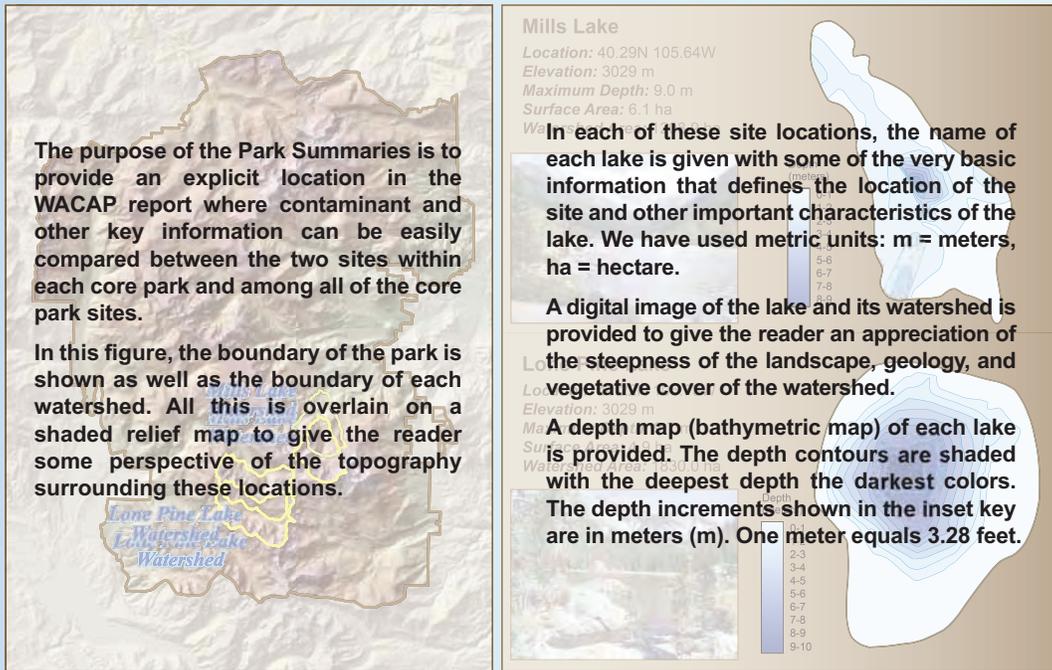


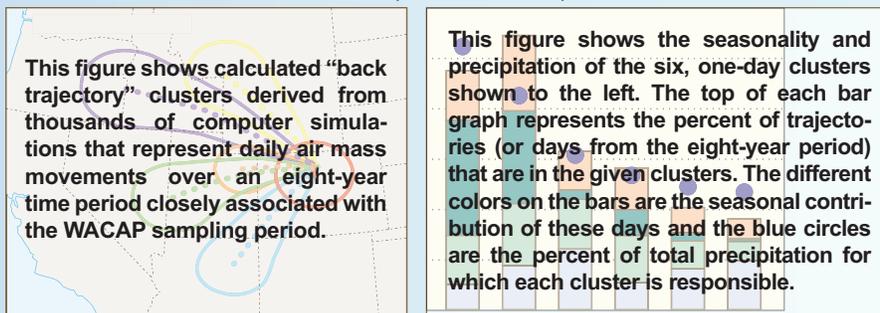
## KEY

The Park Summaries that follow in this chapter have been prepared to provide the reader with a summary of selected contaminant results for each core WACAP national park. A set of reduced summaries for the secondary parks that contain only vegetation results follows the core park summaries, with a separate key. The Arctic parks GAAR and NOAT, with one lake site each, have been combined into one summary. These summaries contain a considerable amount of information, but do not represent all data and information available for the parks. This two-page Key provides explicit detail regarding each block of information the reader will encounter on the two-page graphical summaries and is intended to guide the reader through the summaries. Summaries for all parks are presented in the same format. The summaries are designed so the two lake sites within each park can easily be compared and the relative position of these sites within the context of all WACAP core parks can be visualized. The reader is encouraged to consult the other chapters of this report for more detailed information on the full range of WACAP results and their interpretation.

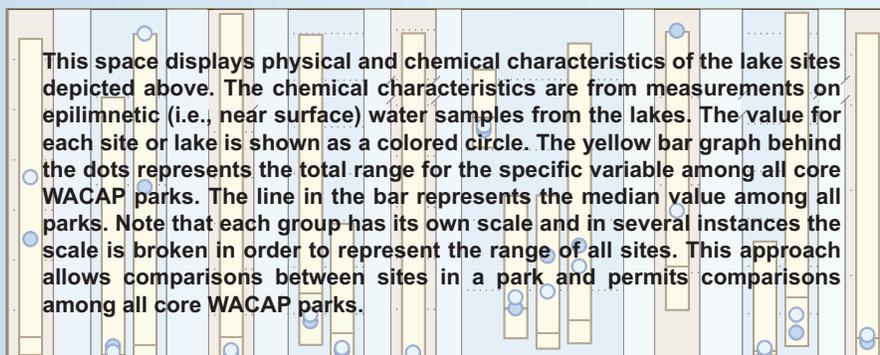
### ◆ Park and Lake Setting ◆



### ◆ Atmospheric Transport ◆

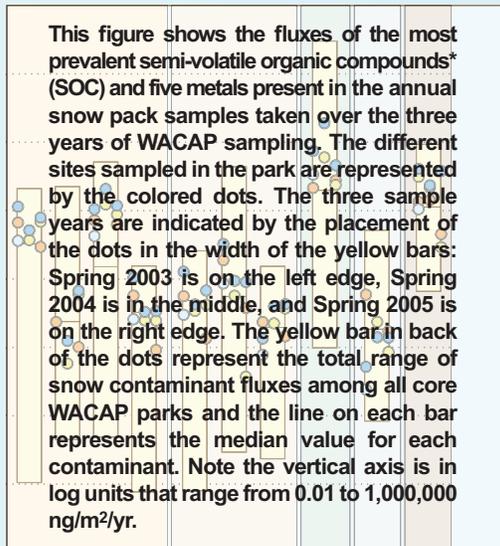


### ◆ Physical and Chemical Characteristics ◆

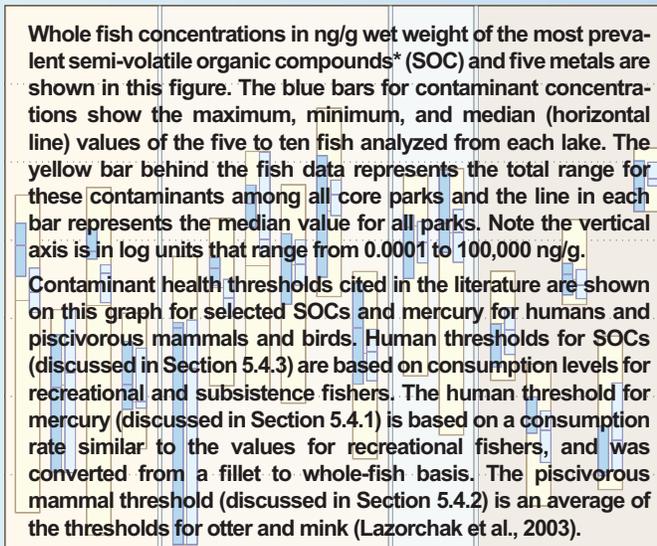


# Key to Park Summaries: Contaminant Summaries

## ◆ Snow Contaminant Fluxes ◆

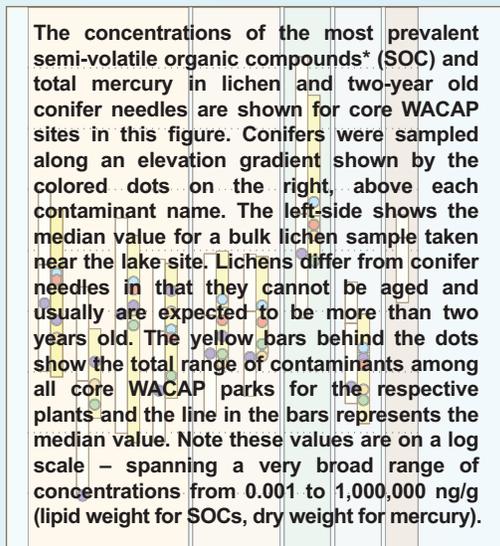


## ◆ Whole Fish Contaminant Concentrations ◆

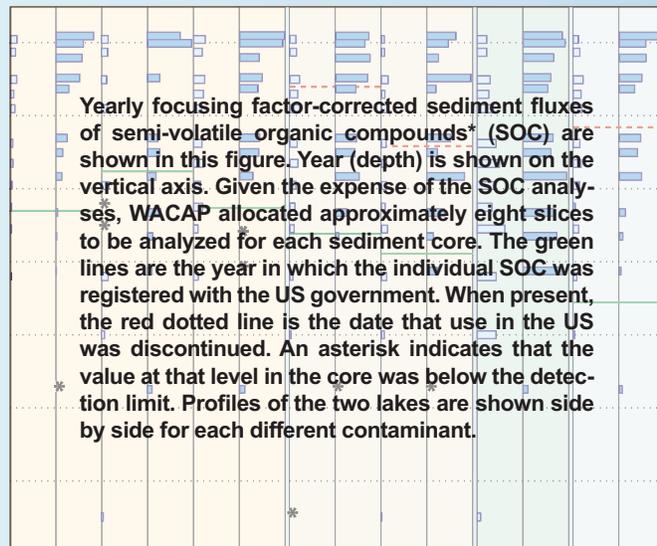


\*SOC groupings by compound class are listed in Table 4-1.

## ◆ Vegetation Contaminant Concentrations ◆



## ◆ Sediment Organic Contaminant Fluxes ◆



## ◆ Sediment Contaminant Fluxes ◆

These figures are sediment profiles for each site. The top of the graph represents the surface of the sediment core; the dates on the vertical axis are derived from <sup>210</sup>Pb dating. Each point on a graph represents results of an analysis of a sediment slice having an average date represented by the circle.

Spheroidal Carbonaceous Particles (SCP) are microscopic "fly ash" materials formed only by high temperature combustion associated with fossil fuel (coal and oil) combustion. They are expressed as number (no.) per unit area per year and are excellent indicators of local or regional sources of human industrial activities. Total Organic Carbon, in mass per unit area per year, is a component of the sediment record derived from in-lake photosynthesis production or watershed sources and typically decreases with depth as a result of biogenic processes in the sediment.

**Sediment Metals Enrichment:** Results of the analysis of four metals in lake sediments for each of the two lakes are shown here. The units are expressed as Percent Enrichment from historical (pre-industrial) background values near ~1880. The results have been "normalized" to titanium, which removes much of the noise in the profiles related to watershed processes (e.g., weathering, avalanches). These profiles show the recent history of metal deposition to each lake system with respect to background.

# Key to Secondary Parks: Summary



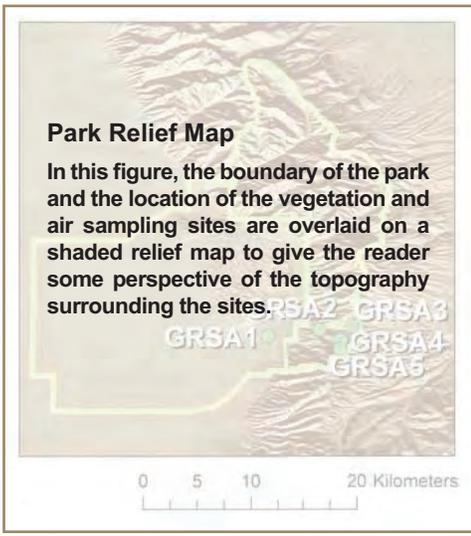
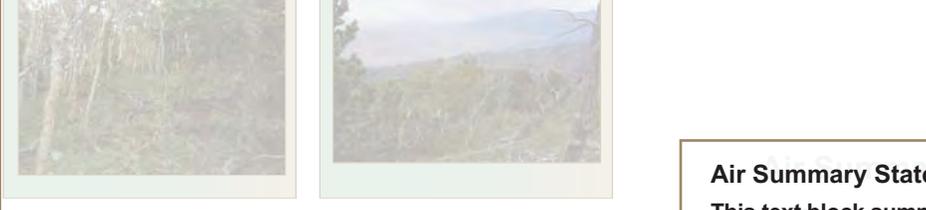
**KEY**

The pages that follow have been prepared to provide the reader with a summary of contaminant results for air and vegetation sampling in each secondary WACAP park. The word *park*, as used here, encompasses federally managed lands, including national parks, monuments, preserves, and wilderness. This one-page key provides explicit detail regarding each block of information the reader will encounter. Summaries for all secondary parks are presented in the same format. The summaries are designed so that the location and contaminant concentrations at the four to six sampling sites within each park and across all parks can be easily visualized and compared. The reader is encouraged to consult the other chapters of this report and the primary park summaries for more information on the full range of WACAP results and their interpretation.



Site Photos

A photograph of the environs at each site is provided to give the reader an appreciation of the vegetative cover, steepness of the landscape, climate, and geology. The name of the sampling site is given with some very basic information: a short verbal description of the site location, latitude and longitude in decimal degrees, average annual temperature and precipitation estimated by the PRISM model, whether or not air was sampled at the site, and the scientific names of the conifer and lichen vegetation sampled at the site. Units follow the metric system: m = meters, cm = centimeters, °C = degrees Centigrade. N, W = north, and west.



Park Relief Map

In this figure, the boundary of the park and the location of the vegetation and air sampling sites are overlaid on a shaded relief map to give the reader some perspective of the topography surrounding the sites.

## Vegetation Summary

- The dominant SOCs detected in vegetation were PAHs, especially 4-5 ring compounds (30-1000 ng/g lipid), endosulfans (3-710, 10x higher in lichens than conifers), and dacthal (2-110, 10x higher in lichens), DDTs (10-100), HCB (1-67), a-HCH (0.1-40), chlorpyrifos (24-32), and g-HCH (5-17); low concentrations of PCBs (1-11) were detected.

**Vegetation Summary Statements**

This text block summarizes the results of the laboratory analysis of vegetation samples and highlights the most important findings. These include: the SOCs detected and their concentrations in nanograms per gram conifer needle lipid or lichen lipid (bdl indicates values below detection limit); differences between concentrations in needles versus lichens, if important; effects of elevation on concentrations of SOCs in lichens; ranking of SOC concentrations in vegetation relative to vegetation in other WACAP parks; concentrations of nitrogen and sulfur (nutrients), mercury and other toxic metals in lichens relative to known or expected background ranges; and ecological implications of, or concerns indicated by, the results.

• Lichen nitrogen concentrations were within background ranges, indicating that nitrogen deposition is not elevated.

## Air Summary Statements

This text block summarizes the results of the laboratory analysis of the passive air sampling devices (PASDs) and highlights the most important findings. These include the location of the monitors in the parks, the SOCs detected and their concentrations in picograms per gram XAD resin (dry weight), within-park differences in SOC concentrations if multiple samplers were deployed, and how park SOC concentrations ranked relative to other WACAP parks.

## Vegetation Contaminant Concentrations

The concentrations of the most prevalent semi-volatile organic compounds (SOCs) in lichens and 2-year-old conifer needles are shown for WACAP sites in the figure. Conifers and lichens were sampled along an elevational gradient. Concentrations at each site are represented by the shaded circles above each contaminant name. The middle horizontal line within each background bar behind the circles shows the median value for all WACAP sites across all parks; the top and bottom horizontal edges of the background bars show the maximum and minimum concentrations across all WACAP sites. Brown and green bars indicate lichen and conifer needle concentrations, respectively. These values are on a log scale – spanning a very broad range of concentrations from 0.001 to 1,000,000 ng SOC per gram of lipid in lichens or needles. When sample concentrations were below detection limits, the circle representing the site was placed at one-half the estimated detection limit and the circle is open. Circle shading intensity darkens with increasing elevation. SOCs are grouped by current-use pesticides (endosulfans, chlorpyrifos, dacthal), historic-use pesticides (g-HCH, a-HCH, HCB), polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs). Metals were not analyzed in vegetation samples at secondary parks.