

Alaska Regional Haze Pilot Project



Department of Environmental Conservation
Division of Air & Water Quality

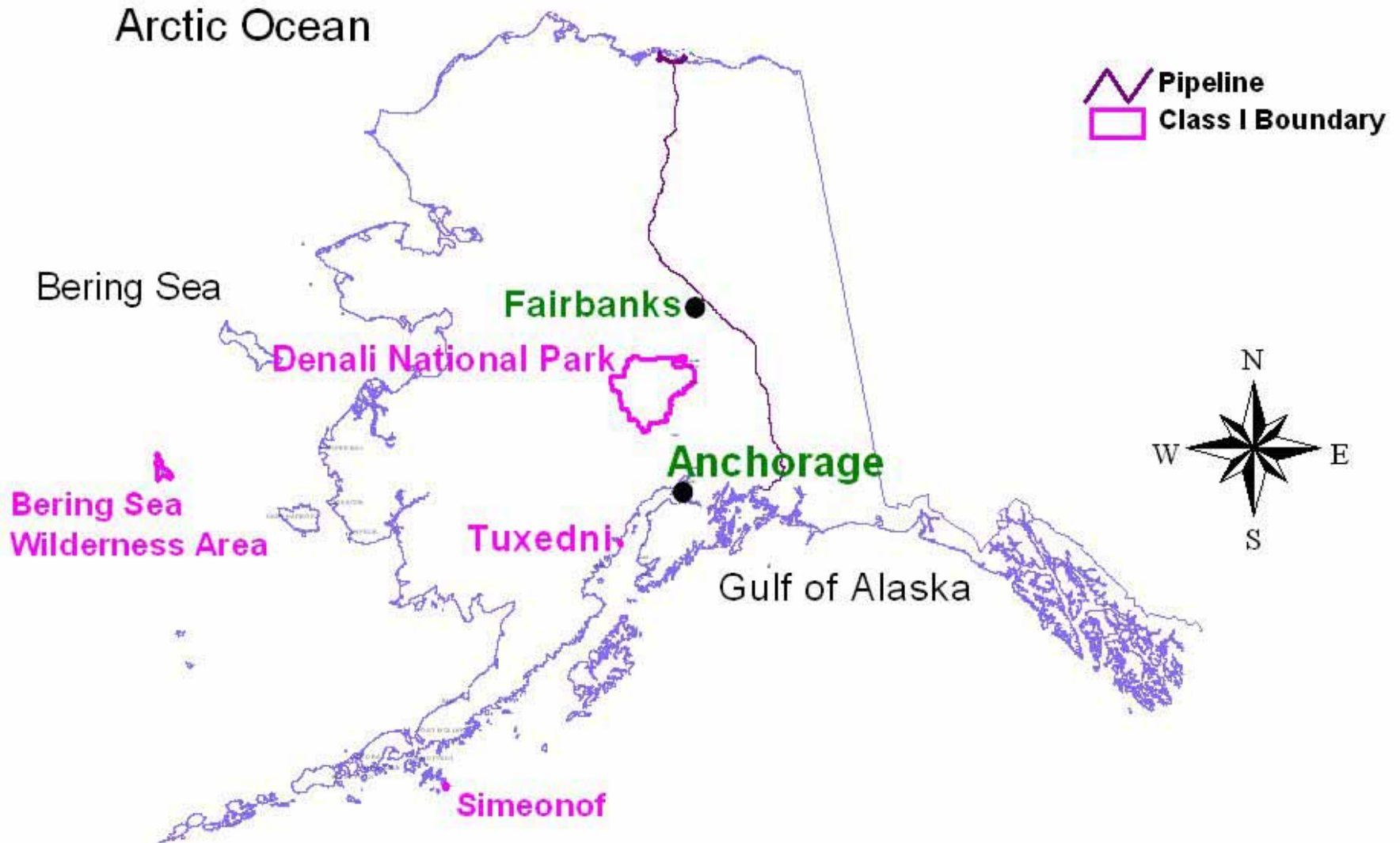
Barbara Trost

907-269-6249

barbara_trost@dec.state.ak.us

20 8 59

Alaska Class One Areas



Alaska Regional Haze Issues

- DEC is required to determine the specific impacts of RH on the 4 Class I areas.
- Air Quality Monitoring is used to quantify impairment.
- Sources of Regional Haze have to be determined.
- Control Strategies for anthropogenic sources (in state) need to be developed (determine BART eligible sources).
- RHR defines the calculation of :
 - Baseline Visibility
 - Natural Visibility
 - Rate of Progress

Alaska Regional Haze Issues (cont.)

- Estimated Natural Conditions (in Deciviews):

Class I Area	Average	20% best	20% worst
Denali NPP	4.68	2.12	7.24
Tuxedni WA	5.00	2.44	7.56
Simeonof WA	5.34	2.78	7.90

- Baseline Conditions: (data from 1995-1999)

Class I Area	20% best	20% worst
Denali NPP	3.5	9.7

- Preliminary Rate of Progress for 2004 to 2018 : 0.57 deciviews

Alaska Regional Haze Issues

- Baseline Conditions:

- Calculated by using the monitoring data of the last 5 years.
- Visibility impairment from the 20 % least and most impaired days will be averaged (in units of deciviews)

- Natural Conditions:

- Defined as the conditions that would exist in the absence of human caused impairments
- Estimates for the best and worst 20% days (defined in RHR)
- Strongly depends on the definition of “natural” versus “man-made”





20 11 5

RH Monitoring at Denali NPP

- IMPROVE

(Interagency Monitoring of Protected Visual Environments)

- 3/1988 start of monitoring at 'Headquarter' site
- 9/2001 start of monitoring at 'Trapper Creek' site (official DNPP site)

- IMPROVE Network in Alaska

- Denali HQ
- Trapper Creek
- Sand Point
- Tuxedni
- Ambler

Visibility Reducing Particles at Denali National Park and Preserve

- Primarily smaller than 2.5 μm in aerodynamic diameter
- Measured at :
 - Denali NPP by IMPROVE
 - and Poker Flat, Denali National Park and Preserve, and Trapper Creek Dry Deposition Network Air Quality Networks
- Come from both local and distant sources

Particulate Sources at Denali NPP

- According to the results of the current air quality monitoring at Denali NPP, the sources of particles impacting the park are seasonally dependent.
- The predominant sources impacting the park are:
 - Wildfire smoke
 - Arctic haze
 - Asian dust

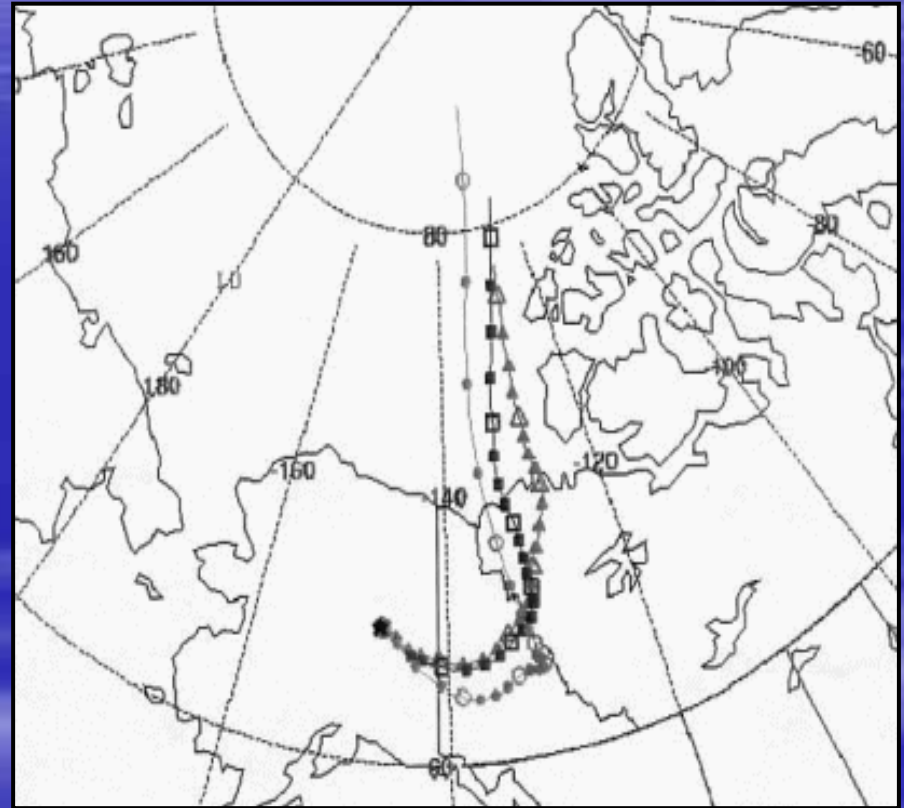
Wildfire Smoke

- Wildfires in Alaska and Siberia produce smoke that reaches the park
- Occurs in summer
- Layered or regional haze depending on the fires' locations
- Characterized by potassium and organic and elemental carbon



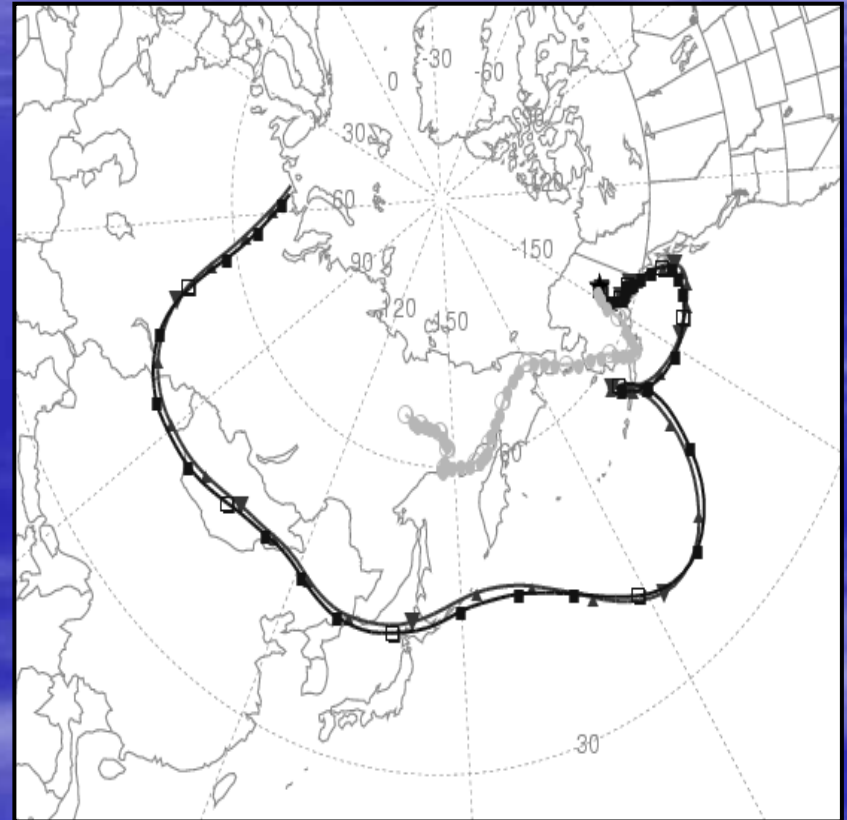
Arctic Haze

- Air enters Alaska from the Arctic
- Occurs in winter
- Layered haze
- Characterized by sulfate, metals and light absorbing carbon



Asian Dust

- Air enters Alaska from Asia, especially China
- Occurs in spring
- Layered haze
- Characterized by soil elements and metals



Alaska Regional Haze Pilot Study

- Only 2 IMPROVE monitors to characterize 6 million acres
- Denali NPP spans a vast remote area
- To verify representiveness of IMPROVE data for the park the State needs instrumentation that can operate of the grid and in extreme cold temperatures in remote areas of the park
- EPA funded a RH pilot study with \$120,000
- State is partnering with NPS, FWS, UAF, UC Davis, EPA

Alaska Regional Haze Pilot Study

- Objective of the pilot study: Testing 3-stage DRUM samplers in remote areas in the winter
- Phase I: (proposed: August-October, 2003)
 - comparison of 3 DRUM to IMPROVE
 - test of alternative power setup for DRUM samplers
 - Gather precision data for DRUM samplers
- Currently underway:
 - Comparison of 2 DRUM sampler next to IMPROVE
 - Gather precision data
- Planned for summer 2005:
 - Development and test of alternative power supply and battery back up

Alaska Regional Haze Pilot Study

- Phase II: (proposed: January-May, 2004)
 - sampling along a east to west transect
 - Sites:
 - South of Ruby
 - Wonderlake / Kantishna Area
 - Headquarters
- Pending power supply development , field sampling in January to May 2006.

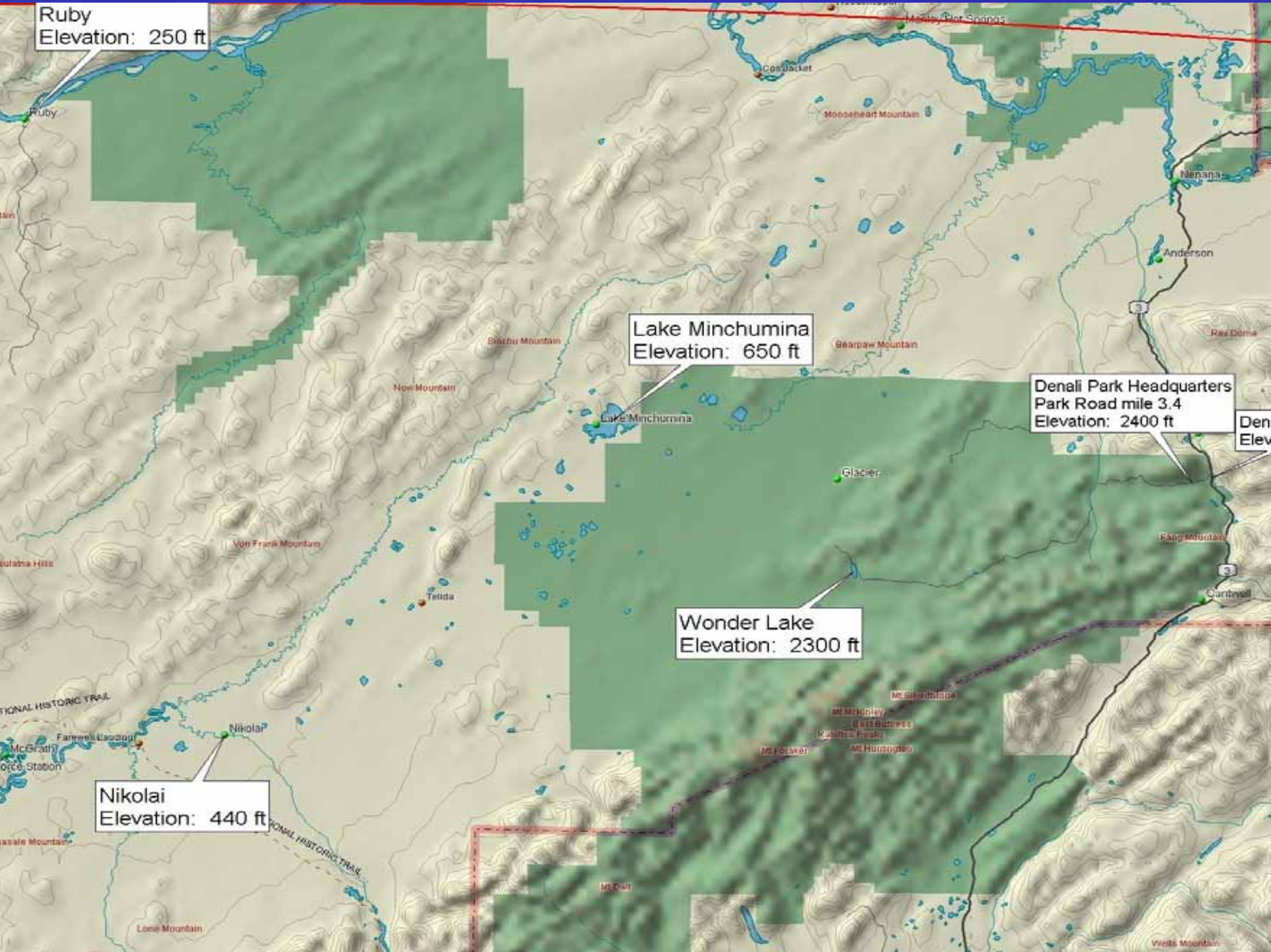
Ruby
Elevation: 250 ft

Lake Minchumina
Elevation: 650 ft

Denali Park Headquarters
Park Road mile 3.4
Elevation: 2400 ft

Wonder Lake
Elevation: 2300 ft

Nikolai
Elevation: 440 ft



DRUM Aerosol Sampler



DRUM Aerosol Sampler

- The mass and optical absorption results will assist in determining periods of interest for more detailed analyses.
- The elemental analyses and associated particle size and composition differences will allow the identification of particle sources.
- Air trajectories will help confirm the particulate source regions.

DRUM Aerosol Sampler

- Collects aerosols in three size fractions:
 - 1.15 to 2.5 μm in aerodynamic diameter
 - 0.34 to 1.15 μm in aerodynamic diameter
 - 0.1 to 0.34 μm in aerodynamic diameter.
- Analyzed for mass (β -gauge), optical absorption (ultraviolet-visible spectroscopy) and selected elements from sodium through uranium (synchrotron x-ray fluorescence).