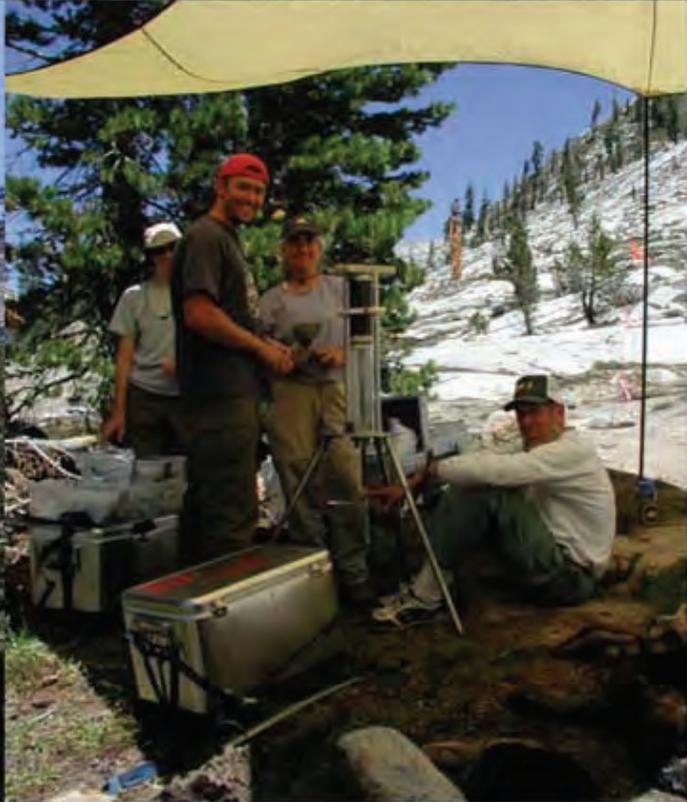


## Sequoia and Kings Canyon National Parks



## Summary: Sequoia and Kings Canyon National Parks

Emerald and Pear lakes are similar physically and chemically, although Emerald Lake is a bit shallower and has slightly higher total phosphorus and nitrogen. Compared to the other sites, they are among the most dilute, poorly buffered (i.e., have low acid neutralizing capacity), and oligotrophic (low productivity) systems. At SEKI, air, vegetation, and snow had among the highest concentrations for current-use pesticides, compared with these media in the other parks. The source of these compounds could be regional agriculture within a few hundred kilometers of the park.

### Air

SOCs detected in air were trifluralin, dacthal, endosulfans, chlorpyrifos, and g-HCH, all of which are current-use pesticides. In addition, HCB, a-HCH, dieldrin, PCBs, and PAHs were detected. Most SOC concentrations in air ranked high relative to those in other parks and more SOC were detected in SEKI than in other parks.

### Snow

Atmospheric deposition in SEKI is dominated by deep snowpacks with high snow water equivalent. Concentrations of many current-use pesticides and historic-use pesticides were high, producing high deposition fluxes in the snow. In contrast, with few local or regional sources of mercury emissions upwind, mercury concentrations in the snow were generally low, producing only moderate fluxes of mercury deposition. Summers are generally quite dry in SEKI, providing less opportunity for wet deposition of contaminants in rainfall than wetter summers at parks in the Rocky Mountains.

### Vegetation

SOCs, Hg, and nutrient concentrations in SEKI vegetation were in the median to highest ranges among the parks, attributable partly to intensive regional agriculture. SOC detected in vegetation were PAHs (mostly retene, CHR/TRI, PHE, FLO, FLA, and PYR), endosulfans, dacthal, DDTs, chlorpyrifos, HCB, g-HCH, dieldrin, a-HCH, and PCBs. Lichen concentrations indicate enhanced nitrogen and sulfur deposition. Concentrations of endosulfan, dacthal, HCH, HCB, and chlorpyrifos in lichens increased with elevation. Because forest productivity is high, pesticides scrubbed from the air by vegetation probably contribute significant contaminant loads to the ecosystem via canopy through-fall and needle litter-fall.

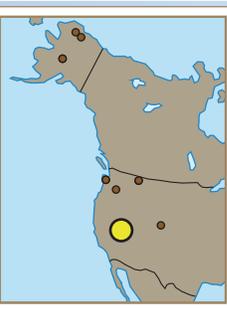
### Fish

Mercury and macrophage aggregates increased with increasing fish age in both lakes. Spleen and kidney macrophage aggregates were positively related to mercury at Pear Lake, but only kidney macrophage aggregates were so related at Emerald Lake. All fish appeared normal reproductively. Current-use SOC concentrations in fish were among the highest measured. Lake average dieldrin and individual fish p,p'-DDE concentrations in both lakes exceeded contaminant health thresholds for subsistence fishers; the dieldrin concentration in one fish in Pear Lake exceeded the threshold for recreational fishers. In at least one fish from each lake, contaminant health thresholds for mercury and DDTs were exceeded for one or more piscivores (otter, mink, kingfishers). Two fish from Pear Lake exceeded the human contaminant health threshold for mercury.

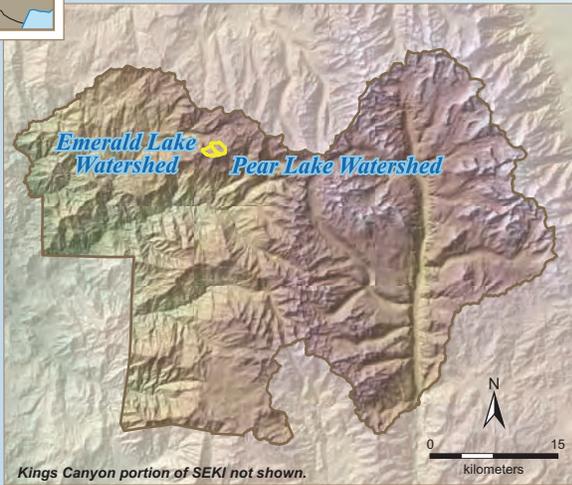
### Sediment

SOC flux profiles are very similar in both lakes, and SOC appear after being registered for use in the USA. DDTs and chlordanes decrease after being banned in the USA, but PCBs are still accumulating. Mercury began to increase in both lakes in the late 1800s, and lead began to increase around 1900. Mercury profiles are similar in both lakes, in that they tend to stabilize, noisily, at about 100% enrichment. Lead and cadmium profiles are similar in Pear Lake, both peaking in the 1970s and decreasing toward the surface (present time). SCPs were first detected in the late 1800s, but the patterns in both lakes are not closely associated with metal flux profiles, suggesting that major high temperature combustion sources were not the primary historic source of metals to the sediments.

# Sequoia and Kings Canyon National Parks: *Site Characteristics*

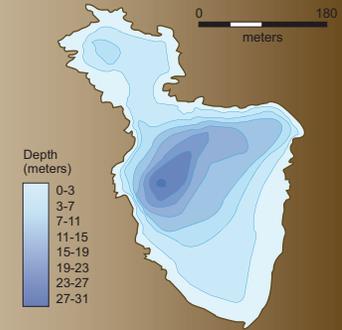


SEKI



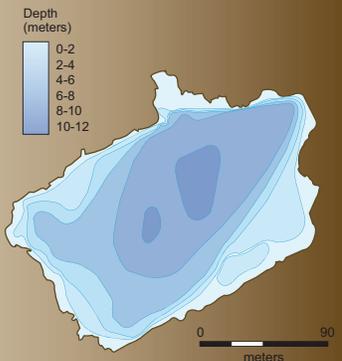
## Pear Lake

**Location:** 36.60N 118.67W  
**Elevation:** 2907.8 m  
**Maximum Depth:** 27.0 m  
**Surface Area:** 7.3 ha  
**Watershed Area:** 142.0 ha

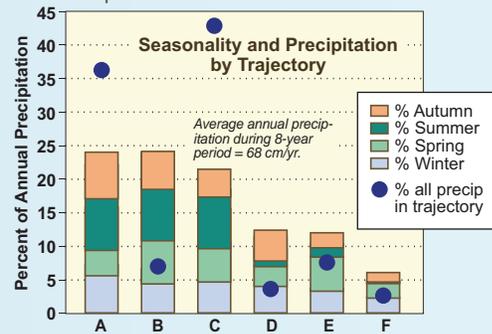
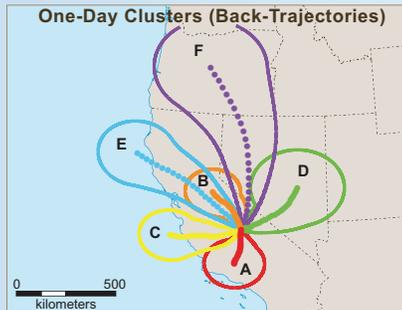


## Emerald Lake

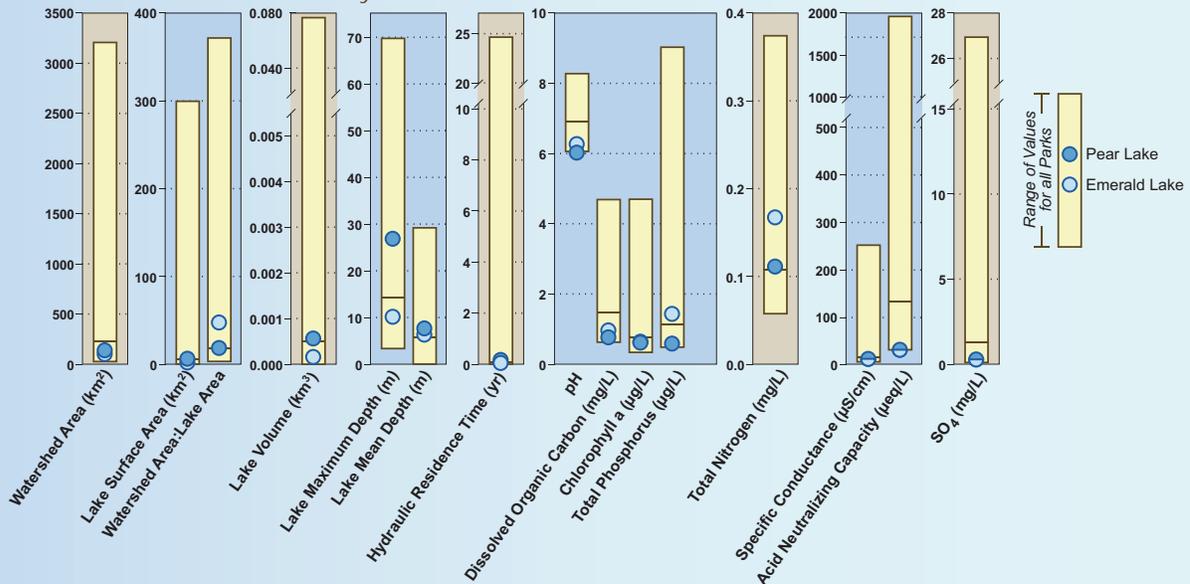
**Location:** 36.58N 118.67W  
**Elevation:** 2810.3 m  
**Maximum Depth:** 10.0 m  
**Surface Area:** 2.5 ha  
**Watershed Area:** 121.3 ha



### ◆ Atmospheric Transport ◆



### ◆ Physical and Chemical Characteristics ◆



# Sequoia and Kings Canyon National Parks: Contaminant Summaries

