

# Alaska Regional Haze Pilot Project



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# 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):

<b>Class I Area</b>	<b>Average</b>	<b>20% best</b>	<b>20% worst</b>
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)

<b>Class I Area</b>	<b>20% best</b>	<b>20% worst</b>
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”







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# 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  $\mu\text{m}$  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

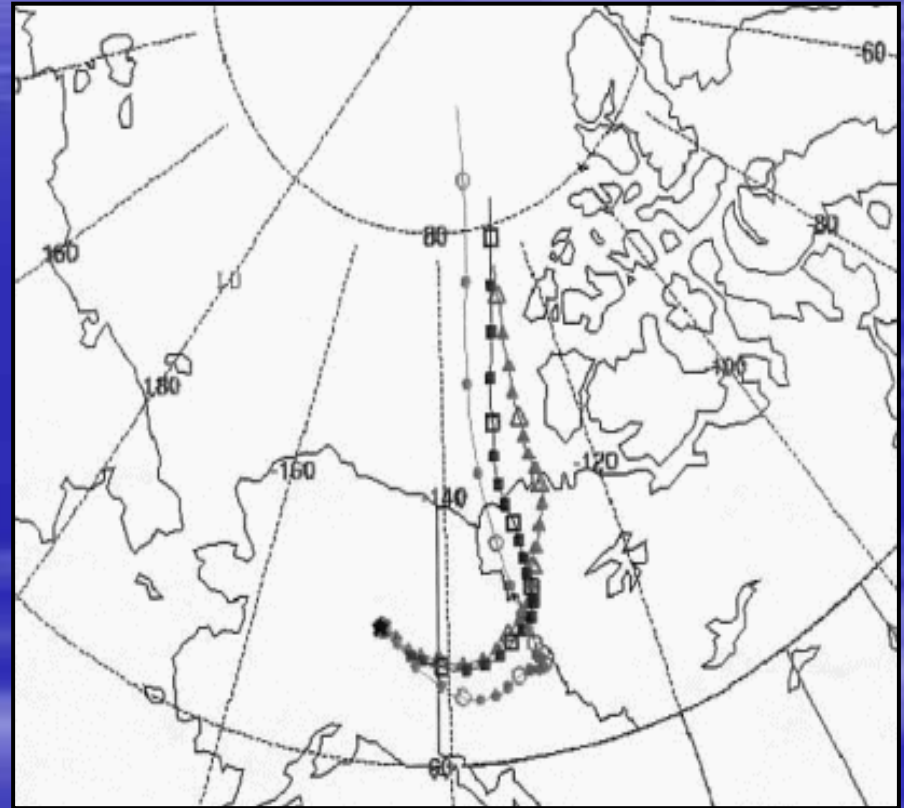
# Wildfire Smoke

- 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



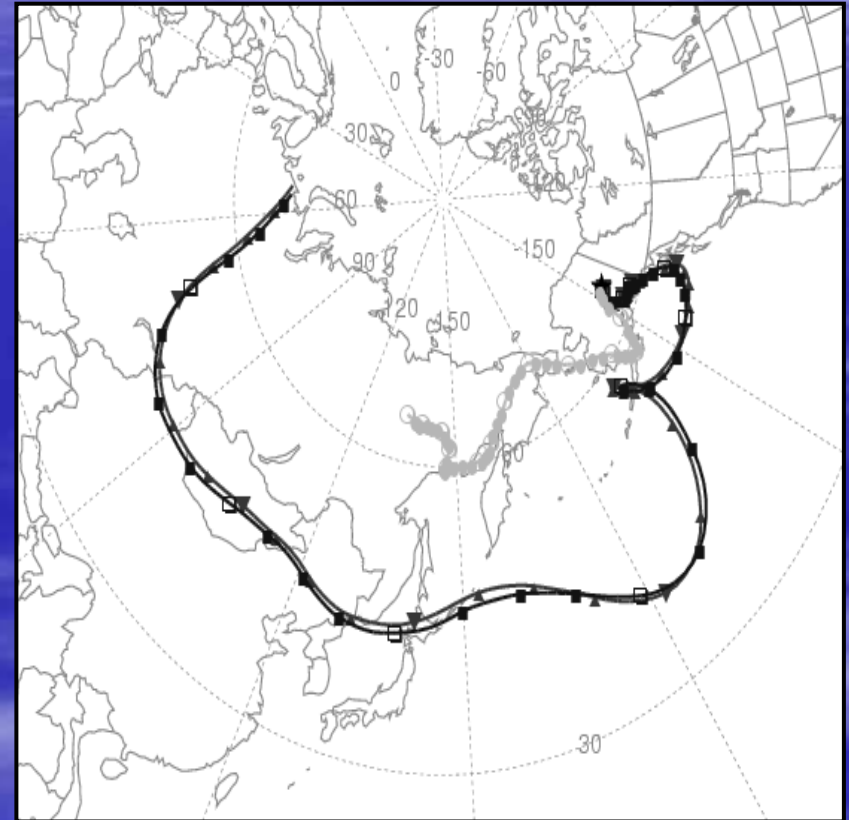
# Arctic Haze

- 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.

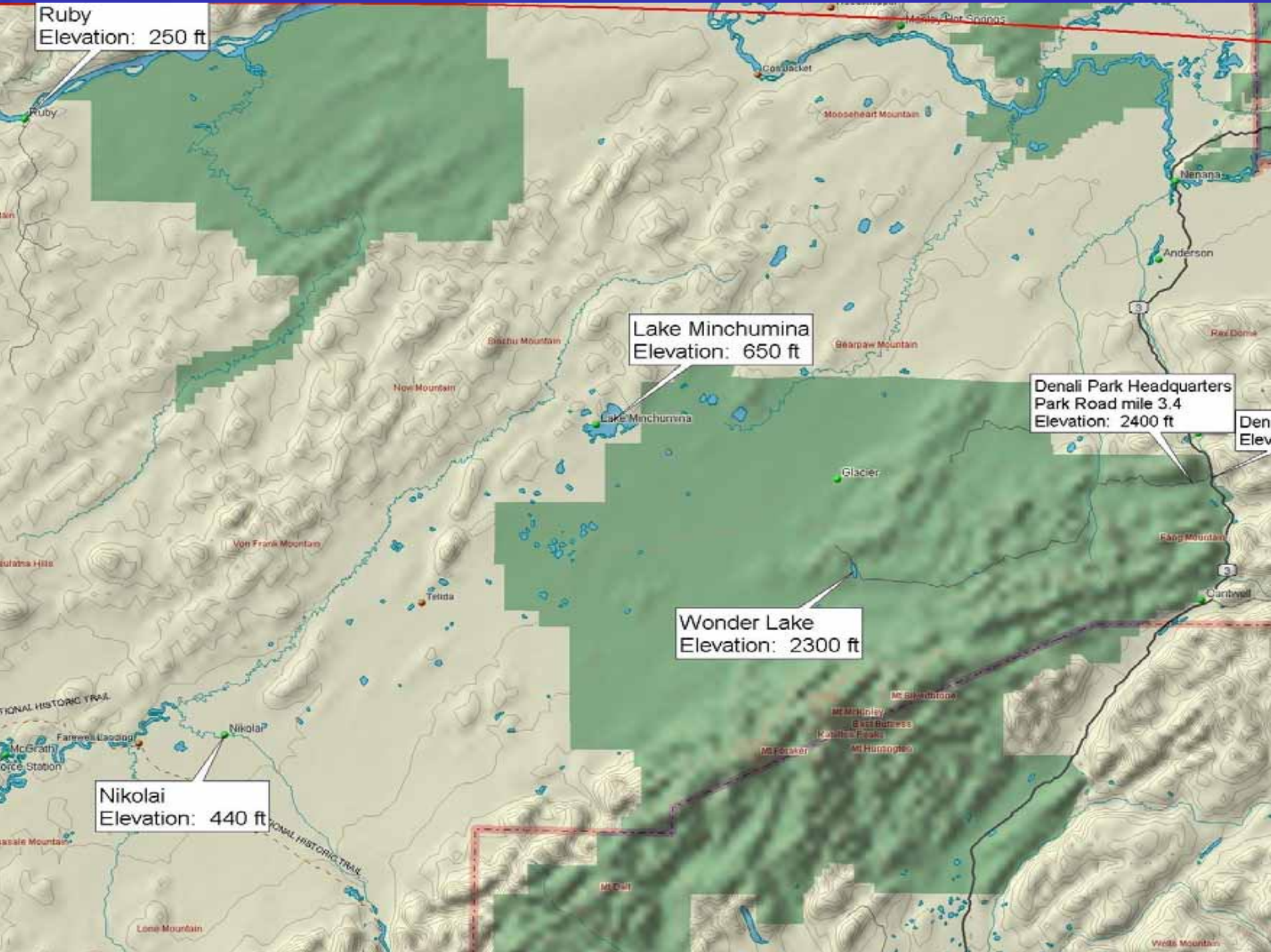
Ruby  
Elevation: 250 ft

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  $\mu\text{m}$  in aerodynamic diameter
  - 0.34 to 1.15  $\mu\text{m}$  in aerodynamic diameter
  - 0.1 to 0.34  $\mu\text{m}$  in aerodynamic diameter.
- Analyzed for mass ( $\beta$ -gauge), optical absorption (ultraviolet-visible spectroscopy) and selected elements from sodium through uranium (synchrotron x-ray fluorescence).