.1	-20	-0.004	-0.003	d	-0.67	-6.5	-0.001	-0.001	d
Wonder	2000	0.25	-2.1	-29	-0.015	-0.004		-0.67	-9.3	-0.005	-0.001	
Wonder	1992	0.75	-2.1	-29	-0.015	-0.004		-0.67	-9.3	-0.005	-0.001	
Wonder	1985	1.25	-2.1	-32	-0.015	-0.004		-0.67	-10	-0.005	-0.001	
Wonder	1977	1.75	-2.1	-35	-0.014	-0.004		-0.67	-11	-0.004	-0.001	
Wonder	1968	2.25	-2.1	-34	-0.01	-0.003		-0.67	-11	-0.003	-0.001	
Wonder	1949	2.75	-2.1	-34	-0.007	-0.002		-0.67	-11	-0.002	-0.001	
Wonder	1919	3.25	-2.1	-39	-0.005	-0.001		-0.67	-13	-0.002	-0.00044	
Golden	2002.5	0.25	-2.1		-0.003	-0.003		-0.67		-0.001	-0.001	
Golden	1996.5	0.75	-2.1		-0.006	-0.006		-0.67		-0.002	-0.002	
Golden	1989.5	1.25	-2.1	-12	-0.008	-0.008		-0.67	-4	-0.003	-0.003	
Golden	1981.5	1.75	-2.1	-12	-0.007	-0.007		-0.67	-4	-0.002	-0.002	
Golden	1972.5	2.25	-2.1	-8.6	-0.006	-0.006		-0.67	-2.8	-0.002	-0.002	
Golden	1962.5	2.75	-2.1	-8.6	-0.005	-0.005		-0.67	-2.8	-0.002	-0.002	
Golden	1951	3.25	-2.1	-8.1	-0.004	-0.004		-0.67	-2.6	-0.001	-0.001	
Golden	1924	4.25	-2.1	-8	-0.004	-0.004		-0.67	-2.6	-0.001	-0.001	
LP 19	2004	0.25	-2.1	-11	-0.023	-0.015		-0.67	-3.6	-0.007	-0.005	
LP 19	1999	1.25	-2.1		-0.02	-0.013		-0.67		-0.006	-0.004	
LP 19	1994	2.25	-2.1	-11	-0.023	-0.015		-0.67	-3.6	-0.007	-0.005	
LP 19	1989	3.25	-2.1	-11	-0.017	-0.012		-0.67	-3.7	-0.006	-0.004	
LP 19	1980	4.25	-2.1	-11	-0.012	-0.008		-0.67	-3.6	-0.004	-0.003	
LP 19	1969	5.25	-2.1	-11	-0.011	-0.007		-0.67	-3.7	-0.003	-0.002	
LP 19	1956	6.25	-2.1	-11	-0.009	-0.006		-0.67	-3.6	-0.003	-0.002	
LP 19	1903	10.5	-2.1	-12	-0.013	-0.009		-0.67	-3.9	-0.004	-0.003	

Hoh	2004	0.25	-2.1	-10	-0.027	-0.009	d	-0.67	-3.3	-0.009	-0.003	d
Hoh	1998	1.25	-2.1	-11	-0.019	-0.006		-0.67	-3.6	-0.006	-0.002	
Hoh	1990.5	2.25	-2.1	-14	-0.023	-0.007		-0.67	-4.7	-0.007	-0.002	
Hoh	1983	3.25	-2.1	-20	-0.03	-0.01	d	-0.67	-6.4	-0.01	-0.003	d
Hoh	1973.5	4.25	-2.1	-23	-0.031	-0.01		-0.67	-7.4	-0.01	-0.003	
Hoh	1963	5.25	-2.1	-20	-0.028	-0.009		-0.67	-6.6	-0.009	-0.003	
Hoh	1952.5	6.25	-2.1	-24	-0.04	-0.013		-0.67	-7.7	-0.013	-0.004	
Hoh	1901	12.75	-2.1	-25	-0.043	-0.014		-0.67	-8.1	-0.014	-0.005	
PJ	2004.5	0.25	-2.1	-13	-0.058	-0.074		-0.67	-4.2	-0.019	-0.024	
PJ	1999	2.75	-2.1	-13	-0.056	-0.071		-0.67	-4.1	-0.018	-0.023	
PJ	1992	4.75	-2.1	-13	-0.05	-0.065		-0.67	-4.1	-0.016	-0.021	
PJ	1984	6.75	-2.1	-13	-0.067	-0.086		-0.67	-4.4	-0.022	-0.028	
PJ	1977.5	8.75	-2.1	-14	-0.11	-0.14		-0.67	-4.4	-0.037	-0.047	
PJ	1968	11.5	-2.1		-0.06	-0.077		-0.67		-0.019	-0.025	
PJ	1963	12.5	-2.1	-14	-0.084	-0.11		-0.67	-4.6	-0.027	-0.035	
PJ	1955	15.5	-2.1	-14	-0.2	-0.26		-0.67	-4.5	-0.065	-0.083	
Oldman	2003.5	0.25	-2.1	-39	-0.11	-0.025		-0.67	-13	-0.037	-0.008	c
Oldman	1997	1.25	-2.1	-41	-0.089	-0.019		-0.67	-13	-0.029	-0.006	c
Oldman	1987	2.25	-2.1	-38	-0.054	-0.012		-0.67	-12	-0.017	-0.004	c
Oldman	1980.5	2.75	-2.1	-40	-0.046	-0.01		-0.67	-13	-0.015	-0.003	c
Oldman	1973	3.25	-2.1	-44	-0.043	-0.01		-0.67	-14	-0.014	-0.003	c
Oldman	1963.5	3.75	-2.1	-46	-0.037	-0.008		-0.67	-15	-0.012	-0.003	c
Oldman	1952	4.25	-2.1	-49	-0.033	-0.007		-0.67	-16	-0.011	-0.002	c
Oldman	1906.5	6.25	-2.1	-60	-0.038	-0.008		-0.67	-20	-0.012	-0.003	c
Snyder	2004	0.25	-2.1	-16	-0.043	-0.032		-0.67	-5.1	-0.014	-0.01	
Snyder	2000	1.25	-2.1	-17	-0.037	-0.027		-0.67	-5.5	-0.012	-0.009	
Snyder	1991.5	2.75	-2.1	-19	-0.032	-0.023		-0.67	-6	-0.01	-0.008	
Snyder	1985	3.75	-2.1	-20	-0.031	-0.023		-0.67	-6.5	-0.01	-0.007	
Snyder	1978	4.75	-2.1	-21	-0.029	-0.021		-0.67	-6.8	-0.009	-0.007	
Snyder	1967.5	5.75	-2.1	-22	-0.027	-0.02		-0.67	-7.2	-0.009	-0.006	
Snyder	1954.5	6.75	-2.1	-21	-0.023	-0.017		-0.67	-6.7	-0.007	-0.005	
Snyder	1893	11.75	-2.1	-24	-0.016	-0.012		-0.67	-7.7	-0.005	-0.004	

Site	Average Year (y)	Average Depth (cm)	BDE #37 pg/g dw	BDE #37 pg/g TOC	BDE #37 Flux pg/cm2.y	BDE #37 Flux (FF) pg/cm2.y		BDE #75 pg/g dw	BDE #75 pg/g TOC	BDE #75 Flux pg/cm2.y	BDE #75 Flux (FF) pg/cm2.y	
Mills	2002	0.25	-1.3	-7.9	-0.036	-0.025		-1.7	-10	-0.049	-0.033	
Mills	2000	0.75	-1.3	-8.8	-0.036	-0.025		-1.7	-12	-0.049	-0.033	
Mills	1991	2.75	-1.3	-9.6	-0.03	-0.02		-1.7	-13	-0.04	-0.027	
Mills	1974	4.75	-1.3	-12	-0.024	-0.016		-1.7	-15	-0.032	-0.021	
Mills	1964	6.25	-1.3	-10	-0.04	-0.027		-1.7	-14	-0.054	-0.036	
Mills	1947	8.75	-1.3	-11	-0.031	-0.021		-1.7	-15	-0.042	-0.028	
Mills	1905	17.5	-1.3	-10	-0.028	-0.019		-1.7	-14	-0.037	-0.025	
Lone Pine	2001	0.25	-1.3	-9	-0.019	-0.013		-1.7	-12	-0.025	-0.017	
Lone Pine	1998	0.75	-1.3	-9.7	-0.019	-0.013		-1.7	-13	-0.025	-0.017	
Lone Pine	1990	1.75	-1.3	-11	-0.021	-0.014		-1.7	-14	-0.028	-0.019	
Lone Pine	1982	2.75	-1.3	-10	-0.021	-0.014		-1.7	-14	-0.028	-0.019	
Lone Pine	1961	4.75	-1.3	-11	-0.018	-0.012		-1.7	-15	-0.023	-0.016	
Lone Pine	1936	6.75	-1.3	-11	-0.015	-0.01		-1.7	-15	-0.02	-0.014	
Lone Pine	1920	7.75	-1.3	-12	-0.015	-0.01		-1.7	-15	-0.02	-0.014	
Lone Pine	1870	11.5	-1.3	-11	-0.015	-0.01		-1.7	-15	-0.02	-0.014	
Emerald	2002	0.25	-1.3	-14	-0.058	-0.015		-1.7	-19	-0.077	-0.021	
Emerald	1997	1.75	-1.3	-14	-0.058	-0.015		-1.7	-19	-0.077	-0.021	
Emerald	1989	3.75	-1.3	-13	-0.058	-0.015		-1.7	-18	-0.077	-0.021	
Emerald	1980	5.75	-1.3	-13	-0.058	-0.015		-1.7	-18	-0.077	-0.021	
Emerald	1971.5	7.75	-1.3	-15	-0.058	-0.015		-1.7	-19	-0.077	-0.021	
Emerald	1961.5	9.75	-1.3	-12	-0.058	-0.015		-1.7	-16	-0.077	-0.021	
Emerald	1958	10.5	-1.3	-16	-0.058	-0.015		-1.7	-21	-0.077	-0.021	
Emerald	1892	21.5	-1.3	-15	-0.072	-0.019		-1.7	-20	-0.095	-0.026	
Burial	2000	0.25	-1.3	-19	-0.005	-0.006		-1.7	-25	-0.007	-0.008	
Burial	1988	0.75	-1.3	-21	-0.005	-0.006		-1.7	-28	-0.007	-0.008	
Burial	1974	1.25	-1.3	-22	-0.006	-0.007		-1.7	-29	-0.008	-0.009	
Burial	1957	1.75	-1.3	-23	-0.004	-0.005		-1.7	-31	-0.006	-0.006	
Burial	1933	2.25	-1.3	-25	-0.004	-0.004		-1.7	-33	-0.005	-0.006	
Burial	1906	2.75	-1.3	-24	-0.004	-0.004		-1.7	-33	-0.005	-0.006	

Burial	1879	3.25	-1.3	-24	-0.004	-0.004		-1.7	-32	-0.005	-0.006		
Mcleod	2002	0.25	-1.3	-10	-0.006	-0.002		-1.7	-14	-0.009	-0.003		
Mcleod	1997	0.75	-1.3	-11	-0.007	-0.003		-1.7	-15	-0.009	-0.004		
Mcleod	1990	1.25	-1.3	-13	-0.008	-0.003		-1.7	-17	-0.011	-0.004		
Mcleod	1982	1.75	-1.3	-14	-0.01	-0.004		-1.7	-18	-0.014	-0.005		
Mcleod	1975	2.25	-1.3	-14	-0.013	-0.005		-1.7	-19	-0.017	-0.007		
Mcleod	1969	2.75	-1.3	-14	-0.014	-0.005		-1.7	-19	-0.019	-0.007		
Mcleod	1962	3.25	-1.3	-13	-0.01	-0.004		-1.7	-18	-0.014	-0.005		
Mcleod	1952	3.75	-1.3	-14	-0.008	-0.003		-1.7	-18	-0.011	-0.004		
Mcleod	1907	6.25	-1.3	-12	-0.007	-0.003		-1.7	-15	-0.01	-0.004		
Matcharak	2001	0.25	-1.3	0	-0.005	-0.004		-1.7	0	-0.007	-0.005		
Matcharak	1993	0.75	-1.3	-9.9	-0.006	-0.005		-1.7	-13	-0.008	-0.006		
Matcharak	1983	1.25	-1.3	-10	-0.005	-0.004		-1.7	-14	-0.007	-0.006		
Matcharak	1971	1.75	-1.3	-11	-0.004	-0.003		-1.7	-14	-0.006	-0.004		
Matcharak	1954	2.25	-1.3	-11	-0.003	-0.003		-1.7	-15	-0.004	-0.003		
Matcharak	1937	2.75	-1.3	-12	-0.003	-0.002		-1.7	-16	-0.004	-0.003		
Matcharak	1910	3.25	-1.3	-12	-0.003	-0.002		-1.7	-16	-0.003	-0.003		
Wonder	2000	0.25	-1.3	-18	-0.009	-0.003		-1.7	-23	-0.012	-0.004		
Wonder	1992	0.75	-1.3	-17	-0.009	-0.003		-1.7	-23	-0.013	-0.004		
Wonder	1985	1.25	-1.3	-20	-0.009	-0.003		-1.7	-26	-0.012	-0.003		
Wonder	1977	1.75	-1.3	-21	-0.008	-0.002		-1.7	-28	-0.011	-0.003		
Wonder	1968	2.25	-1.3	-21	-0.006	-0.002		-1.7	-28	-0.008	-0.002		
Wonder	1949	2.75	-1.3	-21	-0.004	-0.001		-1.7	-28	-0.005	-0.002		
Wonder	1919	3.25	-1.3	-24	-0.003	-0.001		-1.7	-32	-0.004	-0.001		
Golden	2002.5	0.25	-1.3	0	-0.002	-0.002		-1.7	0	-0.002	-0.002		
Golden	1996.5	0.75	-1.3	0	-0.004	-0.004		-1.7	0	-0.005	-0.005		
Golden	1989.5	1.25	-1.3	-7.4	-0.005	-0.005		-1.7	-9.9	-0.006	-0.006		
Golden	1981.5	1.75	-1.3	-7.4	-0.005	-0.005		-1.7	-9.9	-0.006	-0.006		
Golden	1972.5	2.25	-1.3	-5.2	-0.004	-0.004		-1.7	-7	-0.005	-0.005		
Golden	1962.5	2.75	-1.3	-5.2	-0.003	-0.003		-1.7	-7	-0.004	-0.004		
Golden	1951	3.25	-1.3	-4.9	-0.003	-0.003		-1.7	-6.6	-0.004	-0.004		
Golden	1924	4.25	-1.3	-4.9	-0.002	-0.002		-1.7	-6.5	-0.003	-0.003		

LP 19	2004	0.25	-1.3	-6.8	-0.014	-0.009		-1.7	-9.1	-0.018	-0.012		
LP 19	1999	1.25	-1.3	0	-0.012	-0.008		-1.7	0	-0.016	-0.011		
LP 19	1994	2.25	-1.3	-6.8	-0.014	-0.009		-1.7	-9.1	-0.018	-0.012		
LP 19	1989	3.25	-1.3	-6.9	-0.011	-0.007		-1.7	-9.1	-0.014	-0.009		
LP 19	1980	4.25	-1.3	-6.8	-0.008	-0.005		-1.7	-9.1	-0.01	-0.007		
LP 19	1969	5.25	-1.3	-6.9	-0.007	-0.004		-1.7	-9.2	-0.009	-0.006		
LP 19	1956	6.25	-1.3	-6.7	-0.005	-0.003		-1.7	-8.9	-0.007	-0.005		
LP 19	1903	10.5	-1.3	-7.3	-0.008	-0.005		-1.7	-9.8	-0.01	-0.007		
Hoh	2004	0.25	-1.3	-6.2	-0.016	-0.005		-1.7	-8.2	-0.022	-0.007		
Hoh	1998	1.25	-1.3	-6.8	-0.011	-0.004		-1.7	-9.1	-0.015	-0.005		
Hoh	1990.5	2.25	-1.3	-8.8	-0.014	-0.004		-1.7	-12	-0.018	-0.006		
Hoh	1983	3.25	-1.3	-12	-0.018	-0.006		-1.7	-16	-0.024	-0.008		
Hoh	1973.5	4.25	-1.3	-14	-0.019	-0.006		-1.7	-18	-0.025	-0.008		
Hoh	1963	5.25	-1.3	-12	-0.017	-0.005		-1.7	-16	-0.023	-0.007		
Hoh	1952.5	6.25	-1.3	-15	-0.025	-0.008		-1.7	-19	-0.033	-0.011		
Hoh	1901	12.75	-1.3	-15	-0.026	-0.009		-1.7	-20	-0.035	-0.011		
PJ	2004.5	0.25	-1.3	-7.9	-0.035	-0.045		-1.7	-10	-0.047	-0.06		
PJ	1999	2.75	-1.3	-7.7	-0.034	-0.043		-1.7	-10	-0.045	-0.058		
PJ	1992	4.75	-1.3	-7.7	-0.031	-0.039		-1.7	-10	-0.041	-0.053		
PJ	1984	6.75	-1.3	-8.2	-0.041	-0.052		-1.7	-11	-0.054	-0.07		
PJ	1977.5	8.75	-1.3	-8.3	-0.068	-0.088		-1.7	-11	-0.091	-0.12		
PJ	1968	11.5	-1.3	0	-0.036	-0.047		-1.7	0	-0.049	-0.062		
PJ	1963	12.5	-1.3	-8.6	-0.052	-0.066		-1.7	-11	-0.069	-0.088		
PJ	1955	15.5	-1.3	-8.5	-0.12	-0.16		-1.7	-11	-0.16	-0.21		
Oldman	2003.5	0.25	-1.3	-24	-0.069	-0.015		-1.7	-32	-0.092	-0.02		
Oldman	1997	1.25	-1.3	-25	-0.054	-0.012		-1.7	-34	-0.072	-0.016		
Oldman	1987	2.25	-1.3	-23	-0.033	-0.007		-1.7	-31	-0.044	-0.01		
Oldman	1980.5	2.75	-1.3	-25	-0.028	-0.006		-1.7	-33	-0.038	-0.008		
Oldman	1973	3.25	-1.3	-27	-0.026	-0.006		-1.7	-36	-0.035	-0.008		
Oldman	1963.5	3.75	-1.3	-28	-0.023	-0.005		-1.7	-38	-0.03	-0.007		
Oldman	1952	4.25	-1.3	-30	-0.02	-0.004		-1.7	-40	-0.027	-0.006		
Oldman	1906.5	6.25	-1.3	-37	-0.023	-0.005		-1.7	-49	-0.031	-0.007		

Snyder	2004	0.25	-1.3	-9.5	-0.026	-0.019		-1.7	-13	-0.035	-0.026	
Snyder	2000	1.25	-1.3	-10	-0.023	-0.017		-1.7	-14	-0.03	-0.022	
Snyder	1991.5	2.75	-1.3	-11	-0.019	-0.014		-1.7	-15	-0.026	-0.019	
Snyder	1985	3.75	-1.3	-12	-0.019	-0.014		-1.7	-16	-0.025	-0.018	
Snyder	1978	4.75	-1.3	-13	-0.018	-0.013		-1.7	-17	-0.023	-0.017	
Snyder	1967.5	5.75	-1.3	-13	-0.016	-0.012		-1.7	-18	-0.022	-0.016	
Snyder	1954.5	6.75	-1.3	-13	-0.014	-0.01		-1.7	-17	-0.018	-0.013	
Snyder	1893	11.75	-1.3	-14	-0.01	-0.007		-1.7	-19	-0.013	-0.01	

Site	Average Year (y)	Average Depth (cm)	BDE #49 pg/g dw	BDE #49 pg/g TOC	BDE #49 Flux pg/cm2.y	BDE #49 Flux (FF) pg/cm2.y	BDE #49 FLAG	BDE #71 pg/g dw	BDE #71 pg/g TOC	BDE #71 Flux pg/cm2.y	BDE #71 Flux (FF) pg/cm2.y	BDE #71 FLAG
Mills	2002	0.25	-1.1	-7	-0.033	-0.022		-1.1	-7	-0.033	-0.022	
Mills	2000	0.75	-1.1	-7.9	-0.033	-0.022		-1.1	-7.9	-0.033	-0.022	
Mills	1991	2.75	-1.1	-8.6	-0.027	-0.018		-1.1	-8.6	-0.027	-0.018	
Mills	1974	4.75	-1.1	-10	-0.021	-0.014	d	-1.1	-10	-0.021	-0.014	d
Mills	1964	6.25	-1.1	-9.2	-0.036	-0.024		-1.1	-9.2	-0.036	-0.024	
Mills	1947	8.75	-1.1	-9.9	-0.028	-0.019		-1.1	-9.9	-0.028	-0.019	
Mills	1905	17.5	-1.1	-9.2	-0.025	-0.017	d	-1.1	-9.2	-0.025	-0.017	d
Lone Pine	2001	0.25	-1.1	-8.1	-0.017	-0.011		-1.1	-8.1	-0.017	-0.011	
Lone Pine	1998	0.75	-1.1	-8.7	-0.017	-0.011		-1.1	-8.7	-0.017	-0.011	
Lone Pine	1990	1.75	-1.1	-9.7	-0.019	-0.013		-1.1	-9.7	-0.019	-0.013	
Lone Pine	1982	2.75	-1.1	-9.2	-0.019	-0.013		-1.1	-9.2	-0.019	-0.013	
Lone Pine	1961	4.75	-1.1	-9.8	-0.016	-0.011		-1.1	-9.8	-0.016	-0.011	
Lone Pine	1936	6.75	-1.1	-10	-0.013	-0.009		-1.1	-10	-0.013	-0.009	
Lone Pine	1920	7.75	-1.1	-10	-0.013	-0.009		-1.1	-10	-0.013	-0.009	
Lone Pine	1870	11.5	-1.1	-9.7	-0.013	-0.009		-1.1	-9.7	-0.013	-0.009	
Emerald	2002	0.25	-1.1	-13	-0.052	-0.014		-1.1	-13	-0.052	-0.014	
Emerald	1997	1.75	-1.1	-13	-0.052	-0.014		-1.1	-13	-0.052	-0.014	
Emerald	1989	3.75	-1.1	-12	-0.052	-0.014		-1.1	-12	-0.052	-0.014	
Emerald	1980	5.75	-1.1	-12	-0.052	-0.014		-1.1	-12	-0.052	-0.014	
Emerald	1971.5	7.75	-1.1	-13	-0.052	-0.014		-1.1	-13	-0.052	-0.014	

Emerald	1961.5	9.75	-1.1	-11	-0.052	-0.014		-1.1	-11	-0.052	-0.014	
Emerald	1958	10.5	-1.1	-14	-0.052	-0.014		-1.1	-14	-0.052	-0.014	
Emerald	1892	21.5	-1.1	-13	-0.064	-0.017	d	-1.1	-13	-0.064	-0.017	d
Burial	2000	0.25	-1.1	-17	-0.004	-0.005		-1.1	-17	-0.004	-0.005	
Burial	1988	0.75	-1.1	-19	-0.005	-0.005		-1.1	-19	-0.005	-0.005	
Burial	1974	1.25	-1.1	-19	-0.005	-0.006		-1.1	-19	-0.005	-0.006	
Burial	1957	1.75	-1.1	-21	-0.004	-0.004		-1.1	-21	-0.004	-0.004	
Burial	1933	2.25	-1.1	-22	-0.003	-0.004		-1.1	-22	-0.003	-0.004	
Burial	1906	2.75	-1.1	-22	-0.003	-0.004	d	-1.1	-22	-0.003	-0.004	d
Burial	1879	3.25	-1.1	-21	-0.003	-0.004		-1.1	-21	-0.003	-0.004	
Mcleod	2002	0.25	-1.1	-9.2	-0.006	-0.002		-1.1	-9.2	-0.006	-0.002	
Mcleod	1997	0.75	-1.1	-9.8	-0.006	-0.002		-1.1	-9.8	-0.006	-0.002	
Mcleod	1990	1.25	-1.1	-11	-0.007	-0.003		-1.1	-11	-0.007	-0.003	
Mcleod	1982	1.75	-1.1	-12	-0.009	-0.003		-1.1	-12	-0.009	-0.003	
Mcleod	1975	2.25	-1.1	-12	-0.012	-0.004		-1.1	-12	-0.012	-0.004	
Mcleod	1969	2.75	-1.1	-13	-0.013	-0.005		-1.1	-13	-0.013	-0.005	
Mcleod	1962	3.25	-1.1	-12	-0.009	-0.003		-1.1	-12	-0.009	-0.003	
Mcleod	1952	3.75	-1.1	-12	-0.007	-0.003		-1.1	-12	-0.007	-0.003	
Mcleod	1907	6.25	-1.1	-10	-0.006	-0.002		-1.1	-10	-0.006	-0.002	
Matcharak	2001	0.25	-1.1		-0.005	-0.004		-1.1		-0.005	-0.004	
Matcharak	1993	0.75	-1.1	-8.8	-0.005	-0.004		-1.1	-8.8	-0.005	-0.004	
Matcharak	1983	1.25	-1.1	-9.2	-0.005	-0.004		-1.1	-9.2	-0.005	-0.004	
Matcharak	1971	1.75	-1.1	-9.5	-0.004	-0.003		-1.1	-9.5	-0.004	-0.003	
Matcharak	1954	2.25	-1.1	-10	-0.003	-0.002		-1.1	-10	-0.003	-0.002	
Matcharak	1937	2.75	-1.1	-11	-0.002	-0.002		-1.1	-11	-0.002	-0.002	
Matcharak	1910	3.25	-1.1	-11	-0.002	-0.002		-1.1	-11	-0.002	-0.002	
Wonder	2000	0.25	-1.1	-16	-0.008	-0.002		-1.1	-16	-0.008	-0.002	
Wonder	1992	0.75	-1.1	-16	-0.008	-0.002		-1.1	-16	-0.008	-0.002	
Wonder	1985	1.25	-1.1	-17	-0.008	-0.002		-1.1	-17	-0.008	-0.002	
Wonder	1977	1.75	-1.1	-19	-0.007	-0.002		-1.1	-19	-0.007	-0.002	
Wonder	1968	2.25	-1.1	-19	-0.005	-0.002		-1.1	-19	-0.005	-0.002	
Wonder	1949	2.75	-1.1	-19	-0.004	-0.001		-1.1	-19	-0.004	-0.001	

Wonder	1919	3.25	-1.1	-21	-0.003	-0.001		-1.1	-21	-0.003	-0.001	
Golden	2002.5	0.25	-1.1		-0.002	-0.002		-1.1		-0.002	-0.002	
Golden	1996.5	0.75	-1.1		-0.003	-0.003		-1.1		-0.003	-0.003	
Golden	1989.5	1.25	-1.1	-6.6	-0.004	-0.004		-1.1	-6.6	-0.004	-0.004	
Golden	1981.5	1.75	-1.1	-6.6	-0.004	-0.004		-1.1	-6.6	-0.004	-0.004	
Golden	1972.5	2.25	-1.1	-4.7	-0.003	-0.003		-1.1	-4.7	-0.003	-0.003	
Golden	1962.5	2.75	-1.1	-4.7	-0.003	-0.003		-1.1	-4.7	-0.003	-0.003	
Golden	1951	3.25	-1.1	-4.4	-0.002	-0.002		-1.1	-4.4	-0.002	-0.002	
Golden	1924	4.25	-1.1	-4.4	-0.002	-0.002		-1.1	-4.4	-0.002	-0.002	
LP 19	2004	0.25	-1.1	-6.1	-0.012	-0.008		-1.1	-6.1	-0.012	-0.008	
LP 19	1999	1.25	-1.1		-0.011	-0.007	d	-1.1		-0.011	-0.007	d
LP 19	1994	2.25	-1.1	-6.1	-0.012	-0.008		-1.1	-6.1	-0.012	-0.008	
LP 19	1989	3.25	-1.1	-6.1	-0.009	-0.006	d	-1.1	-6.1	-0.009	-0.006	d
LP 19	1980	4.25	-1.1	-6.1	-0.007	-0.005	d	-1.1	-6.1	-0.007	-0.005	d
LP 19	1969	5.25	-1.1	-6.2	-0.006	-0.004	d	-1.1	-6.2	-0.006	-0.004	d
LP 19	1956	6.25	-1.1	-6	-0.005	-0.003	d	-1.1	-6	-0.005	-0.003	d
LP 19	1903	10.5	-1.1	-6.6	-0.007	-0.005	d	-1.1	-6.6	-0.007	-0.005	d
Hoh	2004	0.25	-1.1	-5.5	-0.015	-0.005	d	-1.1	-5.5	-0.015	-0.005	d
Hoh	1998	1.25	-1.1	-6.1	-0.01	-0.003		-1.1	-6.1	-0.01	-0.003	
Hoh	1990.5	2.25	-1.1	-7.9	-0.012	-0.004		-1.1	-7.9	-0.012	-0.004	
Hoh	1983	3.25	-1.1	-11	-0.016	-0.005		-1.1	-11	-0.016	-0.005	
Hoh	1973.5	4.25	-1.1	-12	-0.017	-0.005		-1.1	-12	-0.017	-0.005	
Hoh	1963	5.25	-1.1	-11	-0.015	-0.005		-1.1	-11	-0.015	-0.005	
Hoh	1952.5	6.25	-1.1	-13	-0.022	-0.007	d	-1.1	-13	-0.022	-0.007	d
Hoh	1901	12.75	-1.1	-13	-0.024	-0.008	d	-1.1	-13	-0.024	-0.008	d
PJ	2004.5	0.25	-1.1	-7	-0.031	-0.04		-1.1	-7	-0.031	-0.04	
PJ	1999	2.75	-1.1	-6.9	-0.03	-0.039		-1.1	-6.9	-0.03	-0.039	
PJ	1992	4.75	-1.1	-6.9	-0.027	-0.035		-1.1	-6.9	-0.027	-0.035	
PJ	1984	6.75	-1.1	-7.3	-0.036	-0.047		-1.1	-7.3	-0.036	-0.047	
PJ	1977.5	8.75	-1.1	-7.4	-0.061	-0.078	d	-1.1	-7.4	-0.061	-0.078	d
PJ	1968	11.5	-1.1		-0.033	-0.042	d	-1.1		-0.033	-0.042	d
PJ	1963	12.5	-1.1	-7.7	-0.046	-0.059	d	-1.1	-7.7	-0.046	-0.059	d

PJ	1955	15.5	-1.1	-7.6	-0.11	-0.14	d	-1.1	-7.6	-0.11	-0.14	d
Oldman	2003.5	0.25	-1.1	-21	-0.062	-0.014		-1.1	-21	-0.062	-0.014	
Oldman	1997	1.25	-1.1	-22	-0.048	-0.011		-1.1	-22	-0.048	-0.011	
Oldman	1987	2.25	-1.1	-21	-0.029	-0.006		-1.1	-21	-0.029	-0.006	
Oldman	1980.5	2.75	-1.1	-22	-0.025	-0.006	d	-1.1	-22	-0.025	-0.006	d
Oldman	1973	3.25	-1.1	-24	-0.024	-0.005	d	-1.1	-24	-0.024	-0.005	d
Oldman	1963.5	3.75	-1.1	-25	-0.02	-0.004		-1.1	-25	-0.02	-0.004	
Oldman	1952	4.25	-1.1	-27	-0.018	-0.004		-1.1	-27	-0.018	-0.004	
Oldman	1906.5	6.25	-1.1	-33	-0.021	-0.005		-1.1	-33	-0.021	-0.005	
Snyder	2004	0.25	-1.1	-8.5	-0.024	-0.017		-1.1	-8.5	-0.024	-0.017	
Snyder	2000	1.25	-1.1	-9.1	-0.02	-0.015		-1.1	-9.1	-0.02	-0.015	
Snyder	1991.5	2.75	-1.1	-10	-0.017	-0.013		-1.1	-10	-0.017	-0.013	
Snyder	1985	3.75	-1.1	-11	-0.017	-0.012		-1.1	-11	-0.017	-0.012	
Snyder	1978	4.75	-1.1	-11	-0.016	-0.011		-1.1	-11	-0.016	-0.011	
Snyder	1967.5	5.75	-1.1	-12	-0.015	-0.011		-1.1	-12	-0.015	-0.011	
Snyder	1954.5	6.75	-1.1	-11	-0.012	-0.009		-1.1	-11	-0.012	-0.009	
Snyder	1893	11.75	-1.1	-13	-0.009	-0.007		-1.1	-13	-0.009	-0.007	

Site	Average Year (y)	Average Depth (cm)	BDE #47 pg/g dw	BDE #47 pg/g TOC	BDE #47 Flux pg/cm2.y	BDE #47 Flux (FF) pg/cm2.y	BDE #47 FLAG	BDE #66 pg/g dw	BDE #66 pg/g TOC	BDE #66 Flux pg/cm2.y	BDE #66 Flux (FF) pg/cm2.y	BDE #66 FLAG
Mills	2002	0.25	6900	43000	200	140		-0.47	-3	-0.014	-0.009	
Mills	2000	0.75	3400	24000	98	66		-0.47	-3.3	-0.014	-0.009	
Mills	1991	2.75	1800	14000	42	29		-0.47	-3.6	-0.011	-0.008	
Mills	1974	4.75	-1.7	-15	-0.032	-0.021	d	-0.47	-4.3	-0.009	-0.006	d
Mills	1964	6.25	-1.7	-14	-0.054	-0.036		-0.47	-3.9	-0.015	-0.01	
Mills	1947	8.75					X	-0.47	-4.2	-0.012	-0.008	
Mills	1905	17.5	-1.7	-14	-0.037	-0.025	d	-0.47	-3.9	-0.01	-0.007	d
Lone Pine	2001	0.25	1000	7400	15	10		-0.47	-3.4	-0.007	-0.005	
Lone Pine	1998	0.75					X	-0.47	-3.7	-0.007	-0.005	
Lone Pine	1990	1.75	1000	9000	18	12		-0.47	-4.1	-0.008	-0.005	
Lone Pine	1982	2.75					X	-0.47	-3.9	-0.008	-0.005	

Lone Pine	1961	4.75					X	-0.47	-4.2	-0.007	-0.004	
Lone Pine	1936	6.75					X	-0.47	-4.2	-0.006	-0.004	
Lone Pine	1920	7.75					X	-0.47	-4.4	-0.006	-0.004	
Lone Pine	1870	11.5					X	-0.47	-4.1	-0.006	-0.004	
Emerald	2002	0.25					X	-0.47	-5.4	-0.022	-0.006	
Emerald	1997	1.75	9200	102000	420	110		-0.47	-5.3	-0.022	-0.006	
Emerald	1989	3.75	-1.7	-18	-0.077	-0.021		-0.47	-5	-0.022	-0.006	
Emerald	1980	5.75	17000	184000	790	210		-0.47	-5.1	-0.022	-0.006	
Emerald	1971.5	7.75					X	-0.47	-5.5	-0.022	-0.006	
Emerald	1961.5	9.75	13000	126000	600	160		-0.47	-4.6	-0.022	-0.006	
Emerald	1958	10.5	-1.7	-21	-0.077	-0.021		-0.47	-6	-0.022	-0.006	
Emerald	1892	21.5	-1.7	-20	-0.095	-0.026	d	-0.47	-5.7	-0.027	-0.007	d
Burial	2000	0.25	430	6500	1.7	2	e	-0.47	-7.1	-0.002	-0.002	
Burial	1988	0.75	390	6600	1.6	1.8	e	-0.47	-8	-0.002	-0.002	
Burial	1974	1.25	180	3100	0.83	0.95	e	-0.47	-8.2	-0.002	-0.002	
Burial	1957	1.75	-1.7	-31	-0.006	-0.006		-0.47	-8.8	-0.002	-0.002	
Burial	1933	2.25	61000	1199000	190	210	XXX	-0.47	-9.3	-0.001	-0.002	
Burial	1906	2.75					Z	-0.47	-9.2	-0.001	-0.002	d
Burial	1879	3.25	160	3100	0.5	0.57		-0.47	-9	-0.001	-0.002	
Mcleod	2002	0.25					X	-0.47	-3.9	-0.002	-0.001	
Mcleod	1997	0.75	3400	30000	19	7.4	e	-0.47	-4.1	-0.003	-0.001	
Mcleod	1990	1.25					X	-0.47	-4.8	-0.003	-0.001	
Mcleod	1982	1.75	4900	52000	39	15	e	-0.47	-5.1	-0.004	-0.001	
Mcleod	1975	2.25					X	-0.47	-5.3	-0.005	-0.002	
Mcleod	1969	2.75	6300	70000	70	27	e	-0.47	-5.3	-0.005	-0.002	
Mcleod	1962	3.25					X	-0.47	-5	-0.004	-0.001	
Mcleod	1952	3.75	4500	50000	28	11	e	-0.47	-5.2	-0.003	-0.001	
Mcleod	1907	6.25	8900	82000	51	20		-0.47	-4.3	-0.003	-0.001	
Matcharak	2001	0.25					X	-0.47		-0.002	-0.002	
Matcharak	1993	0.75					X	-0.47	-3.7	-0.002	-0.002	
Matcharak	1983	1.25	1400	12000	6.1	4.9	e	-0.47	-3.9	-0.002	-0.002	
Matcharak	1971	1.75					X	-0.47	-4	-0.002	-0.001	

Matcharak	1954	2.25	4700	42000	12	9.4	e	-0.47	-4.2	-0.001	-0.001	
Matcharak	1937	2.75					X	-0.47	-4.5	-0.001	-0.001	
Matcharak	1910	3.25	2100	21000	4.3	3.4	e	-0.47	-4.6	-0.001	-0.001	
Wonder	2000	0.25	-1.7	-23	-0.012	-0.004		-0.47	-6.6	-0.004	-0.001	
Wonder	1992	0.75	-1.7	-23	-0.013	-0.004		-0.47	-6.6	-0.004	-0.001	
Wonder	1985	1.25	620	9600	4.4	1.3		-0.47	-7.4	-0.003	-0.001	
Wonder	1977	1.75	720	12000	4.7	1.4		-0.47	-7.9	-0.003	-0.001	
Wonder	1968	2.25	33000	551000	160	45		-0.47	-7.9	-0.002	-0.001	
Wonder	1949	2.75	15000	248000	48	14		-0.47	-7.8	-0.002	-0.00043	
Wonder	1919	3.25	4900	93000	11	3.2		-0.47	-9	-0.001	-0.00031	
Golden	2002.5	0.25					X	-0.47		-0.001	-0.001	
Golden	1996.5	0.75	59000		180	180		-0.47		-0.001	-0.001	
Golden	1989.5	1.25	10000	61000	39	39		-0.47	-2.8	-0.002	-0.002	
Golden	1981.5	1.75	34000	201000	120	120		-0.47	-2.8	-0.002	-0.002	
Golden	1972.5	2.25					Z	-0.47	-2	-0.001	-0.001	
Golden	1962.5	2.75	34000	140000	82	82	e	-0.47	-2	-0.001	-0.001	
Golden	1951	3.25	16000	61000	34	34	e	-0.47	-1.9	-0.001	-0.001	
Golden	1924	4.25	19000	75000	33	33	e	-0.47	-1.8	-0.001	-0.001	
LP 19	2004	0.25	-1.7	-9.1	-0.018	-0.012		-0.47	-2.6	-0.005	-0.003	
LP 19	1999	1.25	-1.7		-0.016	-0.011	d	-0.47		-0.004	-0.003	d
LP 19	1994	2.25	4400	24000	49	33		-0.47	-2.6	-0.005	-0.003	
LP 19	1989	3.25	-1.7	-9.1	-0.014	-0.009	d	-0.47	-2.6	-0.004	-0.003	d
LP 19	1980	4.25	-1.7	-9.1	-0.01	-0.007	d	-0.47	-2.6	-0.003	-0.002	d
LP 19	1969	5.25	-1.7	-9.2	-0.009	-0.006	d	-0.47	-2.6	-0.002	-0.002	d
LP 19	1956	6.25	2300	12000	9.7	6.5	d	-0.47	-2.5	-0.002	-0.001	d
LP 19	1903	10.5	-1.7	-9.8	-0.01	-0.007	Z	-0.47	-2.8	-0.003	-0.002	d
Hoh	2004	0.25	1600	8000	21	6.9	d	-0.47	-2.3	-0.006	-0.002	d
Hoh	1998	1.25	4000	22000	36	12		-0.47	-2.6	-0.004	-0.001	
Hoh	1990.5	2.25	-1.7	-12	-0.018	-0.006		-0.47	-3.3	-0.005	-0.002	
Hoh	1983	3.25	1900	18000	27	8.7		-0.47	-4.5	-0.007	-0.002	
Hoh	1973.5	4.25	-1.7	-18	-0.025	-0.008		-0.47	-5.2	-0.007	-0.002	
Hoh	1963	5.25	-1.7	-16	-0.023	-0.007		-0.47	-4.7	-0.006	-0.002	

Hoh	1952.5	6.25	890	10000	17	5.6	d	-0.47	-5.5	-0.009	-0.003	d
Hoh	1901	12.75	-1.7	-20	-0.035	-0.011	d	-0.47	-5.7	-0.01	-0.003	d
PJ	2004.5	0.25	-1.7	-10	-0.047	-0.06		-0.47	-3	-0.013	-0.017	
PJ	1999	2.75	2000	12000	55	70		-0.47	-2.9	-0.013	-0.016	
PJ	1992	4.75	-1.7	-10	-0.041	-0.053		-0.47	-2.9	-0.012	-0.015	
PJ	1984	6.75	-1.7	-11	-0.054	-0.07		-0.47	-3.1	-0.015	-0.02	
PJ	1977.5	8.75	-1.7	-11	-0.091	-0.12	d	-0.47	-3.1	-0.026	-0.033	d
PJ	1968	11.5					Z	-0.47		-0.014	-0.018	d
PJ	1963	12.5	-1.7	-11	-0.069	-0.088	d	-0.47	-3.2	-0.019	-0.025	d
PJ	1955	15.5	-1.7	-11	-0.16	-0.21	d	-0.47	-3.2	-0.046	-0.059	d
Oldman	2003.5	0.25	-1.7	-32	-0.092	-0.02		-0.47	-8.9	-0.026	-0.006	c
Oldman	1997	1.25	-1.7	-34	-0.072	-0.016		-0.47	-9.5	-0.02	-0.004	c
Oldman	1987	2.25	-1.7	-31	-0.044	-0.01		-0.47	-8.8	-0.012	-0.003	c
Oldman	1980.5	2.75	-1.7	-33	-0.038	-0.008	d	-0.47	-9.2	-0.011	-0.002	c,d
Oldman	1973	3.25	410	8600	8.5	1.9	d	-0.47	-10	-0.01	-0.002	c,d
Oldman	1963.5	3.75	-1.7	-38	-0.03	-0.007		-0.47	-11	-0.009	-0.002	c
Oldman	1952	4.25	-1.7	-40	-0.027	-0.006		-0.47	-11	-0.008	-0.002	c
Oldman	1906.5	6.25	-1.7	-49	-0.031	-0.007		-0.47	-14	-0.009	-0.002	c
Snyder	2004	0.25	-1.7	-13	-0.035	-0.026		-0.47	-3.6	-0.01	-0.007	
Snyder	2000	1.25	19000	152000	340	250		-0.47	-3.9	-0.009	-0.006	
Snyder	1991.5	2.75	2200	19000	34	24		-0.47	-4.3	-0.007	-0.005	
Snyder	1985	3.75	-1.7	-16	-0.025	-0.018		-0.47	-4.6	-0.007	-0.005	
Snyder	1978	4.75	1000	10000	14	11		-0.47	-4.8	-0.007	-0.005	
Snyder	1967.5	5.75	500	5300	6.5	4.7		-0.47	-5.1	-0.006	-0.004	
Snyder	1954.5	6.75	-1.7	-17	-0.018	-0.013		-0.47	-4.7	-0.005	-0.004	
Snyder	1893	11.75	-1.7	-19	-0.013	-0.01		-0.47	-5.4	-0.004	-0.003	

Site	Average Year (y)	Average Depth (cm)	BDE #77 pg/g dw	BDE #77 pg/g TOC	BDE #77 Flux pg/cm2.y	BDE #77 Flux (FF) pg/cm2.y	BDE #77 FLAG	BDE #100 pg/g dw	BDE #100 pg/g TOC	BDE #100 Flux pg/cm2.y	BDE #100 Flux (FF) pg/cm2.y	BDE #100 FLAG
Mills	2002	0.25	-0.71	-4.4	-0.021	-0.014		980	6100	28	19	

Mills	2000	0.75	-0.71	-5	-0.021	-0.014		420	3000	12	8.3	
Mills	1991	2.75	-0.71	-5.4	-0.017	-0.012		67	520	1.6	1.1	
Mills	1974	4.75	-0.71	-6.5	-0.013	-0.009	d	-4.1	-37	-0.078	-0.052	
Mills	1964	6.25	-0.71	-5.8	-0.023	-0.015		-4.1	-34	-0.13	-0.088	
Mills	1947	8.75	-0.71	-6.3	-0.018	-0.012						X
Mills	1905	17.5	-0.71	-5.8	-0.016	-0.011	d	-4.1	-34	-0.09	-0.061	d
Lone Pine	2001	0.25	-0.71	-5.1	-0.011	-0.007		-4.1	-29	-0.061	-0.041	
Lone Pine	1998	0.75	-0.71	-5.5	-0.011	-0.007						X
Lone Pine	1990	1.75	-0.71	-6.1	-0.012	-0.008		130	1100	2.3	1.5	
Lone Pine	1982	2.75	-0.71	-5.8	-0.012	-0.008						X
Lone Pine	1961	4.75	-0.71	-6.2	-0.01	-0.007						X
Lone Pine	1936	6.75	-0.71	-6.3	-0.009	-0.006						X
Lone Pine	1920	7.75	-0.71	-6.6	-0.009	-0.006						X
Lone Pine	1870	11.5	-0.71	-6.2	-0.009	-0.006						X
Emerald	2002	0.25	-0.71	-8.1	-0.033	-0.009		1000	12000	48	13	e
Emerald	1997	1.75	-0.71	-7.9	-0.033	-0.009		860	9600	40	11	e
Emerald	1989	3.75	-0.71	-7.4	-0.033	-0.009		340	3600	16	4.2	e
Emerald	1980	5.75	-0.71	-7.6	-0.033	-0.009		2500	26000	110	30	
Emerald	1971.5	7.75	-0.71	-8.2	-0.033	-0.009						X
Emerald	1961.5	9.75	-0.71	-6.9	-0.033	-0.009	c	270	2700	13	3.4	
Emerald	1958	10.5	-0.71	-9	-0.033	-0.009		83	1100	3.8	1	e
Emerald	1892	21.5	-0.71	-8.5	-0.04	-0.011	c,d	-4.1	-49	-0.23	-0.062	
Burial	2000	0.25	-0.71	-11	-0.003	-0.003		-4.1	-62	-0.016	-0.019	
Burial	1988	0.75	-0.71	-12	-0.003	-0.003		84	1400	0.34	0.39	e
Burial	1974	1.25	-0.71	-12	-0.003	-0.004						X
Burial	1957	1.75	-0.71	-13	-0.002	-0.003						Z
Burial	1933	2.25	-0.71	-14	-0.002	-0.002		16000	320000	50	57	XXX
Burial	1906	2.75	-0.71	-14	-0.002	-0.002	d	210	4000	0.64	0.72	
Burial	1879	3.25	-0.71	-13	-0.002	-0.002		68	1300	0.21	0.24	
Mcleod	2002	0.25	-0.71	-5.8	-0.004	-0.001	c					X
Mcleod	1997	0.75	-0.71	-6.2	-0.004	-0.002	c	940	8200	5.3	2	
Mcleod	1990	1.25	-0.71	-7.2	-0.005	-0.002	c					X

Mcleod	1982	1.75	-0.71	-7.7	-0.006	-0.002	c	1300	14000	10	4	
Mcleod	1975	2.25	-0.71	-7.9	-0.007	-0.003	c					X
Mcleod	1969	2.75	-0.71	-7.9	-0.008	-0.003	c	2000	22000	22	8.6	
Mcleod	1962	3.25	-0.71	-7.5	-0.006	-0.002	c					X
Mcleod	1952	3.75	-0.71	-7.8	-0.004	-0.002	c	720	8000	4.5	1.7	
Mcleod	1907	6.25	-0.71	-6.5	-0.004	-0.002	c	2800	26000	16	6.2	
Matcharak	2001	0.25	-0.71		-0.003	-0.002	c					X
Matcharak	1993	0.75	-0.71	-5.6	-0.003	-0.003	c					X
Matcharak	1983	1.25	-0.71	-5.8	-0.003	-0.002	c					X
Matcharak	1971	1.75	-0.71	-6	-0.002	-0.002	c	-4.1	-35	-0.013	-0.011	
Matcharak	1954	2.25	-0.71	-6.3	-0.002	-0.001	c	1100	10000	2.9	2.3	
Matcharak	1937	2.75	-0.71	-6.7	-0.001	-0.001	c	-4.1	-39	-0.009	-0.007	
Matcharak	1910	3.25	-0.71	-6.9	-0.001	-0.001	c	-4.1	-40	-0.008	-0.007	
Wonder	2000	0.25	-0.71	-9.9	-0.005	-0.002		-4.1	-57	-0.03	-0.009	
Wonder	1992	0.75	-0.71	-9.9	-0.005	-0.002		-4.1	-57	-0.031	-0.009	
Wonder	1985	1.25	-0.71	-11	-0.005	-0.001		-4.1	-64	-0.029	-0.008	
Wonder	1977	1.75	-0.71	-12	-0.005	-0.001		-4.1	-68	-0.027	-0.008	
Wonder	1968	2.25	-0.71	-12	-0.003	-0.001		11000	175000	50	14	
Wonder	1949	2.75	-0.71	-12	-0.002	-0.001		3700	62000	12	3.4	
Wonder	1919	3.25	-0.71	-13	-0.002	-0.00047		1700	32000	3.9	1.1	
Golden	2002.5	0.25	-0.71		-0.001	-0.001		1300		1.8	1.8	
Golden	1996.5	0.75	-0.71		-0.002	-0.002		13000		39	39	d
Golden	1989.5	1.25	-0.71	-4.2	-0.003	-0.003		2400	14000	9	9	
Golden	1981.5	1.75	-0.71	-4.2	-0.003	-0.003		6100	36000	22	22	
Golden	1972.5	2.25	-0.71	-3	-0.002	-0.002		2100	8800	6.2	6.2	
Golden	1962.5	2.75	-0.71	-3	-0.002	-0.002		17000	69000	41	41	d
Golden	1951	3.25	-0.71	-2.8	-0.002	-0.002		3600	14000	7.8	7.8	e
Golden	1924	4.25	-0.71	-2.8	-0.001	-0.001		3800	15000	6.5	6.5	e
LP 19	2004	0.25	-0.71	-3.9	-0.008	-0.005		-4.1	-22	-0.045	-0.03	
LP 19	1999	1.25	-0.71		-0.007	-0.004	d	-4.1		-0.039	-0.026	
LP 19	1994	2.25	-0.71	-3.9	-0.008	-0.005		940	5100	10	6.9	
LP 19	1989	3.25	-0.71	-3.9	-0.006	-0.004	d	-4.1	-22	-0.035	-0.023	

LP 19	1980	4.25	-0.71	-3.9	-0.004	-0.003	d	-4.1	-22	-0.025	-0.016	
LP 19	1969	5.25	-0.71	-3.9	-0.004	-0.002	d	-4.1	-22	-0.021	-0.014	
LP 19	1956	6.25	-0.71	-3.8	-0.003	-0.002	d	-4.1	-22	-0.017	-0.011	
LP 19	1903	10.5	-0.71	-4.1	-0.004	-0.003	d	3500	20000	22	14	
Hoh	2004	0.25	-0.71	-3.5	-0.009	-0.003	d	-4.1	-20	-0.053	-0.017	d
Hoh	1998	1.25	-0.71	-3.9	-0.006	-0.002		-4.1	-22	-0.037	-0.012	
Hoh	1990.5	2.25	-0.71	-5	-0.008	-0.003		-4.1	-29	-0.045	-0.015	
Hoh	1983	3.25	-0.71	-6.8	-0.01	-0.003		-4.1	-39	-0.059	-0.019	d
Hoh	1973.5	4.25	-0.71	-7.8	-0.011	-0.003		-4.1	-45	-0.061	-0.02	
Hoh	1963	5.25	-0.71	-7	-0.01	-0.003		-4.1	-40	-0.055	-0.018	
Hoh	1952.5	6.25	-0.71	-8.2	-0.014	-0.004	d	2700	32000	53	17	
Hoh	1901	12.75	-0.71	-8.5	-0.015	-0.005	d	-4.1	-49	-0.086	-0.028	
PJ	2004.5	0.25	-0.71	-4.4	-0.02	-0.025		-4.1	-26	-0.11	-0.15	
PJ	1999	2.75	-0.71	-4.4	-0.019	-0.025		-4.1	-25	-0.11	-0.14	
PJ	1992	4.75	-0.71	-4.4	-0.017	-0.022		-4.1	-25	-0.1	-0.13	
PJ	1984	6.75	-0.71	-4.6	-0.023	-0.03		-4.1	-27	-0.13	-0.17	
PJ	1977.5	8.75	-0.71	-4.7	-0.039	-0.05	d	-4.1	-27	-0.22	-0.29	
PJ	1968	11.5	-0.71		-0.021	-0.026	d	-4.1		-0.12	-0.15	
PJ	1963	12.5	-0.71	-4.9	-0.029	-0.037	d	-4.1	-28	-0.17	-0.21	
PJ	1955	15.5	-0.71	-4.8	-0.069	-0.088	d	-4.1	-28	-0.4	-0.51	
Oldman	2003.5	0.25	-0.71	-13	-0.039	-0.009	c	-4.1	-77	-0.22	-0.049	
Oldman	1997	1.25	-0.71	-14	-0.031	-0.007	c	-4.1	-82	-0.18	-0.039	
Oldman	1987	2.25	-0.71	-13	-0.018	-0.004	c	-4.1	-76	-0.11	-0.023	
Oldman	1980.5	2.75	-0.71	-14	-0.016	-0.004	c,d	-4.1	-80	-0.092	-0.02	
Oldman	1973	3.25	-0.71	-15	-0.015	-0.003	c,d	-4.1	-87	-0.086	-0.019	
Oldman	1963.5	3.75	-0.71	-16	-0.013	-0.003	c	-4.1	-92	-0.074	-0.016	
Oldman	1952	4.25	-0.71	-17	-0.011	-0.002	c	-4.1	-97	-0.065	-0.014	
Oldman	1906.5	6.25	-0.71	-21	-0.013	-0.003	c	-4.1	-120	-0.076	-0.017	
Snyder	2004	0.25	-0.71	-5.4	-0.015	-0.011		-4.1	-31	-0.086	-0.063	
Snyder	2000	1.25	-0.71	-5.8	-0.013	-0.009		5400	44000	98	72	
Snyder	1991.5	2.75	-0.71	-6.4	-0.011	-0.008		-4.1	-37	-0.063	-0.046	
Snyder	1985	3.75	-0.71	-6.8	-0.011	-0.008		-4.1	-39	-0.061	-0.045	

Snyder	1978	4.75	-0.71	-7.2	-0.01	-0.007		750	7700	11	7.7	
Snyder	1967.5	5.75	-0.71	-7.6	-0.009	-0.007		370	3900	4.8	3.5	
Snyder	1954.5	6.75	-0.71	-7.1	-0.008	-0.006		-4.1	-41	-0.045	-0.033	
Snyder	1893	11.75	-0.71	-8.1	-0.006	-0.004		-4.1	-47	-0.033	-0.024	

Site	Average Year (y)	Average Depth (cm)	BDE #119 pg/g dw	BDE #119 pg/g TOC	BDE #119 Flux pg/cm2.y	BDE #119 Flux (FF) pg/cm2.y	BDE #119 FLAG	BDE #99 pg/g dw	BDE #99 pg/g TOC	BDE #99 Flux pg/cm2.y	BDE #99 Flux (FF) pg/cm2.y	BDE #99 FLAG
Mills	2002	0.25	-3.3	-20	-0.095	-0.064		5500	35000	160	110	
Mills	2000	0.75	-3.3	-23	-0.095	-0.064		2900	21000	85	58	
Mills	1991	2.75	-3.3	-25	-0.078	-0.053		1400	10000	32	22	
Mills	1974	4.75	-3.3	-30	-0.062	-0.042		440	4100	8.4	5.7	
Mills	1964	6.25	-3.3	-27	-0.1	-0.071		-2.7	-22	-0.087	-0.059	
Mills	1947	8.75	-3.3	-29	-0.082	-0.055						X
Mills	1905	17.5	-3.3	-27	-0.072	-0.049	d	-2.7	-22	-0.06	-0.04	d
Lone Pine	2001	0.25	-3.3	-24	-0.049	-0.033		450	3300	6.8	4.6	
Lone Pine	1998	0.75	-3.3	-25	-0.049	-0.033						X
Lone Pine	1990	1.75	-3.3	-28	-0.056	-0.038		780	6700	13	9	
Lone Pine	1982	2.75	-3.3	-27	-0.056	-0.038						X
Lone Pine	1961	4.75	-3.3	-29	-0.046	-0.031						X
Lone Pine	1936	6.75	-3.3	-29	-0.039	-0.027						X
Lone Pine	1920	7.75	-3.3	-30	-0.039	-0.027						X
Lone Pine	1870	11.5	-3.3	-28	-0.039	-0.027						X
Emerald	2002	0.25	-3.3	-37	-0.15	-0.04		2400	28000	110	30	e
Emerald	1997	1.75	-3.3	-36	-0.15	-0.04		4200	47000	200	52	e
Emerald	1989	3.75	-3.3	-34	-0.15	-0.04		1800	18000	81	22	e
Emerald	1980	5.75	-3.3	-35	-0.15	-0.04		-2.7	-29	-0.13	-0.034	
Emerald	1971.5	7.75	-3.3	-38	-0.15	-0.04		2100	24000	94	25	e
Emerald	1961.5	9.75	-3.3	-32	-0.15	-0.04		22000	215000	1000	270	
Emerald	1958	10.5	-3.3	-41	-0.15	-0.04		250	3100	11	3.1	e
Emerald	1892	21.5	-3.3	-39	-0.19	-0.05						X

Burial	2000	0.25	-3.3	-49	-0.013	-0.015						X
Burial	1988	0.75	-3.3	-55	-0.013	-0.015		520	8800	2.1	2.4	e
Burial	1974	1.25	-3.3	-57	-0.015	-0.017						Z
Burial	1957	1.75	-3.3	-61	-0.011	-0.012		480	8800	1.6	1.8	e
Burial	1933	2.25	-3.3	-64	-0.01	-0.012		85000	1670000	260	300	XXX
Burial	1906	2.75	-3.3	-64	-0.01	-0.012		860	17000	2.7	3	
Burial	1879	3.25	-3.3	-62	-0.01	-0.012		400	7500	1.2	1.4	e
Mcleod	2002	0.25	-3.3	-27	-0.017	-0.006						X
Mcleod	1997	0.75	-3.3	-29	-0.018	-0.007		3900	35000	22	8.5	e
Mcleod	1990	1.25	-3.3	-33	-0.021	-0.008						X
Mcleod	1982	1.75	-3.3	-35	-0.026	-0.01		7200	77000	58	22	e
Mcleod	1975	2.25	-3.3	-36	-0.034	-0.013						X
Mcleod	1969	2.75	-3.3	-37	-0.037	-0.014		10000	112000	110	43	
Mcleod	1962	3.25	-3.3	-35	-0.026	-0.01						X
Mcleod	1952	3.75	-3.3	-36	-0.021	-0.008		5900	65000	37	14	e
Mcleod	1907	6.25	-3.3	-30	-0.019	-0.007		15000	137000	85	33	
Matcharak	2001	0.25	-3.3		-0.013	-0.011						X
Matcharak	1993	0.75	-3.3	-26	-0.015	-0.012						X
Matcharak	1983	1.25	-3.3	-27	-0.014	-0.011						X
Matcharak	1971	1.75	-3.3	-28	-0.011	-0.009						X
Matcharak	1954	2.25	-3.3	-29	-0.008	-0.007		8300	74000	21	17	e
Matcharak	1937	2.75	-3.3	-31	-0.007	-0.005						X
Matcharak	1910	3.25	-3.3	-32	-0.007	-0.005		2300	22000	4.5	3.6	e
Wonder	2000	0.25	-3.3	-46	-0.024	-0.007		-2.7	-38	-0.02	-0.006	
Wonder	1992	0.75	-3.3	-46	-0.025	-0.007		-2.7	-38	-0.02	-0.006	
Wonder	1985	1.25	-3.3	-51	-0.024	-0.007		-2.7	-42	-0.02	-0.006	
Wonder	1977	1.75	-3.3	-55	-0.022	-0.006		610	10000	4.1	1.2	
Wonder	1968	2.25	-3.3	-54	-0.015	-0.004		53000	880000	250	71	
Wonder	1949	2.75	-3.3	-54	-0.01	-0.003		21000	355000	68	20	
Wonder	1919	3.25	-3.3	-62	-0.008	-0.002		8500	162000	20	5.6	
Golden	2002.5	0.25	-3.3		-0.004	-0.004						X
Golden	1996.5	0.75	-3.3		-0.01	-0.01	d	65000		200	200	d

Golden	1989.5	1.25	-3.3	-19	-0.012	-0.012		4100	24000	15	15	
Golden	1981.5	1.75	-3.3	-19	-0.012	-0.012		24000	144000	88	88	
Golden	1972.5	2.25	-3.3	-14	-0.01	-0.01		1200	5000	3.6	3.6	
Golden	1962.5	2.75	-3.3	-14	-0.008	-0.008	d	50000	210000	120	120	e
Golden	1951	3.25	-3.3	-13	-0.007	-0.007						X
Golden	1924	4.25	-3.3	-13	-0.006	-0.006						X
LP 19	2004	0.25	-3.3	-18	-0.036	-0.024		-2.7	-15	-0.03	-0.02	
LP 19	1999	1.25	-3.3		-0.031	-0.021		-2.7		-0.026	-0.017	
LP 19	1994	2.25	-3.3	-18	-0.036	-0.024		2400	13000	27	18	
LP 19	1989	3.25	-3.3	-18	-0.028	-0.018		-2.7	-15	-0.023	-0.015	
LP 19	1980	4.25	-3.3	-18	-0.02	-0.013		-2.7	-15	-0.016	-0.011	
LP 19	1969	5.25	-3.3	-18	-0.017	-0.011		-2.7	-15	-0.014	-0.009	
LP 19	1956	6.25	-3.3	-17	-0.014	-0.009		-2.7	-15	-0.011	-0.008	
LP 19	1903	10.5	-3.3	-19	-0.02	-0.014		19000	112000	120	79	
Hoh	2004	0.25	-3.3	-16	-0.043	-0.014	d					X
Hoh	1998	1.25	-3.3	-18	-0.029	-0.009						X
Hoh	1990.5	2.25	-3.3	-23	-0.036	-0.012		-2.7	-19	-0.03	-0.01	
Hoh	1983	3.25	-3.3	-31	-0.047	-0.015	d	-2.7	-26	-0.039	-0.013	d
Hoh	1973.5	4.25	-3.3	-36	-0.049	-0.016		-2.7	-30	-0.041	-0.013	
Hoh	1963	5.25	-3.3	-32	-0.044	-0.014		-2.7	-27	-0.037	-0.012	
Hoh	1952.5	6.25	-3.3	-38	-0.064	-0.021		18000	207000	350	110	
Hoh	1901	12.75	-3.3	-39	-0.069	-0.022		-2.7	-33	-0.057	-0.018	
PJ	2004.5	0.25	-3.3	-20	-0.092	-0.12		1800	11000	50	64	
PJ	1999	2.75	-3.3	-20	-0.088	-0.11		2100	13000	57	72	
PJ	1992	4.75	-3.3	-20	-0.08	-0.1		-2.7	-17	-0.067	-0.085	
PJ	1984	6.75	-3.3	-21	-0.11	-0.14		-2.7	-18	-0.088	-0.11	
PJ	1977.5	8.75	-3.3	-22	-0.18	-0.23		-2.7	-18	-0.15	-0.19	
PJ	1968	11.5	-3.3		-0.095	-0.12		640		18	24	
PJ	1963	12.5	-3.3	-22	-0.13	-0.17		-2.7	-19	-0.11	-0.14	
PJ	1955	15.5	-3.3	-22	-0.32	-0.41		-2.7	-18	-0.26	-0.34	
Oldman	2003.5	0.25	-3.3	-62	-0.18	-0.04		-2.7	-51	-0.15	-0.033	
Oldman	1997	1.25	-3.3	-66	-0.14	-0.031		-2.7	-55	-0.12	-0.026	

Oldman	1987	2.25	-3.3	-61	-0.085	-0.019		-2.7	-51	-0.071	-0.016	
Oldman	1980.5	2.75	-3.3	-64	-0.074	-0.016		-2.7	-53	-0.061	-0.013	
Oldman	1973	3.25	-3.3	-69	-0.069	-0.015		490	10000	10	2.3	
Oldman	1963.5	3.75	-3.3	-74	-0.059	-0.013		-2.7	-61	-0.049	-0.011	
Oldman	1952	4.25	-3.3	-78	-0.052	-0.011		310	7400	5	1.1	
Oldman	1906.5	6.25	-3.3	-96	-0.06	-0.013		170	4900	3.1	0.69	
Snyder	2004	0.25	-3.3	-25	-0.069	-0.05		-2.7	-21	-0.057	-0.042	
Snyder	2000	1.25	-3.3	-27	-0.059	-0.043		28000	225000	500	360	
Snyder	1991.5	2.75	-3.3	-29	-0.051	-0.037		2400	21000	36	27	
Snyder	1985	3.75	-3.3	-31	-0.049	-0.036		-2.7	-26	-0.041	-0.03	
Snyder	1978	4.75	-3.3	-33	-0.046	-0.033		4100	42000	58	42	
Snyder	1967.5	5.75	-3.3	-35	-0.043	-0.031		2000	21000	26	19	
Snyder	1954.5	6.75	-3.3	-33	-0.036	-0.026		-2.7	-27	-0.03	-0.022	
Snyder	1893	11.75	-3.3	-37	-0.026	-0.019		-2.7	-31	-0.022	-0.016	

Site	Average Year (y)	Average Depth (cm)	BDE #116 pg/g dw	BDE #116 pg/g TOC	BDE #116 Flux pg/cm2.y	BDE #116 Flux (FF) pg/cm2.y	BDE #116 FLAG	BDE 85/155 pg/g dw	BDE 85/155 pg/g TOC	BDE 85/155 Flux pg/cm2.y	BDE 85/155 Flux (FF) pg/cm2.y	BDE 85/155 FLAG
Mills	2002	0.25	-1.8	-11	-0.051	-0.035		-1.8	-11	-0.051	-0.035	
Mills	2000	0.75	-1.8	-12	-0.051	-0.035		-1.8	-12	-0.051	-0.035	
Mills	1991	2.75	-1.8	-14	-0.042	-0.029		-1.8	-14	-0.042	-0.029	
Mills	1974	4.75	-1.8	-16	-0.034	-0.023		-1.8	-16	-0.034	-0.023	
Mills	1964	6.25	-1.8	-15	-0.057	-0.038		-1.8	-15	-0.057	-0.038	
Mills	1947	8.75	-1.8	-16	-0.044	-0.03		-1.8	-16	-0.044	-0.03	
Mills	1905	17.5	-1.8	-15	-0.039	-0.026	d	-1.8	-15	-0.039	-0.026	d
Lone Pine	2001	0.25	-1.8	-13	-0.026	-0.018		-1.8	-13	-0.026	-0.018	
Lone Pine	1998	0.75	-1.8	-14	-0.026	-0.018		-1.8	-14	-0.026	-0.018	
Lone Pine	1990	1.75	-1.8	-15	-0.03	-0.02		-1.8	-15	-0.03	-0.02	
Lone Pine	1982	2.75	-1.8	-14	-0.03	-0.02		-1.8	-14	-0.03	-0.02	
Lone Pine	1961	4.75	-1.8	-16	-0.025	-0.017		-1.8	-16	-0.025	-0.017	
Lone Pine	1936	6.75	-1.8	-16	-0.021	-0.014		-1.8	-16	-0.021	-0.014	
Lone Pine	1920	7.75	-1.8	-16	-0.021	-0.014		-1.8	-16	-0.021	-0.014	

Lone Pine	1870	11.5	-1.8	-15	-0.021	-0.014		-1.8	-15	-0.021	-0.014	
Emerald	2002	0.25	-1.8	-20	-0.081	-0.022		-1.8	-20	-0.081	-0.022	
Emerald	1997	1.75	-1.8	-20	-0.081	-0.022		-1.8	-20	-0.081	-0.022	
Emerald	1989	3.75	-1.8	-19	-0.081	-0.022		-1.8	-19	-0.081	-0.022	
Emerald	1980	5.75	-1.8	-19	-0.081	-0.022		-1.8	-19	-0.081	-0.022	
Emerald	1971.5	7.75	-1.8	-20	-0.081	-0.022		-1.8	-20	-0.081	-0.022	
Emerald	1961.5	9.75	-1.8	-17	-0.081	-0.022		-1.8	-17	-0.081	-0.022	
Emerald	1958	10.5	-1.8	-22	-0.081	-0.022		-1.8	-22	-0.081	-0.022	
Emerald	1892	21.5	-1.8	-21	-0.1	-0.027		-1.8	-21	-0.1	-0.027	
Burial	2000	0.25	-1.8	-27	-0.007	-0.008		-1.8	-27	-0.007	-0.008	
Burial	1988	0.75	-1.8	-30	-0.007	-0.008		-1.8	-30	-0.007	-0.008	
Burial	1974	1.25	-1.8	-31	-0.008	-0.009		-1.8	-31	-0.008	-0.009	
Burial	1957	1.75	-1.8	-33	-0.006	-0.007		-1.8	-33	-0.006	-0.007	
Burial	1933	2.25	-1.8	-35	-0.005	-0.006		-1.8	-35	-0.005	-0.006	
Burial	1906	2.75	-1.8	-34	-0.005	-0.006		-1.8	-34	-0.005	-0.006	
Burial	1879	3.25	-1.8	-34	-0.005	-0.006		-1.8	-34	-0.005	-0.006	
Mcleod	2002	0.25	-1.8	-15	-0.009	-0.003		-1.8	-15	-0.009	-0.003	
Mcleod	1997	0.75	-1.8	-15	-0.01	-0.004		-1.8	-15	-0.01	-0.004	
Mcleod	1990	1.25	-1.8	-18	-0.011	-0.004		-1.8	-18	-0.011	-0.004	
Mcleod	1982	1.75	-1.8	-19	-0.014	-0.006		-1.8	-19	-0.014	-0.006	
Mcleod	1975	2.25	-1.8	-20	-0.018	-0.007		-1.8	-20	-0.018	-0.007	
Mcleod	1969	2.75	-1.8	-20	-0.02	-0.008		-1.8	-20	-0.02	-0.008	
Mcleod	1962	3.25	-1.8	-19	-0.014	-0.006		-1.8	-19	-0.014	-0.006	
Mcleod	1952	3.75	-1.8	-19	-0.011	-0.004		-1.8	-19	-0.011	-0.004	
Mcleod	1907	6.25	-1.8	-16	-0.01	-0.004		-1.8	-16	-0.01	-0.004	
Matcharak	2001	0.25	-1.8		-0.007	-0.006		-1.8		-0.007	-0.006	
Matcharak	1993	0.75	-1.8	-14	-0.008	-0.006		-1.8	-14	-0.008	-0.006	
Matcharak	1983	1.25	-1.8	-14	-0.008	-0.006		-1.8	-14	-0.008	-0.006	
Matcharak	1971	1.75	-1.8	-15	-0.006	-0.005		-1.8	-15	-0.006	-0.005	
Matcharak	1954	2.25	-1.8	-16	-0.004	-0.004		-1.8	-16	-0.004	-0.004	
Matcharak	1937	2.75	-1.8	-17	-0.004	-0.003		-1.8	-17	-0.004	-0.003	
Matcharak	1910	3.25	-1.8	-17	-0.004	-0.003		-1.8	-17	-0.004	-0.003	

Wonder	2000	0.25	-1.8	-25	-0.013	-0.004		-1.8	-25	-0.013	-0.004		
Wonder	1992	0.75	-1.8	-25	-0.013	-0.004		-1.8	-25	-0.013	-0.004		
Wonder	1985	1.25	-1.8	-27	-0.013	-0.004		-1.8	-27	-0.013	-0.004		
Wonder	1977	1.75	-1.8	-30	-0.012	-0.003		-1.8	-30	-0.012	-0.003		
Wonder	1968	2.25	-1.8	-29	-0.008	-0.002		4000	66000	19	5.3		
Wonder	1949	2.75	-1.8	-29	-0.006	-0.002		-1.8	-29	-0.006	-0.002		
Wonder	1919	3.25	-1.8	-33	-0.004	-0.001		-1.8	-33	-0.004	-0.001		
Golden	2002.5	0.25	-1.8		-0.002	-0.002	d	-1.8		-0.002	-0.002	d	
Golden	1996.5	0.75	-1.8		-0.005	-0.005	d	-1.8		-0.005	-0.005	d	
Golden	1989.5	1.25	-1.8	-10	-0.007	-0.007		-1.8	-10	-0.007	-0.007		
Golden	1981.5	1.75	-1.8	-10	-0.006	-0.006		-1.8	-10	-0.006	-0.006		
Golden	1972.5	2.25	-1.8	-7.4	-0.005	-0.005		-1.8	-7.4	-0.005	-0.005		
Golden	1962.5	2.75	-1.8	-7.4	-0.004	-0.004		-1.8	-7.4	-0.004	-0.004		
Golden	1951	3.25	-1.8	-6.9	-0.004	-0.004		-1.8	-6.9	-0.004	-0.004		
Golden	1924	4.25	-1.8	-6.9	-0.003	-0.003		-1.8	-6.9	-0.003	-0.003		
LP 19	2004	0.25	-1.8	-9.6	-0.019	-0.013		-1.8	-9.6	-0.019	-0.013		
LP 19	1999	1.25	-1.8		-0.017	-0.011		-1.8		-0.017	-0.011		
LP 19	1994	2.25	-1.8	-9.6	-0.019	-0.013		-1.8	-9.6	-0.019	-0.013		
LP 19	1989	3.25	-1.8	-9.6	-0.015	-0.01		-1.8	-9.6	-0.015	-0.01		
LP 19	1980	4.25	-1.8	-9.6	-0.011	-0.007		-1.8	-9.6	-0.011	-0.007		
LP 19	1969	5.25	-1.8	-9.7	-0.009	-0.006		-1.8	-9.7	-0.009	-0.006		
LP 19	1956	6.25	-1.8	-9.4	-0.007	-0.005		-1.8	-9.4	-0.007	-0.005		
LP 19	1903	10.5	-1.8	-10	-0.011	-0.007		-1.8	-10	-0.011	-0.007		
Hoh	2004	0.25	-1.8	-8.7	-0.023	-0.007	d	-1.8	-8.7	-0.023	-0.007	d	
Hoh	1998	1.25	-1.8	-9.6	-0.016	-0.005		-1.8	-9.6	-0.016	-0.005		
Hoh	1990.5	2.25	-1.8	-12	-0.019	-0.006		-1.8	-12	-0.019	-0.006		
Hoh	1983	3.25	-1.8	-17	-0.026	-0.008	d	-1.8	-17	-0.026	-0.008	d	
Hoh	1973.5	4.25	-1.8	-20	-0.026	-0.009		-1.8	-20	-0.026	-0.009		
Hoh	1963	5.25	-1.8	-17	-0.024	-0.008		-1.8	-17	-0.024	-0.008		
Hoh	1952.5	6.25	-1.8	-20	-0.034	-0.011		-1.8	-20	-0.034	-0.011		
Hoh	1901	12.75	-1.8	-21	-0.037	-0.012		-1.8	-21	-0.037	-0.012		

PJ	2004.5	0.25	-1.8	-11	-0.049	-0.063		-1.8	-11	-0.049	-0.063	
PJ	1999	2.75	-1.8	-11	-0.048	-0.061		-1.8	-11	-0.048	-0.061	
PJ	1992	4.75	-1.8	-11	-0.043	-0.055		-1.8	-11	-0.043	-0.055	
PJ	1984	6.75	-1.8	-12	-0.057	-0.074		-1.8	-12	-0.057	-0.074	
PJ	1977.5	8.75	-1.8	-12	-0.096	-0.12		-1.8	-12	-0.096	-0.12	
PJ	1968	11.5	-1.8		-0.051	-0.066		-1.8		-0.051	-0.066	
PJ	1963	12.5	-1.8	-12	-0.072	-0.093		-1.8	-12	-0.072	-0.093	
PJ	1955	15.5	-1.8	-12	-0.17	-0.22		-1.8	-12	-0.17	-0.22	
Oldman	2003.5	0.25	-1.8	-33	-0.097	-0.021		-1.8	-33	-0.097	-0.021	
Oldman	1997	1.25	-1.8	-35	-0.076	-0.017		-1.8	-35	-0.076	-0.017	
Oldman	1987	2.25	-1.8	-33	-0.046	-0.01		-1.8	-33	-0.046	-0.01	
Oldman	1980.5	2.75	-1.8	-34	-0.04	-0.009		-1.8	-34	-0.04	-0.009	
Oldman	1973	3.25	-1.8	-38	-0.037	-0.008		-1.8	-38	-0.037	-0.008	
Oldman	1963.5	3.75	-1.8	-40	-0.032	-0.007		-1.8	-40	-0.032	-0.007	
Oldman	1952	4.25	-1.8	-42	-0.028	-0.006		-1.8	-42	-0.028	-0.006	
Oldman	1906.5	6.25	-1.8	-52	-0.033	-0.007		-1.8	-52	-0.033	-0.007	
Snyder	2004	0.25	-1.8	-13	-0.037	-0.027	c	-1.8	-13	-0.037	-0.027	
Snyder	2000	1.25	-1.8	-14	-0.032	-0.023	c	-1.8	-14	-0.032	-0.023	
Snyder	1991.5	2.75	-1.8	-16	-0.027	-0.02	c	-1.8	-16	-0.027	-0.02	
Snyder	1985	3.75	-1.8	-17	-0.026	-0.019	c	-1.8	-17	-0.026	-0.019	
Snyder	1978	4.75	-1.8	-18	-0.025	-0.018	c	-1.8	-18	-0.025	-0.018	
Snyder	1967.5	5.75	-1.8	-19	-0.023	-0.017	c	-1.8	-19	-0.023	-0.017	
Snyder	1954.5	6.75	-1.8	-18	-0.019	-0.014	c	-1.8	-18	-0.019	-0.014	
Snyder	1893	11.75	-1.8	-20	-0.014	-0.01	c	-1.8	-20	-0.014	-0.01	

Site	Average Year (y)	Average Depth (cm)	BDE# 126 pg/g dw	BDE# 126 pg/g TOC	BDE# 126 Flux pg/cm2.y	BDE# 126 Flux (FF) pg/cm2.y	BDE# 126 FLAG	BDE #118 pg/g dw	BDE #118 pg/g TOC	BDE #118 Flux pg/cm2.y	BDE #118 Flux (FF) pg/cm2.y	BDE #118 FLAG
Mills	2002	0.25	-2.1	-13	-0.061	-0.041		-2.5	-16	-0.073	-0.049	d
Mills	2000	0.75	-2.1	-15	-0.061	-0.041		-2.5	-18	-0.073	-0.049	
Mills	1991	2.75	-2.1	-16	-0.05	-0.034		-2.5	-19	-0.061	-0.041	
Mills	1974	4.75	-2.1	-19	-0.04	-0.027		-2.5	-23	-0.048	-0.032	d

Mills	1964	6.25	-2.1	-17	-0.067	-0.045		-2.5	-21	-0.081	-0.055	
Mills	1947	8.75	-2.1	-19	-0.053	-0.036		-2.5	-22	-0.063	-0.043	d
Mills	1905	17.5	-2.1	-17	-0.046	-0.031	d	-2.5	-21	-0.056	-0.038	d
Lone Pine	2001	0.25	-2.1	-15	-0.032	-0.021		-2.5	-18	-0.038	-0.026	d
Lone Pine	1998	0.75	-2.1	-16	-0.032	-0.021		-2.5	-19	-0.038	-0.026	
Lone Pine	1990	1.75	-2.1	-18	-0.036	-0.024		-2.5	-22	-0.043	-0.029	
Lone Pine	1982	2.75	-2.1	-17	-0.036	-0.024		-2.5	-21	-0.043	-0.029	
Lone Pine	1961	4.75	-2.1	-18	-0.029	-0.02		-2.5	-22	-0.035	-0.024	
Lone Pine	1936	6.75	-2.1	-19	-0.025	-0.017		-2.5	-23	-0.03	-0.02	
Lone Pine	1920	7.75	-2.1	-19	-0.025	-0.017		-2.5	-23	-0.03	-0.02	
Lone Pine	1870	11.5	-2.1	-18	-0.025	-0.017		-2.5	-22	-0.03	-0.02	
Emerald	2002	0.25	-2.1	-24	-0.097	-0.026		-2.5	-29	-0.12	-0.031	
Emerald	1997	1.75	-2.1	-23	-0.097	-0.026		-2.5	-28	-0.12	-0.031	
Emerald	1989	3.75	-2.1	-22	-0.097	-0.026		-2.5	-26	-0.12	-0.031	d
Emerald	1980	5.75	-2.1	-22	-0.097	-0.026		-2.5	-27	-0.12	-0.031	d
Emerald	1971.5	7.75	-2.1	-24	-0.097	-0.026		-2.5	-29	-0.12	-0.031	
Emerald	1961.5	9.75	-2.1	-20	-0.097	-0.026		-2.5	-24	-0.12	-0.031	d
Emerald	1958	10.5	-2.1	-27	-0.097	-0.026		-2.5	-32	-0.12	-0.031	d
Emerald	1892	21.5	-2.1	-25	-0.12	-0.032		-2.5	-30	-0.14	-0.039	d
Burial	2000	0.25	-2.1	-32	-0.008	-0.01		-2.5	-38	-0.01	-0.011	
Burial	1988	0.75	-2.1	-35	-0.009	-0.01		-2.5	-43	-0.01	-0.012	
Burial	1974	1.25	-2.1	-36	-0.01	-0.011		-2.5	-44	-0.012	-0.013	
Burial	1957	1.75	-2.1	-39	-0.007	-0.008		-2.5	-47	-0.008	-0.009	d
Burial	1933	2.25	-2.1	-41	-0.007	-0.007		-2.5	-50	-0.008	-0.009	d
Burial	1906	2.75	-2.1	-41	-0.007	-0.007		-2.5	-49	-0.008	-0.009	d
Burial	1879	3.25	-2.1	-40	-0.007	-0.007		-2.5	-48	-0.008	-0.009	
Mcleod	2002	0.25	-2.1	-17	-0.011	-0.004		-2.5	-21	-0.013	-0.005	d
Mcleod	1997	0.75	-2.1	-18	-0.012	-0.005		-2.5	-22	-0.014	-0.005	d
Mcleod	1990	1.25	-2.1	-21	-0.013	-0.005		-2.5	-26	-0.016	-0.006	d
Mcleod	1982	1.75	-2.1	-23	-0.017	-0.007		-2.5	-27	-0.02	-0.008	d
Mcleod	1975	2.25	-2.1	-23	-0.022	-0.008		-2.5	-28	-0.026	-0.01	d
Mcleod	1969	2.75	-2.1	-24	-0.024	-0.009		-2.5	-28	-0.028	-0.011	d

Mcleod	1962	3.25	-2.1	-22	-0.017	-0.007		-2.5	-27	-0.02	-0.008	d
Mcleod	1952	3.75	-2.1	-23	-0.013	-0.005		-2.5	-28	-0.016	-0.006	d
Mcleod	1907	6.25	-2.1	-19	-0.012	-0.005		-2.5	-23	-0.014	-0.006	d
Matcharak	2001	0.25	-2.1		-0.009	-0.007		-2.5		-0.01	-0.008	d
Matcharak	1993	0.75	-2.1	-17	-0.009	-0.008		-2.5	-20	-0.011	-0.009	d
Matcharak	1983	1.25	-2.1	-17	-0.009	-0.007		-2.5	-21	-0.011	-0.009	d
Matcharak	1971	1.75	-2.1	-18	-0.007	-0.006		-2.5	-21	-0.008	-0.007	d
Matcharak	1954	2.25	-2.1	-19	-0.005	-0.004		-2.5	-22	-0.006	-0.005	d
Matcharak	1937	2.75	-2.1	-20	-0.004	-0.004		-2.5	-24	-0.005	-0.004	d
Matcharak	1910	3.25	-2.1	-21	-0.004	-0.003		-2.5	-25	-0.005	-0.004	d
Wonder	2000	0.25	-2.1	-29	-0.016	-0.004		-2.5	-35	-0.019	-0.005	
Wonder	1992	0.75	-2.1	-29	-0.016	-0.005		-2.5	-35	-0.019	-0.005	
Wonder	1985	1.25	-2.1	-33	-0.015	-0.004		-2.5	-39	-0.018	-0.005	
Wonder	1977	1.75	-2.1	-35	-0.014	-0.004		-2.5	-42	-0.017	-0.005	
Wonder	1968	2.25	-2.1	-35	-0.01	-0.003		-2.5	-42	-0.012	-0.003	d
Wonder	1949	2.75	-2.1	-35	-0.007	-0.002		-2.5	-42	-0.008	-0.002	d
Wonder	1919	3.25	-2.1	-40	-0.005	-0.001		-2.5	-48	-0.006	-0.002	d
Golden	2002.5	0.25	-2.1		-0.003	-0.003	d	-2.5		-0.003	-0.003	d
Golden	1996.5	0.75	-2.1		-0.007	-0.007	d	-2.5		-0.008	-0.008	d
Golden	1989.5	1.25	-2.1	-12	-0.008	-0.008		-2.5	-15	-0.009	-0.009	d
Golden	1981.5	1.75	-2.1	-12	-0.008	-0.008		-2.5	-15	-0.009	-0.009	
Golden	1972.5	2.25	-2.1	-8.8	-0.006	-0.006		-2.5	-11	-0.007	-0.007	
Golden	1962.5	2.75	-2.1	-8.8	-0.005	-0.005		-2.5	-11	-0.006	-0.006	
Golden	1951	3.25	-2.1	-8.2	-0.005	-0.005		-2.5	-9.9	-0.005	-0.005	
Golden	1924	4.25	-2.1	-8.2	-0.004	-0.004		-2.5	-9.8	-0.004	-0.004	
LP 19	2004	0.25	-2.1	-11	-0.023	-0.015		-2.5	-14	-0.028	-0.019	d
LP 19	1999	1.25	-2.1		-0.02	-0.013		-2.5		-0.024	-0.016	d
LP 19	1994	2.25	-2.1	-11	-0.023	-0.015		-2.5	-14	-0.028	-0.019	d
LP 19	1989	3.25	-2.1	-11	-0.018	-0.012		-2.5	-14	-0.021	-0.014	d
LP 19	1980	4.25	-2.1	-11	-0.013	-0.008		-2.5	-14	-0.015	-0.01	d
LP 19	1969	5.25	-2.1	-12	-0.011	-0.007		-2.5	-14	-0.013	-0.009	d
LP 19	1956	6.25	-2.1	-11	-0.009	-0.006		-2.5	-13	-0.01	-0.007	d

LP 19	1903	10.5	-2.1	-12	-0.013	-0.009		-2.5	-15	-0.016	-0.01	d
Hoh	2004	0.25	-2.1	-10	-0.027	-0.009	d	-2.5	-12	-0.033	-0.011	d
Hoh	1998	1.25	-2.1	-11	-0.019	-0.006		-2.5	-14	-0.023	-0.007	
Hoh	1990.5	2.25	-2.1	-15	-0.023	-0.007		-2.5	-18	-0.028	-0.009	
Hoh	1983	3.25	-2.1	-20	-0.03	-0.01	d	-2.5	-24	-0.037	-0.012	
Hoh	1973.5	4.25	-2.1	-23	-0.032	-0.01		-2.5	-28	-0.038	-0.012	
Hoh	1963	5.25	-2.1	-21	-0.028	-0.009		-2.5	-25	-0.034	-0.011	
Hoh	1952.5	6.25	-2.1	-24	-0.041	-0.013		-2.5	-29	-0.049	-0.016	
Hoh	1901	12.75	-2.1	-25	-0.044	-0.014		-2.5	-30	-0.053	-0.017	d
PJ	2004.5	0.25	-2.1	-13	-0.059	-0.075		-2.5	-16	-0.071	-0.091	
PJ	1999	2.75	-2.1	-13	-0.057	-0.073		-2.5	-15	-0.068	-0.087	
PJ	1992	4.75	-2.1	-13	-0.052	-0.066		-2.5	-16	-0.062	-0.079	
PJ	1984	6.75	-2.1	-14	-0.068	-0.088		-2.5	-16	-0.082	-0.11	
PJ	1977.5	8.75	-2.1	-14	-0.11	-0.15		-2.5	-17	-0.14	-0.18	d
PJ	1968	11.5	-2.1		-0.061	-0.078		-2.5		-0.073	-0.094	
PJ	1963	12.5	-2.1	-14	-0.086	-0.11		-2.5	-17	-0.1	-0.13	d
PJ	1955	15.5	-2.1	-14	-0.2	-0.26		-2.5	-17	-0.24	-0.31	d
Oldman	2003.5	0.25	-2.1	-40	-0.12	-0.025		-2.5	-48	-0.14	-0.031	
Oldman	1997	1.25	-2.1	-42	-0.09	-0.02		-2.5	-51	-0.11	-0.024	d
Oldman	1987	2.25	-2.1	-39	-0.055	-0.012		-2.5	-47	-0.066	-0.014	d
Oldman	1980.5	2.75	-2.1	-41	-0.047	-0.01		-2.5	-49	-0.057	-0.012	d
Oldman	1973	3.25	-2.1	-45	-0.044	-0.01		-2.5	-54	-0.053	-0.012	d
Oldman	1963.5	3.75	-2.1	-47	-0.038	-0.008		-2.5	-57	-0.045	-0.01	d
Oldman	1952	4.25	-2.1	-50	-0.034	-0.007		-2.5	-60	-0.04	-0.009	
Oldman	1906.5	6.25	-2.1	-61	-0.039	-0.009		-2.5	-74	-0.047	-0.01	d
Snyder	2004	0.25	-2.1	-16	-0.044	-0.032		-2.5	-19	-0.053	-0.039	
Snyder	2000	1.25	-2.1	-17	-0.038	-0.028		-2.5	-21	-0.045	-0.033	d
Snyder	1991.5	2.75	-2.1	-19	-0.033	-0.024		-2.5	-23	-0.039	-0.029	
Snyder	1985	3.75	-2.1	-20	-0.032	-0.023		-2.5	-24	-0.038	-0.028	d
Snyder	1978	4.75	-2.1	-21	-0.029	-0.021		-2.5	-26	-0.035	-0.026	
Snyder	1967.5	5.75	-2.1	-23	-0.027	-0.02		-2.5	-27	-0.033	-0.024	d
Snyder	1954.5	6.75	-2.1	-21	-0.023	-0.017		-2.5	-25	-0.028	-0.02	

Snyder	1893	11.75	-2.1	-24	-0.017	-0.012		-2.5	-29	-0.02	-0.015	d

Site	Average Year (y)	Average Depth (cm)	BDE #155 pg/g dw	BDE #155 pg/g TOC	BDE #155 Flux pg/cm2.y	BDE #155 Flux (FF) pg/cm2.y	BDE #155 FLAG	BDE #154 pg/g dw	BDE #154 pg/g TOC	BDE #154 Flux pg/cm2.y	BDE #154 Flux (FF) pg/cm2.y	BDE #154 FLAG
Mills	2002	0.25	-5.2	-33	-0.15	-0.1	c	350	2200	10	6.8	
Mills	2000	0.75	-5.2	-37	-0.15	-0.1	c	220	1600	6.5	4.4	
Mills	1991	2.75	-5.2	-40	-0.12	-0.084	c	82	630	2	1.3	
Mills	1974	4.75	-5.2	-48	-0.099	-0.067	c	-0.89	-8.2	-0.017	-0.011	
Mills	1964	6.25	-5.2	-43	-0.17	-0.11		-0.89	-7.4	-0.029	-0.019	
Mills	1947	8.75	-5.2	-46	-0.13	-0.088		62	550	1.5	1	
Mills	1905	17.5	-5.2	-43	-0.11	-0.077	d	-0.89	-7.4	-0.02	-0.013	d
Lone Pine	2001	0.25	-5.2	-37	-0.078	-0.053	c	-0.89	-6.4	-0.013	-0.009	
Lone Pine	1998	0.75	-5.2	-40	-0.078	-0.053	c	-0.89	-6.9	-0.013	-0.009	
Lone Pine	1990	1.75	-5.2	-45	-0.088	-0.06	c	82	700	1.4	0.94	
Lone Pine	1982	2.75	-5.2	-43	-0.088	-0.06	c	-0.89	-7.3	-0.015	-0.01	
Lone Pine	1961	4.75	-5.2	-46	-0.073	-0.049		-0.89	-7.9	-0.013	-0.008	
Lone Pine	1936	6.75	-5.2	-46	-0.062	-0.042		-0.89	-8	-0.011	-0.007	
Lone Pine	1920	7.75	-5.2	-48	-0.062	-0.042		-0.89	-8.3	-0.011	-0.007	
Lone Pine	1870	11.5	-5.2	-45	-0.062	-0.042		-0.89	-7.8	-0.011	-0.007	
Emerald	2002	0.25	-5.2	-59	-0.24	-0.064	c	-0.89	-10	-0.041	-0.011	
Emerald	1997	1.75	-5.2	-58	-0.24	-0.064		-0.89	-10	-0.041	-0.011	
Emerald	1989	3.75	-5.2	-55	-0.24	-0.064		-0.89	-9.4	-0.041	-0.011	
Emerald	1980	5.75	-5.2	-56	-0.24	-0.064		-0.89	-9.6	-0.041	-0.011	
Emerald	1971.5	7.75	-5.2	-60	-0.24	-0.064	c	-0.89	-10	-0.041	-0.011	
Emerald	1961.5	9.75	-5.2	-50	-0.24	-0.064		-0.89	-8.7	-0.041	-0.011	c
Emerald	1958	10.5	-5.2	-66	-0.24	-0.064		-0.89	-11	-0.041	-0.011	
Emerald	1892	21.5	-5.2	-62	-0.3	-0.079		-0.89	-11	-0.051	-0.014	c
Burial	2000	0.25	-5.2	-79	-0.021	-0.024		-0.89	-14	-0.004	-0.004	
Burial	1988	0.75	-5.2	-88	-0.021	-0.024		-0.89	-15	-0.004	-0.004	
Burial	1974	1.25	-5.2	-90	-0.024	-0.027		-0.89	-15	-0.004	-0.005	

Burial	1957	1.75	-5.2	-96	-0.017	-0.02		-0.89	-17	-0.003	-0.003	
Burial	1933	2.25	-5.2	-100	-0.016	-0.018		4800	94000	15	17	XXX
Burial	1906	2.75	-5.2	-100	-0.016	-0.018		-0.89	-17	-0.003	-0.003	
Burial	1879	3.25	-5.2	-99	-0.016	-0.018		-0.89	-17	-0.003	-0.003	
Mcleod	2002	0.25	-5.2	-43	-0.027	-0.01		-0.89	-7.4	-0.005	-0.002	c
Mcleod	1997	0.75	-5.2	-45	-0.029	-0.011		-0.89	-7.8	-0.005	-0.002	c
Mcleod	1990	1.25	-5.2	-53	-0.033	-0.013		-0.89	-9.1	-0.006	-0.002	c
Mcleod	1982	1.75	-5.2	-56	-0.042	-0.016		-0.89	-9.7	-0.007	-0.003	c
Mcleod	1975	2.25	-5.2	-58	-0.054	-0.021		-0.89	-9.9	-0.009	-0.004	c
Mcleod	1969	2.75	-5.2	-58	-0.058	-0.022		-0.89	-10	-0.01	-0.004	c
Mcleod	1962	3.25	-5.2	-55	-0.042	-0.016		-0.89	-9.5	-0.007	-0.003	c
Mcleod	1952	3.75	-5.2	-57	-0.033	-0.013		-0.89	-9.9	-0.006	-0.002	c
Mcleod	1907	6.25	-5.2	-48	-0.03	-0.011		-0.89	-8.2	-0.005	-0.002	c
Matcharak	2001	0.25	-5.2		-0.021	-0.017		-0.89		-0.004	-0.003	c
Matcharak	1993	0.75	-5.2	-41	-0.023	-0.019		-0.89	-7	-0.004	-0.003	c
Matcharak	1983	1.25	-5.2	-43	-0.022	-0.018		-0.89	-7.3	-0.004	-0.003	c
Matcharak	1971	1.75	-5.2	-44	-0.017	-0.014		-0.89	-7.6	-0.003	-0.002	c
Matcharak	1954	2.25	-5.2	-46	-0.013	-0.01		-0.89	-8	-0.002	-0.002	c
Matcharak	1937	2.75	-5.2	-49	-0.011	-0.009		-0.89	-8.4	-0.002	-0.002	c
Matcharak	1910	3.25	-5.2	-51	-0.01	-0.008	d	-0.89	-8.7	-0.002	-0.001	c,d
Wonder	2000	0.25	-5.2	-72	-0.038	-0.011		-0.89	-12	-0.007	-0.002	
Wonder	1992	0.75	-5.2	-72	-0.039	-0.011		-0.89	-12	-0.007	-0.002	
Wonder	1985	1.25	-5.2	-81	-0.037	-0.011		-0.89	-14	-0.006	-0.002	
Wonder	1977	1.75	-5.2	-87	-0.034	-0.01		-0.89	-15	-0.006	-0.002	
Wonder	1968	2.25	-5.2	-86	-0.024	-0.007		4700	79000	22	6.4	
Wonder	1949	2.75	-5.2	-86	-0.017	-0.005		-0.89	-15	-0.003	-0.001	
Wonder	1919	3.25	-5.2	-99	-0.012	-0.003		-0.89	-17	-0.002	-0.001	
Golden	2002.5	0.25	-5.2		-0.007	-0.007		-0.89		-0.001	-0.001	d
Golden	1996.5	0.75	-5.2		-0.016	-0.016		3600		11	11	d
Golden	1989.5	1.25	-5.2	-31	-0.02	-0.02		-0.89	-5.3	-0.003	-0.003	
Golden	1981.5	1.75	-5.2	-31	-0.019	-0.019		1100	6600	4	4	d
Golden	1972.5	2.25	-5.2	-22	-0.015	-0.015		-0.89	-3.7	-0.003	-0.003	d

Golden	1962.5	2.75	-5.2	-22	-0.013	-0.013		2500	10000	6	6	d
Golden	1951	3.25	-5.2	-20	-0.011	-0.011		-0.89	-3.5	-0.002	-0.002	d
Golden	1924	4.25	-5.2	-20	-0.009	-0.009		-0.89	-3.5	-0.002	-0.002	
LP 19	2004	0.25	-5.2	-28	-0.057	-0.038		-0.89	-4.9	-0.01	-0.007	
LP 19	1999	1.25	-5.2		-0.049	-0.033		-0.89		-0.009	-0.006	d
LP 19	1994	2.25	-5.2	-28	-0.057	-0.038		-0.89	-4.9	-0.01	-0.007	
LP 19	1989	3.25	-5.2	-28	-0.044	-0.029		-0.89	-4.9	-0.008	-0.005	d
LP 19	1980	4.25	-5.2	-28	-0.031	-0.021		-0.89	-4.9	-0.005	-0.004	
LP 19	1969	5.25	-5.2	-29	-0.027	-0.018		-0.89	-4.9	-0.005	-0.003	d
LP 19	1956	6.25	-5.2	-28	-0.022	-0.014		-0.89	-4.8	-0.004	-0.002	
LP 19	1903	10.5	-5.2	-30	-0.032	-0.022		-0.89	-5.2	-0.006	-0.004	d
Hoh	2004	0.25	-5.2	-26	-0.068	-0.022		-0.89	-4.4	-0.012	-0.004	d
Hoh	1998	1.25	-5.2	-28	-0.047	-0.015		-0.89	-4.9	-0.008	-0.003	d
Hoh	1990.5	2.25	-5.2	-37	-0.057	-0.018		-0.89	-6.3	-0.01	-0.003	d
Hoh	1983	3.25	-5.2	-49	-0.075	-0.024		-0.89	-8.5	-0.013	-0.004	
Hoh	1973.5	4.25	-5.2	-57	-0.078	-0.025		-0.89	-9.9	-0.013	-0.004	
Hoh	1963	5.25	-5.2	-51	-0.07	-0.023		-0.89	-8.8	-0.012	-0.004	
Hoh	1952.5	6.25	-5.2	-60	-0.1	-0.033		2000	23000	39	13	
Hoh	1901	12.75	-5.2	-63	-0.11	-0.035		-0.89	-11	-0.019	-0.006	d
PJ	2004.5	0.25	-5.2	-33	-0.15	-0.19		-0.89	-5.6	-0.025	-0.032	
PJ	1999	2.75	-5.2	-32	-0.14	-0.18	d	-0.89	-5.5	-0.024	-0.031	d
PJ	1992	4.75	-5.2	-32	-0.13	-0.16		-0.89	-5.5	-0.022	-0.028	
PJ	1984	6.75	-5.2	-34	-0.17	-0.22		-0.89	-5.8	-0.029	-0.037	
PJ	1977.5	8.75	-5.2	-34	-0.28	-0.36	d	-0.89	-5.9	-0.049	-0.063	d
PJ	1968	11.5	-5.2		-0.15	-0.19		-0.89		-0.026	-0.033	
PJ	1963	12.5	-5.2	-36	-0.21	-0.27	d	-0.89	-6.1	-0.037	-0.047	d
PJ	1955	15.5	-5.2	-35	-0.5	-0.65	d	-0.89	-6	-0.087	-0.11	d
Oldman	2003.5	0.25	-5.2	-98	-0.29	-0.063		-0.89	-17	-0.049	-0.011	
Oldman	1997	1.25	-5.2	-100	-0.22	-0.049		-0.89	-18	-0.038	-0.008	
Oldman	1987	2.25	-5.2	-97	-0.14	-0.03		-0.89	-17	-0.023	-0.005	d
Oldman	1980.5	2.75	-5.2	-100	-0.12	-0.026		-0.89	-17	-0.02	-0.004	
Oldman	1973	3.25	-5.2	-110	-0.11	-0.024		-0.89	-19	-0.019	-0.004	

Oldman	1963.5	3.75	-5.2	-120	-0.094	-0.021		-0.89	-20	-0.016	-0.004	
Oldman	1952	4.25	-5.2	-120	-0.083	-0.018		-0.89	-21	-0.014	-0.003	
Oldman	1906.5	6.25	-5.2	-150	-0.096	-0.021		-0.89	-26	-0.017	-0.004	
Snyder	2004	0.25	-5.2	-40	-0.11	-0.08		-0.89	-6.8	-0.019	-0.014	
Snyder	2000	1.25	-5.2	-42	-0.094	-0.068		1400	11000	25	18	
Snyder	1991.5	2.75	-5.2	-47	-0.081	-0.059		-0.89	-8.1	-0.014	-0.01	
Snyder	1985	3.75	-5.2	-50	-0.078	-0.057		-0.89	-8.6	-0.013	-0.01	
Snyder	1978	4.75	-5.2	-53	-0.073	-0.053		330	3300	4.6	3.3	
Snyder	1967.5	5.75	-5.2	-56	-0.068	-0.049		160	1700	2.1	1.5	
Snyder	1954.5	6.75	-5.2	-52	-0.057	-0.042		-0.89	-8.9	-0.01	-0.007	
Snyder	1893	11.75	-5.2	-60	-0.042	-0.03		-0.89	-10	-0.007	-0.005	

Site	Average Year (y)	Average Depth (cm)	BDE #153 pg/g dw	BDE #153 pg/g TOC	BDE #153 Flux pg/cm2.y	BDE #153 Flux (FF) pg/cm2.y	BDE #153 FLAG	BDE #138 pg/g dw	BDE #138 pg/g TOC	BDE #138 Flux pg/cm2.y	BDE #138 Flux (FF) pg/cm2.y	BDE #138 FLAG
Mills	2002	0.25	470	3000	14	9.3		-3.3	-20	-0.094	-0.064	
Mills	2000	0.75	270	1900	7.9	5.3		-3.3	-23	-0.094	-0.064	
Mills	1991	2.75	150	1100	3.5	2.4		-3.3	-25	-0.078	-0.053	
Mills	1974	4.75	-5.2	-48	-0.099	-0.067		-3.3	-30	-0.062	-0.042	
Mills	1964	6.25	-5.2	-43	-0.17	-0.11		-3.3	-27	-0.1	-0.07	
Mills	1947	8.75	78	680	1.9	1.3		-3.3	-29	-0.081	-0.055	
Mills	1905	17.5	-5.2	-43	-0.11	-0.077	d	-3.3	-27	-0.072	-0.048	d
Lone Pine	2001	0.25	110	800	1.7	1.1		-3.3	-23	-0.049	-0.033	
Lone Pine	1998	0.75					X	-3.3	-25	-0.049	-0.033	
Lone Pine	1990	1.75	140	1200	2.3	1.6		-3.3	-28	-0.055	-0.037	
Lone Pine	1982	2.75	-5.2	-43	-0.088	-0.06		-3.3	-27	-0.055	-0.037	
Lone Pine	1961	4.75	-5.2	-46	-0.073	-0.049		-3.3	-29	-0.046	-0.031	
Lone Pine	1936	6.75	-5.2	-46	-0.062	-0.042		-3.3	-29	-0.039	-0.026	
Lone Pine	1920	7.75	-5.2	-48	-0.062	-0.042		-3.3	-30	-0.039	-0.026	
Lone Pine	1870	11.5	-5.2	-45	-0.062	-0.042		-3.3	-28	-0.039	-0.026	
Emerald	2002	0.25	-5.2	-59	-0.24	-0.064		-3.3	-37	-0.15	-0.04	c

Emerald	1997	1.75	410	4600	19	5.1	e	-3.3	-36	-0.15	-0.04	
Emerald	1989	3.75	180	1800	8.1	2.2	e	-3.3	-34	-0.15	-0.04	
Emerald	1980	5.75	980	10000	45	12		-3.3	-35	-0.15	-0.04	
Emerald	1971.5	7.75	180	2100	8.5	2.3		-3.3	-38	-0.15	-0.04	c
Emerald	1961.5	9.75	-5.2	-50	-0.24	-0.064		-3.3	-31	-0.15	-0.04	c
Emerald	1958	10.5	-5.2	-66	-0.24	-0.064		-3.3	-41	-0.15	-0.04	
Emerald	1892	21.5	-5.2	-62	-0.3	-0.079		-3.3	-39	-0.19	-0.05	c
Burial	2000	0.25	-5.2	-79	-0.021	-0.024		-3.3	-49	-0.013	-0.015	
Burial	1988	0.75	-5.2	-88	-0.021	-0.024		-3.3	-55	-0.013	-0.015	
Burial	1974	1.25	-5.2	-90	-0.024	-0.027		-3.3	-56	-0.015	-0.017	
Burial	1957	1.75	-5.2	-96	-0.017	-0.02		-3.3	-60	-0.011	-0.012	
Burial	1933	2.25	6200	123000	19	22	XXX	840	17000	2.6	3	XXX
Burial	1906	2.75	-5.2	-100	-0.016	-0.018		-3.3	-63	-0.01	-0.011	
Burial	1879	3.25	-5.2	-99	-0.016	-0.018		-3.3	-62	-0.01	-0.011	
Mcleod	2002	0.25	-5.2	-43	-0.027	-0.01		-3.3	-27	-0.017	-0.006	c
Mcleod	1997	0.75	-5.2	-45	-0.029	-0.011		-3.3	-28	-0.018	-0.007	c
Mcleod	1990	1.25	-5.2	-53	-0.033	-0.013		-3.3	-33	-0.021	-0.008	c
Mcleod	1982	1.75	-5.2	-56	-0.042	-0.016		-3.3	-35	-0.026	-0.01	c
Mcleod	1975	2.25	-5.2	-58	-0.054	-0.021		-3.3	-36	-0.034	-0.013	c
Mcleod	1969	2.75	920	10000	10	4		-3.3	-36	-0.036	-0.014	c
Mcleod	1962	3.25	-5.2	-55	-0.042	-0.016		-3.3	-34	-0.026	-0.01	c
Mcleod	1952	3.75	-5.2	-57	-0.033	-0.013		-3.3	-36	-0.02	-0.008	c
Mcleod	1907	6.25	-5.2	-48	-0.03	-0.011		-3.3	-30	-0.019	-0.007	c
Matcharak	2001	0.25	-5.2		-0.021	-0.017		-3.3		-0.013	-0.011	c
Matcharak	1993	0.75	-5.2	-41	-0.023	-0.019		-3.3	-26	-0.015	-0.012	c
Matcharak	1983	1.25	-5.2	-43	-0.022	-0.018		-3.3	-27	-0.014	-0.011	c
Matcharak	1971	1.75	-5.2	-44	-0.017	-0.014		-3.3	-28	-0.011	-0.009	c
Matcharak	1954	2.25	930	8300	2.3	1.9		-3.3	-29	-0.008	-0.007	c
Matcharak	1937	2.75	-5.2	-49	-0.011	-0.009		-3.3	-31	-0.007	-0.005	c
Matcharak	1910	3.25	-5.2	-51	-0.01	-0.008	d	-3.3	-32	-0.007	-0.005	c,d
Wonder	2000	0.25	-5.2	-72	-0.038	-0.011		-3.3	-45	-0.024	-0.007	
Wonder	1992	0.75	-5.2	-72	-0.039	-0.011		-3.3	-45	-0.024	-0.007	

Wonder	1985	1.25	-5.2	-81	-0.037	-0.011		-3.3	-51	-0.023	-0.007	
Wonder	1977	1.75	-5.2	-87	-0.034	-0.01		-3.3	-54	-0.021	-0.006	
Wonder	1968	2.25	5700	95000	27	7.7		-3.3	-54	-0.015	-0.004	
Wonder	1949	2.75	1900	31000	6	1.7		-3.3	-54	-0.01	-0.003	
Wonder	1919	3.25	780	15000	1.8	0.51		-3.3	-62	-0.007	-0.002	
Golden	2002.5	0.25	-5.2		-0.007	-0.007	d	-3.3		-0.004	-0.004	d
Golden	1996.5	0.75	6000		19	19	d	-3.3		-0.01	-0.01	d
Golden	1989.5	1.25	-5.2	-31	-0.02	-0.02		-3.3	-19	-0.012	-0.012	
Golden	1981.5	1.75	1400	8400	5.1	5.1	d	-3.3	-19	-0.012	-0.012	d
Golden	1972.5	2.25	-5.2	-22	-0.015	-0.015	d	-3.3	-14	-0.01	-0.01	d
Golden	1962.5	2.75	4500	19000	11	11	d	-3.3	-14	-0.008	-0.008	d
Golden	1951	3.25	-5.2	-20	-0.011	-0.011	d	-3.3	-13	-0.007	-0.007	d
Golden	1924	4.25	-5.2	-20	-0.009	-0.009		-3.3	-13	-0.006	-0.006	
LP 19	2004	0.25	-5.2	-28	-0.057	-0.038		-3.3	-18	-0.036	-0.024	
LP 19	1999	1.25	-5.2		-0.049	-0.033	d	-3.3		-0.031	-0.021	d
LP 19	1994	2.25	-5.2	-28	-0.057	-0.038		-3.3	-18	-0.036	-0.024	
LP 19	1989	3.25	-5.2	-28	-0.044	-0.029	d	-3.3	-18	-0.027	-0.018	d
LP 19	1980	4.25	-5.2	-28	-0.031	-0.021		-3.3	-18	-0.02	-0.013	
LP 19	1969	5.25	-5.2	-29	-0.027	-0.018	d	-3.3	-18	-0.017	-0.011	d
LP 19	1956	6.25	-5.2	-28	-0.022	-0.014		-3.3	-17	-0.013	-0.009	
LP 19	1903	10.5	-5.2	-30	-0.032	-0.022	d	-3.3	-19	-0.02	-0.013	d
Hoh	2004	0.25	-5.2	-26	-0.068	-0.022	d	-3.3	-16	-0.042	-0.014	d
Hoh	1998	1.25	-5.2	-28	-0.047	-0.015	d	-3.3	-18	-0.029	-0.009	d
Hoh	1990.5	2.25	-5.2	-37	-0.057	-0.018	d	-3.3	-23	-0.036	-0.012	d
Hoh	1983	3.25	-5.2	-49	-0.075	-0.024		-3.3	-31	-0.047	-0.015	
Hoh	1973.5	4.25	-5.2	-57	-0.078	-0.025		-3.3	-36	-0.049	-0.016	
Hoh	1963	5.25	-5.2	-51	-0.07	-0.023		-3.3	-32	-0.044	-0.014	
Hoh	1952.5	6.25	1700	19000	33	10		-3.3	-38	-0.063	-0.02	
Hoh	1901	12.75	-5.2	-63	-0.11	-0.035	d	-3.3	-39	-0.068	-0.022	d
PJ	2004.5	0.25	-5.2	-33	-0.15	-0.19		-3.3	-20	-0.091	-0.12	
PJ	1999	2.75	-5.2	-32	-0.14	-0.18	d	-3.3	-20	-0.088	-0.11	d
PJ	1992	4.75	-5.2	-32	-0.13	-0.16		-3.3	-20	-0.08	-0.1	

PJ	1984	6.75	-5.2	-34	-0.17	-0.22		-3.3	-21	-0.11	-0.14	
PJ	1977.5	8.75	-5.2	-34	-0.28	-0.36	d	-3.3	-22	-0.18	-0.23	d
PJ	1968	11.5	-5.2		-0.15	-0.19		-3.3		-0.094	-0.12	
PJ	1963	12.5	-5.2	-36	-0.21	-0.27	d	-3.3	-22	-0.13	-0.17	d
PJ	1955	15.5	-5.2	-35	-0.5	-0.65	d	-3.3	-22	-0.32	-0.4	d
Oldman	2003.5	0.25	-5.2	-98	-0.29	-0.063		-3.3	-61	-0.18	-0.039	
Oldman	1997	1.25	-5.2	-100	-0.22	-0.049		-3.3	-65	-0.14	-0.031	
Oldman	1987	2.25	-5.2	-97	-0.14	-0.03	d	-3.3	-60	-0.085	-0.019	d
Oldman	1980.5	2.75	-5.2	-100	-0.12	-0.026		-3.3	-63	-0.073	-0.016	
Oldman	1973	3.25	-5.2	-110	-0.11	-0.024		-3.3	-69	-0.068	-0.015	
Oldman	1963.5	3.75	-5.2	-120	-0.094	-0.021		-3.3	-73	-0.059	-0.013	
Oldman	1952	4.25	-5.2	-120	-0.083	-0.018		-3.3	-77	-0.052	-0.011	
Oldman	1906.5	6.25	-5.2	-150	-0.096	-0.021		-3.3	-95	-0.06	-0.013	
Snyder	2004	0.25	-5.2	-40	-0.11	-0.08		-3.3	-25	-0.068	-0.05	
Snyder	2000	1.25	1400	12000	26	19		-3.3	-26	-0.059	-0.043	
Snyder	1991.5	2.75	-5.2	-47	-0.081	-0.059		-3.3	-29	-0.05	-0.037	
Snyder	1985	3.75	-5.2	-50	-0.078	-0.057		-3.3	-31	-0.049	-0.036	
Snyder	1978	4.75	350	3500	4.9	3.6		-3.3	-33	-0.046	-0.033	
Snyder	1967.5	5.75	170	1800	2.2	1.6		-3.3	-35	-0.042	-0.031	
Snyder	1954.5	6.75	-5.2	-52	-0.057	-0.042		-3.3	-32	-0.036	-0.026	
Snyder	1893	11.75	-5.2	-60	-0.042	-0.03		-3.3	-37	-0.026	-0.019	

Site	Average Year (y)	Average Depth (cm)	BDE #166 pg/g dw	BDE #166 pg/g TOC	BDE #166 Flux pg/cm2.y	BDE #166 Flux (FF) pg/cm2.y	BDE #166 FLAG	BDE #183 pg/g dw	BDE #183 pg/g TOC	BDE #183 Flux pg/cm2.y	BDE #183 Flux (FF) pg/cm2.y	BDE #183 FLAG
Mills	2002	0.25	-2.8	-18	-0.082	-0.055	c	-7.5	-47	-0.22	-0.15	
Mills	2000	0.75	-2.8	-20	-0.082	-0.055	c	-7.5	-53	-0.22	-0.15	
Mills	1991	2.75	-2.8	-22	-0.068	-0.046	c	-7.5	-58	-0.18	-0.12	
Mills	1974	4.75	-2.8	-26	-0.054	-0.036		-7.5	-69	-0.14	-0.097	d
Mills	1964	6.25	-2.8	-23	-0.09	-0.061		-7.5	-62	-0.24	-0.16	
Mills	1947	8.75	-2.8	-25	-0.07	-0.048		-7.5	-66	-0.19	-0.13	d
Mills	1905	17.5	-2.8	-23	-0.062	-0.042	d	-7.5	-62	-0.17	-0.11	d

Lone Pine	2001	0.25	-2.8	-20	-0.042	-0.029	c	-7.5	-54	-0.11	-0.076	
Lone Pine	1998	0.75	-2.8	-22	-0.042	-0.029	c	-7.5	-58	-0.11	-0.076	
Lone Pine	1990	1.75	-2.8	-24	-0.048	-0.032	c	-7.5	-65	-0.13	-0.086	
Lone Pine	1982	2.75	-2.8	-23	-0.048	-0.032	c	-7.5	-62	-0.13	-0.086	
Lone Pine	1961	4.75	-2.8	-25	-0.039	-0.027		-7.5	-66	-0.11	-0.071	
Lone Pine	1936	6.75	-2.8	-25	-0.034	-0.023		-7.5	-67	-0.09	-0.061	
Lone Pine	1920	7.75	-2.8	-26	-0.034	-0.023		-7.5	-70	-0.09	-0.061	
Lone Pine	1870	11.5	-2.8	-24	-0.034	-0.023		-7.5	-65	-0.09	-0.061	
Emerald	2002	0.25	-2.8	-32	-0.13	-0.035	c	200	2300	9.1	2.4	
Emerald	1997	1.75	-2.8	-31	-0.13	-0.035		-7.5	-84	-0.35	-0.093	
Emerald	1989	3.75	-2.8	-30	-0.13	-0.035		-7.5	-79	-0.35	-0.093	
Emerald	1980	5.75	-2.8	-30	-0.13	-0.035		-7.5	-80	-0.35	-0.093	
Emerald	1971.5	7.75	-2.8	-33	-0.13	-0.035	c	-7.5	-87	-0.35	-0.093	
Emerald	1961.5	9.75	-2.8	-27	-0.13	-0.035	c	-7.5	-73	-0.35	-0.093	
Emerald	1958	10.5	-2.8	-36	-0.13	-0.035		-7.5	-95	-0.35	-0.093	
Emerald	1892	21.5	-2.8	-34	-0.16	-0.043	c	-7.5	-90	-0.43	-0.11	
Burial	2000	0.25	-2.8	-43	-0.011	-0.013		-7.5	-110	-0.03	-0.034	
Burial	1988	0.75	-2.8	-48	-0.012	-0.013		-7.5	-130	-0.031	-0.035	
Burial	1974	1.25	-2.8	-49	-0.013	-0.015		-7.5	-130	-0.035	-0.039	
Burial	1957	1.75	-2.8	-52	-0.009	-0.011		-7.5	-140	-0.025	-0.028	
Burial	1933	2.25	-2.8	-55	-0.009	-0.01		150	2900	0.46	0.52	XXX
Burial	1906	2.75	-2.8	-55	-0.009	-0.01		-7.5	-150	-0.023	-0.026	
Burial	1879	3.25	-2.8	-53	-0.009	-0.01		-7.5	-140	-0.023	-0.026	
Mcleod	2002	0.25	-2.8	-23	-0.014	-0.006	c	-7.5	-62	-0.038	-0.015	
Mcleod	1997	0.75	-2.8	-25	-0.016	-0.006	c	-7.5	-66	-0.042	-0.016	
Mcleod	1990	1.25	-2.8	-29	-0.018	-0.007	c	-7.5	-76	-0.048	-0.019	
Mcleod	1982	1.75	-2.8	-30	-0.023	-0.009	c	-7.5	-81	-0.061	-0.023	
Mcleod	1975	2.25	-2.8	-31	-0.029	-0.011	c	-7.5	-83	-0.078	-0.03	
Mcleod	1969	2.75	-2.8	-32	-0.032	-0.012	c	-7.5	-84	-0.084	-0.032	
Mcleod	1962	3.25	-2.8	-30	-0.023	-0.009	c	-7.5	-80	-0.061	-0.023	
Mcleod	1952	3.75	-2.8	-31	-0.018	-0.007	c	-7.5	-83	-0.047	-0.018	
Mcleod	1907	6.25	-2.8	-26	-0.016	-0.006	c	-7.5	-69	-0.043	-0.016	

Matcharak	2001	0.25	-2.8		-0.012	-0.009	c	-7.5		-0.031	-0.025	
Matcharak	1993	0.75	-2.8	-22	-0.013	-0.01	c	-7.5	-59	-0.034	-0.027	
Matcharak	1983	1.25	-2.8	-23	-0.012	-0.01	c	-7.5	-61	-0.032	-0.026	
Matcharak	1971	1.75	-2.8	-24	-0.009	-0.007	c	-7.5	-64	-0.025	-0.02	
Matcharak	1954	2.25	-2.8	-25	-0.007	-0.006	c	-7.5	-67	-0.019	-0.015	
Matcharak	1937	2.75	-2.8	-27	-0.006	-0.005	c	-7.5	-71	-0.016	-0.013	
Matcharak	1910	3.25	-2.8	-28	-0.006	-0.005	c,d	-7.5	-73	-0.015	-0.012	d
Wonder	2000	0.25	-2.8	-39	-0.021	-0.006		-7.5	-100	-0.056	-0.016	
Wonder	1992	0.75	-2.8	-39	-0.021	-0.006		-7.5	-100	-0.056	-0.016	
Wonder	1985	1.25	-2.8	-44	-0.02	-0.006		-7.5	-120	-0.054	-0.016	
Wonder	1977	1.75	-2.8	-47	-0.019	-0.005		-7.5	-130	-0.05	-0.014	
Wonder	1968	2.25	-2.8	-47	-0.013	-0.004		-7.5	-120	-0.035	-0.01	
Wonder	1949	2.75	-2.8	-47	-0.009	-0.003		-7.5	-120	-0.024	-0.007	
Wonder	1919	3.25	-2.8	-53	-0.006	-0.002		-7.5	-140	-0.017	-0.005	
Golden	2002.5	0.25	-2.8		-0.004	-0.004	d	-7.5		-0.01	-0.01	
Golden	1996.5	0.75	-2.8		-0.009	-0.009	d	-7.5		-0.023	-0.023	
Golden	1989.5	1.25	-2.8	-17	-0.011	-0.011		-7.5	-44	-0.028	-0.028	
Golden	1981.5	1.75	-2.8	-17	-0.01	-0.01	d	-7.5	-44	-0.027	-0.027	d
Golden	1972.5	2.25	-2.8	-12	-0.008	-0.008	d	-7.5	-31	-0.022	-0.022	d
Golden	1962.5	2.75	-2.8	-12	-0.007	-0.007	d	-7.5	-31	-0.018	-0.018	d
Golden	1951	3.25	-2.8	-11	-0.006	-0.006	d	-7.5	-29	-0.016	-0.016	d
Golden	1924	4.25	-2.8	-11	-0.005	-0.005		-7.5	-29	-0.013	-0.013	
LP 19	2004	0.25	-2.8	-15	-0.031	-0.021		-7.5	-41	-0.083	-0.055	
LP 19	1999	1.25	-2.8		-0.027	-0.018	d	-7.5		-0.071	-0.048	
LP 19	1994	2.25	-2.8	-15	-0.031	-0.021		-7.5	-41	-0.083	-0.055	
LP 19	1989	3.25	-2.8	-15	-0.024	-0.016	d	-7.5	-41	-0.064	-0.042	
LP 19	1980	4.25	-2.8	-15	-0.017	-0.011		-7.5	-41	-0.045	-0.03	
LP 19	1969	5.25	-2.8	-15	-0.015	-0.01	d	-7.5	-41	-0.039	-0.026	
LP 19	1956	6.25	-2.8	-15	-0.012	-0.008		-7.5	-40	-0.031	-0.021	
LP 19	1903	10.5	-2.8	-16	-0.017	-0.012	d	-7.5	-44	-0.047	-0.031	
Hoh	2004	0.25	-2.8	-14	-0.037	-0.012	d	-7.5	-37	-0.098	-0.032	d

Hoh	1998	1.25	-2.8	-15	-0.025	-0.008	d	-7.5	-41	-0.068	-0.022	
Hoh	1990.5	2.25	-2.8	-20	-0.031	-0.01	d	-7.5	-53	-0.083	-0.027	
Hoh	1983	3.25	-2.8	-27	-0.041	-0.013		-7.5	-72	-0.11	-0.035	
Hoh	1973.5	4.25	-2.8	-31	-0.042	-0.014		-7.5	-83	-0.11	-0.036	
Hoh	1963	5.25	-2.8	-28	-0.038	-0.012		-7.5	-74	-0.1	-0.033	
Hoh	1952.5	6.25	-2.8	-32	-0.055	-0.018		-7.5	-87	-0.15	-0.047	
Hoh	1901	12.75	-2.8	-34	-0.059	-0.019	d	-7.5	-90	-0.16	-0.051	
PJ	2004.5	0.25	-2.8	-18	-0.079	-0.1		-7.5	-47	-0.21	-0.27	
PJ	1999	2.75	-2.8	-17	-0.076	-0.097	d	-7.5	-46	-0.2	-0.26	d
PJ	1992	4.75	-2.8	-17	-0.069	-0.088		-7.5	-46	-0.18	-0.24	
PJ	1984	6.75	-2.8	-18	-0.092	-0.12		-7.5	-49	-0.24	-0.31	
PJ	1977.5	8.75	-2.8	-19	-0.15	-0.2	d	-7.5	-50	-0.41	-0.53	
PJ	1968	11.5	-2.8		-0.082	-0.1		-7.5		-0.22	-0.28	
PJ	1963	12.5	-2.8	-19	-0.12	-0.15	d	-7.5	-51	-0.31	-0.4	
PJ	1955	15.5	-2.8	-19	-0.27	-0.35	d	-7.5	-51	-0.73	-0.93	
Oldman	2003.5	0.25	-2.8	-53	-0.15	-0.034		-7.5	-140	-0.41	-0.091	
Oldman	1997	1.25	-2.8	-57	-0.12	-0.027		-7.5	-150	-0.32	-0.071	
Oldman	1987	2.25	-2.8	-52	-0.073	-0.016	d	-7.5	-140	-0.2	-0.043	d
Oldman	1980.5	2.75	-2.8	-55	-0.063	-0.014		-7.5	-150	-0.17	-0.037	
Oldman	1973	3.25	-2.8	-60	-0.059	-0.013		-7.5	-160	-0.16	-0.035	
Oldman	1963.5	3.75	-2.8	-63	-0.051	-0.011		-7.5	-170	-0.14	-0.03	d
Oldman	1952	4.25	-2.8	-67	-0.045	-0.01		-7.5	-180	-0.12	-0.026	
Oldman	1906.5	6.25	-2.8	-82	-0.052	-0.011		-7.5	-220	-0.14	-0.031	
Snyder	2004	0.25	-2.8	-21	-0.059	-0.043	c	-7.5	-57	-0.16	-0.12	
Snyder	2000	1.25	-2.8	-23	-0.051	-0.037	c	-7.5	-61	-0.14	-0.099	d
Snyder	1991.5	2.75	-2.8	-25	-0.044	-0.032	c	-7.5	-68	-0.12	-0.085	
Snyder	1985	3.75	-2.8	-27	-0.042	-0.031	c	-7.5	-72	-0.11	-0.082	
Snyder	1978	4.75	-2.8	-29	-0.039	-0.029	c	-7.5	-77	-0.11	-0.077	
Snyder	1967.5	5.75	-2.8	-30	-0.037	-0.027	c	-7.5	-81	-0.098	-0.071	d
Snyder	1954.5	6.75	-2.8	-28	-0.031	-0.023	c	-7.5	-75	-0.083	-0.06	d
Snyder	1893	11.75	-2.8	-32	-0.023	-0.016	c	-7.5	-86	-0.06	-0.044	
Site	Average	Average	BDE	BDE	BDE	BDE	BDE	BDE	BDE	BDE	BDE	BDE

	Year (y)	Depth (cm)	#181 pg/g dw	#181 pg/g TOC	#181 Flux pg/cm2.y	#181 Flux (FF) pg/cm2.y	#181 FLAG	#190 pg/g dw	#190 pg/g TOC	#190 Flux pg/cm2.y	#190 Flux (FF) pg/cm2.y	#190 FLAG
Mills	2002	0.25	-5.8	-37	-0.17	-0.11	c	-5.7	-36	-0.16	-0.11	c
Mills	2000	0.75	-5.8	-41	-0.17	-0.11	c	-5.7	-40	-0.16	-0.11	c
Mills	1991	2.75	-5.8	-45	-0.14	-0.095	c	-5.7	-44	-0.14	-0.092	c
Mills	1974	4.75	-5.8	-54	-0.11	-0.075	c,d	-5.7	-52	-0.11	-0.073	c,d
Mills	1964	6.25	-5.8	-48	-0.19	-0.13		-5.7	-47	-0.18	-0.12	
Mills	1947	8.75	-5.8	-52	-0.15	-0.099	d	-5.7	-50	-0.14	-0.096	d
Mills	1905	17.5	-5.8	-48	-0.13	-0.087	d	-5.7	-47	-0.12	-0.084	d
Lone Pine	2001	0.25	-5.8	-42	-0.088	-0.059	c	-5.7	-41	-0.085	-0.058	c
Lone Pine	1998	0.75	-5.8	-45	-0.088	-0.059	c	-5.7	-44	-0.085	-0.058	c
Lone Pine	1990	1.75	-5.8	-50	-0.099	-0.067	c	-5.7	-49	-0.097	-0.065	c
Lone Pine	1982	2.75	-5.8	-48	-0.099	-0.067	c	-5.7	-47	-0.097	-0.065	c
Lone Pine	1961	4.75	-5.8	-51	-0.082	-0.055		-5.7	-50	-0.08	-0.054	
Lone Pine	1936	6.75	-5.8	-52	-0.07	-0.047		-5.7	-51	-0.068	-0.046	
Lone Pine	1920	7.75	-5.8	-54	-0.07	-0.047		-5.7	-53	-0.068	-0.046	
Lone Pine	1870	11.5	-5.8	-51	-0.07	-0.047		-5.7	-49	-0.068	-0.046	
Emerald	2002	0.25	-5.8	-67	-0.27	-0.072	c	-5.7	-65	-0.26	-0.07	c
Emerald	1997	1.75	-5.8	-65	-0.27	-0.072		-5.7	-63	-0.26	-0.07	
Emerald	1989	3.75	-5.8	-61	-0.27	-0.072		-5.7	-60	-0.26	-0.07	
Emerald	1980	5.75	-5.8	-62	-0.27	-0.072		-5.7	-61	-0.26	-0.07	
Emerald	1971.5	7.75	-5.8	-68	-0.27	-0.072	c	-5.7	-66	-0.26	-0.07	c
Emerald	1961.5	9.75	-5.8	-56	-0.27	-0.072		-5.7	-55	-0.26	-0.07	
Emerald	1958	10.5	-5.8	-74	-0.27	-0.072		-5.7	-72	-0.26	-0.07	
Emerald	1892	21.5	-5.8	-70	-0.33	-0.089		-5.7	-68	-0.32	-0.087	
Burial	2000	0.25	-5.8	-88	-0.023	-0.027		-5.7	-86	-0.023	-0.026	
Burial	1988	0.75	-5.8	-99	-0.024	-0.027		-5.7	-96	-0.023	-0.026	
Burial	1974	1.25	-5.8	-100	-0.027	-0.031		-5.7	-98	-0.026	-0.03	
Burial	1957	1.75	-5.8	-110	-0.019	-0.022		-5.7	-110	-0.019	-0.021	
Burial	1933	2.25	-5.8	-110	-0.018	-0.021		-5.7	-110	-0.018	-0.02	
Burial	1906	2.75	-5.8	-110	-0.018	-0.021		-5.7	-110	-0.018	-0.02	

Burial	1879	3.25	-5.8	-110	-0.018	-0.021		-5.7	-110	-0.018	-0.02	
Mcleod	2002	0.25	-5.8	-48	-0.03	-0.011		-5.7	-47	-0.029	-0.011	
Mcleod	1997	0.75	-5.8	-51	-0.033	-0.013		-5.7	-50	-0.032	-0.012	
Mcleod	1990	1.25	-5.8	-59	-0.037	-0.014		-5.7	-58	-0.036	-0.014	
Mcleod	1982	1.75	-5.8	-63	-0.047	-0.018		-5.7	-61	-0.046	-0.018	
Mcleod	1975	2.25	-5.8	-65	-0.061	-0.023		-5.7	-63	-0.059	-0.023	
Mcleod	1969	2.75	-5.8	-65	-0.065	-0.025		-5.7	-64	-0.064	-0.024	
Mcleod	1962	3.25	-5.8	-62	-0.047	-0.018		-5.7	-60	-0.046	-0.018	
Mcleod	1952	3.75	-5.8	-64	-0.037	-0.014		-5.7	-63	-0.036	-0.014	
Mcleod	1907	6.25	-5.8	-54	-0.033	-0.013		-5.7	-52	-0.032	-0.012	
Matcharak	2001	0.25	-5.8		-0.024	-0.019		-5.7		-0.023	-0.019	
Matcharak	1993	0.75	-5.8	-46	-0.026	-0.021		-5.7	-45	-0.026	-0.02	
Matcharak	1983	1.25	-5.8	-48	-0.025	-0.02		-5.7	-46	-0.024	-0.02	
Matcharak	1971	1.75	-5.8	-50	-0.019	-0.015		-5.7	-48	-0.019	-0.015	
Matcharak	1954	2.25	-5.8	-52	-0.015	-0.012		-5.7	-50	-0.014	-0.011	
Matcharak	1937	2.75	-5.8	-55	-0.012	-0.01		-5.7	-54	-0.012	-0.01	
Matcharak	1910	3.25	-5.8	-57	-0.012	-0.009	d	-5.7	-55	-0.011	-0.009	d
Wonder	2000	0.25	-5.8	-81	-0.043	-0.012	c	-5.7	-79	-0.042	-0.012	c
Wonder	1992	0.75	-5.8	-81	-0.044	-0.013	c	-5.7	-79	-0.043	-0.012	c
Wonder	1985	1.25	-5.8	-91	-0.042	-0.012	c	-5.7	-88	-0.041	-0.012	c
Wonder	1977	1.75	-5.8	-98	-0.039	-0.011	c	-5.7	-95	-0.037	-0.011	c
Wonder	1968	2.25	-5.8	-97	-0.027	-0.008	c	-5.7	-94	-0.027	-0.008	c
Wonder	1949	2.75	-5.8	-97	-0.019	-0.005	c	-5.7	-94	-0.018	-0.005	c
Wonder	1919	3.25	-5.8	-110	-0.013	-0.004	c	-5.7	-110	-0.013	-0.004	c
Golden	2002.5	0.25	-5.8		-0.008	-0.008		-5.7		-0.008	-0.008	
Golden	1996.5	0.75	-5.8		-0.018	-0.018		-5.7		-0.018	-0.018	
Golden	1989.5	1.25	-5.8	-35	-0.022	-0.022		-5.7	-34	-0.021	-0.021	
Golden	1981.5	1.75	-5.8	-35	-0.021	-0.021	d	-5.7	-34	-0.02	-0.02	d
Golden	1972.5	2.25	-5.8	-24	-0.017	-0.017	d	-5.7	-24	-0.017	-0.017	d
Golden	1962.5	2.75	-5.8	-24	-0.014	-0.014	d	-5.7	-24	-0.014	-0.014	d
Golden	1951	3.25	-5.8	-23	-0.013	-0.013	d	-5.7	-22	-0.012	-0.012	d
Golden	1924	4.25	-5.8	-23	-0.01	-0.01		-5.7	-22	-0.01	-0.01	

LP 19	2004	0.25	-5.8	-32	-0.064	-0.043		-5.7	-31	-0.062	-0.042	
LP 19	1999	1.25	-5.8		-0.056	-0.037		-5.7		-0.054	-0.036	
LP 19	1994	2.25	-5.8	-32	-0.064	-0.043		-5.7	-31	-0.062	-0.042	
LP 19	1989	3.25	-5.8	-32	-0.049	-0.033		-5.7	-31	-0.048	-0.032	
LP 19	1980	4.25	-5.8	-32	-0.035	-0.024		-5.7	-31	-0.034	-0.023	
LP 19	1969	5.25	-5.8	-32	-0.03	-0.02		-5.7	-31	-0.03	-0.02	
LP 19	1956	6.25	-5.8	-31	-0.024	-0.016		-5.7	-30	-0.024	-0.016	
LP 19	1903	10.5	-5.8	-34	-0.036	-0.024		-5.7	-33	-0.035	-0.023	
Hoh	2004	0.25	-5.8	-29	-0.076	-0.025	d	-5.7	-28	-0.074	-0.024	d
Hoh	1998	1.25	-5.8	-32	-0.053	-0.017		-5.7	-31	-0.051	-0.016	
Hoh	1990.5	2.25	-5.8	-41	-0.064	-0.021		-5.7	-40	-0.062	-0.02	
Hoh	1983	3.25	-5.8	-56	-0.085	-0.027		-5.7	-54	-0.082	-0.027	
Hoh	1973.5	4.25	-5.8	-65	-0.088	-0.028		-5.7	-63	-0.085	-0.027	
Hoh	1963	5.25	-5.8	-58	-0.079	-0.025		-5.7	-56	-0.077	-0.025	
Hoh	1952.5	6.25	-5.8	-67	-0.11	-0.037		-5.7	-66	-0.11	-0.036	
Hoh	1901	12.75	-5.8	-70	-0.12	-0.04		-5.7	-68	-0.12	-0.038	
PJ	2004.5	0.25	-5.8	-37	-0.16	-0.21		-5.7	-36	-0.16	-0.2	c
PJ	1999	2.75	-5.8	-36	-0.16	-0.2	d	-5.7	-35	-0.15	-0.2	c,d
PJ	1992	4.75	-5.8	-36	-0.14	-0.18		-5.7	-35	-0.14	-0.18	c
PJ	1984	6.75	-5.8	-38	-0.19	-0.24		-5.7	-37	-0.18	-0.24	c
PJ	1977.5	8.75	-5.8	-39	-0.32	-0.41		-5.7	-38	-0.31	-0.4	
PJ	1968	11.5	-5.8		-0.17	-0.22		-5.7		-0.16	-0.21	
PJ	1963	12.5	-5.8	-40	-0.24	-0.31		-5.7	-39	-0.23	-0.3	c
PJ	1955	15.5	-5.8	-39	-0.57	-0.73		-5.7	-38	-0.55	-0.71	
Oldman	2003.5	0.25	-5.8	-110	-0.32	-0.071		-5.7	-110	-0.31	-0.069	
Oldman	1997	1.25	-5.8	-120	-0.25	-0.055		-5.7	-110	-0.24	-0.054	
Oldman	1987	2.25	-5.8	-110	-0.15	-0.033	d	-5.7	-110	-0.15	-0.032	d
Oldman	1980.5	2.75	-5.8	-110	-0.13	-0.029		-5.7	-110	-0.13	-0.028	
Oldman	1973	3.25	-5.8	-120	-0.12	-0.027		-5.7	-120	-0.12	-0.026	
Oldman	1963.5	3.75	-5.8	-130	-0.11	-0.023	d	-5.7	-130	-0.1	-0.022	d
Oldman	1952	4.25	-5.8	-140	-0.093	-0.021		-5.7	-130	-0.091	-0.02	
Oldman	1906.5	6.25	-5.8	-170	-0.11	-0.024		-5.7	-170	-0.11	-0.023	

Snyder	2004	0.25	-5.8	-44	-0.12	-0.09	c	-5.7	-43	-0.12	-0.087	c
Snyder	2000	1.25	-5.8	-48	-0.11	-0.077	c,d	-5.7	-46	-0.1	-0.075	c,d
Snyder	1991.5	2.75	-5.8	-53	-0.091	-0.066	c	-5.7	-51	-0.088	-0.064	c
Snyder	1985	3.75	-5.8	-56	-0.088	-0.064	c	-5.7	-55	-0.085	-0.062	c
Snyder	1978	4.75	-5.8	-60	-0.082	-0.06	c	-5.7	-58	-0.08	-0.058	c
Snyder	1967.5	5.75	-5.8	-63	-0.076	-0.055	c,d	-5.7	-61	-0.074	-0.054	c,d
Snyder	1954.5	6.75	-5.8	-58	-0.064	-0.047	c,d	-5.7	-57	-0.062	-0.046	c,d
Snyder	1893	11.75	-5.8	-67	-0.047	-0.034	c	-5.7	-65	-0.045	-0.033	