

National Park Service
U.S. Department of the Interior
Yellowstone National Park



Yellowstone Winter Use: Science Summary



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Key Monitoring Topics

- Wildlife
- Air Quality
- Soundscape
- Visitor Use, Experience and Accessibility
- Health and Safety

Resource Topic: Wildlife

Monitoring Focus: Interaction of Wildlife and Over-snow Vehicles (OSV) Along Groomed Roads

- **Timeframe:** Annual Monitoring
Winter 1999 – Winter 2009 (Ten Years)
- **Species Observed:** Bison, Elk, Trumpeter Swans and Bald Eagles
- **Monitoring Objectives:**
 - To Quantify Human(OSV)-Wildlife Interactions during Winter Use
 - Identify Relevant Variables Shaping Animals' Behavioral Responses
 - Assess Effects of OSV Use on Individual Animals' Success and Survival (Stress Response, Behavior, Mortality)
 - Assess Effects of OSV Use on Wildlife Population Abundance, Demographics and Distribution
- **Key Conclusion:** OSV use disturbed some individual animals near groomed roads, but had a negligible to minor impact on wildlife populations.

Resource Topic: Air Quality

Monitoring Focus: Impacts of OSV Vehicle Tailpipe Emissions on Yellowstone's Air Quality

- **Timeframe:** 1980 – present
- **Monitoring Locations:** West Entrance (NO₂, CO, PM_{2.5}), Old Faithful (CO, PM_{2.5}), Yellowstone Lake (Ozone, SO₂), Tower Ranger Station (atmospheric deposition), town of West Yellowstone (CO, PM_{2.5}, PM₁₀)
- **Monitoring Objectives:**
 - To Assess Yellowstone's Air Quality Conditions and Evaluate the Effects of OSV Use on Those Conditions
 - Measure Ambient Concentrations of Six Known Air Pollutants to ensure they do not exceed national and state standards, or degrade a Class I resource under the Clean Air Act (CO, lead, NO₂, SO₂, PM₁₀, O and PM_{2.5})
 - Assess Air Quality Resource Conditions and Trends via Three Indicators (Ozone, Visibility, Atmospheric Deposition)
 - Assess Comparability of Tailpipe Emissions (CO, hydrocarbons, No_x) from Snowcoaches vs. Snowmobiles via Portable Emission Measurement (PEM) Testing
- **Key Conclusion:** From 2003 to 2011, air quality conditions stabilized at the monitoring stations in the park and the data indicated a positive trend toward lower emissions by OSVs.

Resource Topic: Soundscape

Monitoring Focus: Impacts of Oversnow Vehicles Noise on the Natural Soundscape

■ **Timeframe:** Annual Monitoring

Winter 2003 – Winter 2012 (Ten Years)

Computer Acoustic Modeling

Winter Use Plans: 2000, 2003, 2007, and 2013

■ **Monitoring Locations:** Thirty-five long-term sites along travel corridors, developed areas, and backcountry areas

■ **Monitoring Objectives:**

- To Evaluate the Impacts of OSV noise on the Natural Soundscape
 - Document where, how often, and how loud noise occurs
 - Compare findings to winter use plan standards and thresholds
 - Measure Percent Time Audible
 - Measure Sound Levels (decibels)

■ **Computer Modeling Objectives:**

- To compare noise impacts of OSV use among FSEIS plan alternatives

■ **Key Conclusion:** OSV use has a negligible to moderate impact on the natural soundscape.

Resource Topic: Visitor Use, Experience and Accessibility

Monitoring Focus: The Visitor Experience and Social Perceptions of Park Management during Winter Use

- **Timeframe:** 1996 – 2011
- **Study Locations:** Old Faithful, West Yellowstone, Park Entrances, Fishing Bridge, Mammoth Hotel
- **Monitoring Objectives**
 - To assess trends in winter visitation and OSV use
 - To assess visitor motivations, values and satisfaction with the Yellowstone winter-time experience
 - To assess broader social perceptions of and preferences for winter use management, including human-wildlife interactions, the guided experience, and opportunities to experience natural soundscapes
- **Key Conclusions:** Since 2004, there has been a general decrease in OSV use and a general increase in snowcoach transportation events while visitation has fluctuated. The majority of visitors are highly satisfied with their winter-time experience in Yellowstone, and highly value winter wildlife viewing. Yet, visitors have a wide range of motivations and preferences and cannot be easily profiled according to mode of transport only.

Resource Topic: Health and Safety

Monitoring Focus: Human Exposure to OSV Exhaust and Noise Emissions

- **Timeframe:** Annual Monitoring
 - Winter 1997 – Winter 2009 (exhaust)
 - Winter 1997 – Winter 2012 (noise)
- **Monitoring Locations:** Entrance Stations
- **Monitoring Objectives:**
 - To Quantify human exposure to exhaust and noise emissions
 - Evaluate NPS employee exposure to particulate matter, other air contaminants, and noise emitted by OSVs
 - Evaluate visitor exposure to noise from OSVs
 - To Evaluate number of OSV accidents
- **Key Conclusions:** BAT snowmobiles and the increase in snowcoach use has resulted in lower levels of human exposure to exhaust and noise emissions, and guided trips have resulted in fewer OSV accidents.

Yellowstone National Park

Winter Use Adaptive Management Program

<http://www.nps.gov/yell/parkmgmt/wuamp.htm>

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