

USGS Provides Baselines For Two Alaska Parks

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Through the cooperative efforts of the National Park Service, over the past two years U.S. Geological Survey (USGS) has worked in Alaska to develop geochemical and biogeochemical baselines for Denali NP and Preserve (DENA) and Wrangell-St. Elias NP and Preserve (WSEP).

Three fundamental objectives are common to all baseline studies, but first, a basic definition: A baseline represents the concentration of a given parameter measured at some point in time—a snapshot—and may not represent a natural concentration devoid of human influence.

Inherent in establishing baselines is the need to describe the nature and variation of the environment—important for attaching a confidence level to any geochemical map produced. Next is the need to assess the extent or intensity of alteration to the environment—how much has the system been disturbed (either naturally or by humans). Finally, we want to provide basic information for studying environmental processes—information for formulating hypotheses on the mobilization, transportation, and deposition of elements.

At DENA, in central Alaska, a coal-fired power plant in the town of Healy near the park's northeast corner may be enlarged from 25 to 75 MW. At WSEP, a proposed 10 MW coal-fired power plant near the town of Gakona would provide power for a proposed radar complex. At both sites our studies were to establish the feasibility of preparing geochemical and biogeochemical maps and to establish baseline information for native vegetation and soils. This information could then be used to assess possible geochemical impacts on the biological resources of the parks.

For these studies, we sampled *Hylocomium splendens* (feather moss), *Picea glauca* (white spruce), *Peltigera aphthosa* (soil lichen), and the top, organic-rich soil horizon. All samples were analyzed for their major, minor, and trace element content by a variety of analytical techniques by the Branch of Geochemistry staff.

Sampling sites for the DENA study were positioned at geometric intervals along three generally west to east traverses and one north to south traverse, all starting about 0.25 km from the existing power plant. The samples for the WSEP study consisted of three traverses originating from the proposed power plant site and going south and east into the park. Two different methods of baseline calculation were used. For DENA, baselines were calculated as a range of observed values from the samples collected at sites beyond 6 km from the existing power plant. This distance

proved to be beyond the probable influence of the facility. For WSEP baselines were calculated from the total range of all samples collected.

Elemental concentration baselines for both areas followed the general trend of soil > moss > or = lichen > or = spruce. For most elements, there is good agreement with the limited available literature. For a given element, for a given medium, WSEP was similar to DENA. Noticeable point-source element concentration trends do exist for all

the media sampled for the DENA study, but for many of the environmentally important elements there is a leveling-off effect seen 6 km and beyond from the existing power plant.

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