



06/14/2022

National Park Service (NPS) Formal Consultation Call for Regional Haze SIP Development with the Georgia Department of Natural Resources; Environmental Protection Division (GA EPD).

Attendees:

- National Park Service
  - Kirsten King, Air Resources Division (ARD) – Denver, CO
  - Debbie Miller, ARD – Denver, CO
  - Melanie Peters, ARD – Denver, CO
  - Tim Pinon & Jonathan Jernigan, Mammoth Cave NP – KY
  - Jim Renfro, Great Smoky Mountains NP – TN
  - Don Shepherd, ARD – Denver, CO
  - Andrea Stacy, ARD – Denver, CO
- Georgia EPD
  - Anna Aponte
  - Karen Hayes
  - Jim Boylan
  - Steve Allison
  - Terry Hamby
  - Ruben Gijon-Felix
  - Delveccio Brown
- Fish & Wildlife Service
  - Tim Allen
- U.S. Forest Service
  - Jacob Deal
  - Gisele Majidi-Weese
  - Melanie Pitrolo
- Environmental Protection Agency (Region 4)
  - Michele Notaranni
  - Katy Walther
  - Pearlene Williams

*NPS photos from left to right: Great Smoky Mountains NP, Denali NP, Yellowstone NP, Grand Canyon NP*

# Agenda

- Welcome & Introductions
- NPS Regional Haze Background
- NPS Class I Area Most Affected by Georgia
  - Great Smoky Mountains National Park
- SIP feedback
  - Need to include NO<sub>x</sub>/Nitrate in RP determinations
    - Monitoring data & emissions
  - Source Selection
    - Process/outcome concerns
    - Recommendations & list of sources to consider
  - Facility-specific review and recommendations
- Conclusions & Recommendations
- Next-Steps

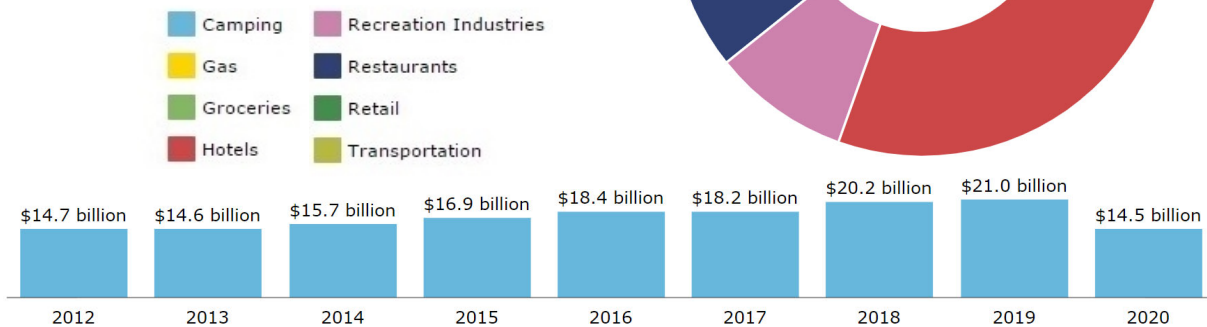


We welcome discussion at any time during this presentation. Please feel free to ask questions or add information along the way.

*NPS Photo, Great Smoky Mountains NP*

## By the Numbers

- 423 national park units
- 237 million park visitors
- \$14.5 billion spent in local gateway regions



Nationally, in 2020 NPS visitation and spending numbers were down due to the pandemic. It is pretty amazing that even in 2020 there were 237 million park visitors who generated \$14.5 billion for the economy – perhaps emphasizing more than ever the economic value of National Parks to our country.

For comparison in 2019:

328 million park visitors spent an estimated \$21 billion in local gateway regions while visiting National Park Service lands across the country.

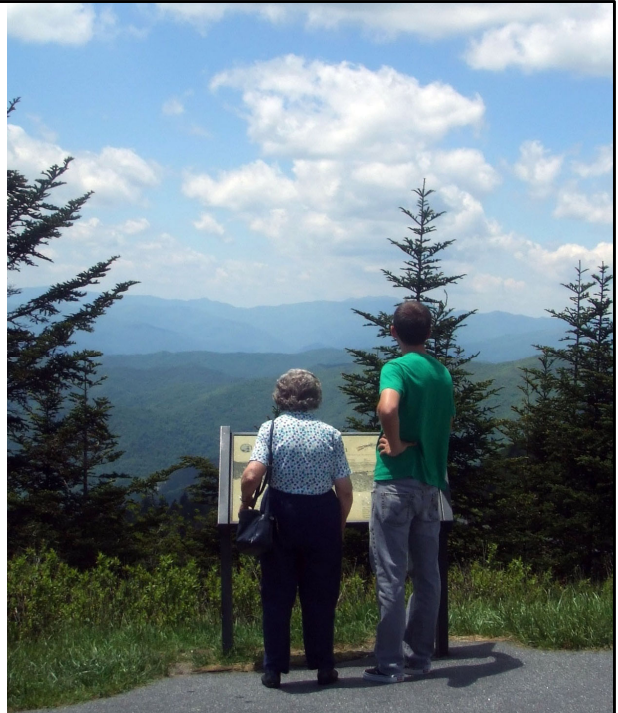
These expenditures supported a total of

- 341 thousand jobs,
- \$14.1 billion in labor income,
- \$24.3 billion in value added, and
- \$41.7 billion in economic output in the national economy.

<https://www.nps.gov/subjects/socialscience/vse.htm>

## By the Numbers

- **48** Class I areas
- In **24** states
- **90%** of visitors surveyed say that scenic views are ***extremely*** to ***very*** important
- **100%** of visitors surveyed rate clean air in the **top 5** attributes to protect in national parks



List of Class I areas: <https://www.nps.gov/subjects/air/npsclass1.htm>

States with at least one Class I area:

AK, AZ, CA, CO, FL, HI, ID, KY, ME, MI, MN, MT, NC, ND, NM, OR, SD, TN, TX, UT, VA, VI, WA, WY

Statistics citation:

Kulesza C and Others. 2013. National Park Service visitor values & perceptions of clean air, scenic views, & dark night skies; 1988–2011. Natural Resource Report. NPS/NRSS/ARD/NRR—2013/622. National Park Service. Fort Collins, Colorado

*NPS photo of Great Smoky Mountains NP, NC & TN*





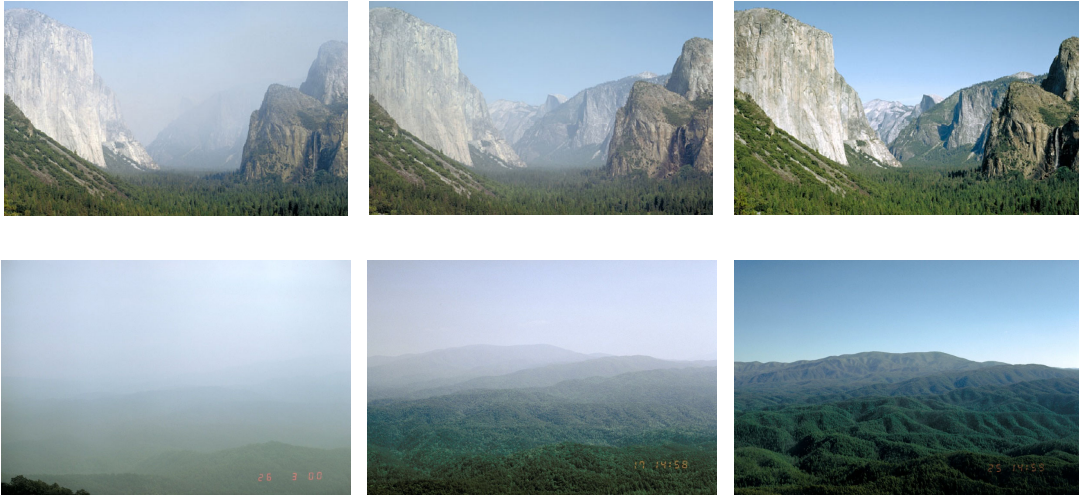
The NPS has an affirmative legal responsibility to protect clean air in national parks.

- 1916 NPS Organic Act: created the agency with the mandate to conserve the scenery, natural and cultural resources, and other values of parks in a way that will leave them unimpaired for the enjoyment of future generations. This statutory responsibility to leave National Park Service units “unimpaired” requires us to protect all National Park Service units from the harmful effects of air pollution.
- 1970 Clean Air Act: authorized the development of comprehensive federal and state regulations to limit emissions from both stationary (industrial) sources and mobile sources. The Act also requires the Environmental Protection Agency to set air quality standards.
- 1977 Clean Air Act Amendments: these amendments to the Clean Air Act provide a framework for federal land managers such as the National Park Service to have a special role in decisions related to new sources of air pollution, and other pollution control programs to protect visibility, or how well you can see distant views. The Act established a national goal to prevent future and remedy existing visibility impairment in national parks larger than 6,000 acres and national wilderness areas larger than 5,000 acres that were in existence when the amendments were enacted (Class I areas).
- 1990 Clean Air Act Amendments: created regulatory programs to address acid rain and expanded the visibility protection and toxic air pollution programs. The acid rain regulations began a series of regional emissions reductions from electric generating facilities and industrial sources that have substantially reduced air pollutant emissions.

NPS photo of Washington DC: <https://npqgallery.nps.gov/AirWebCams/wash>

## Visibility goal:

*Restore natural conditions by 2064*

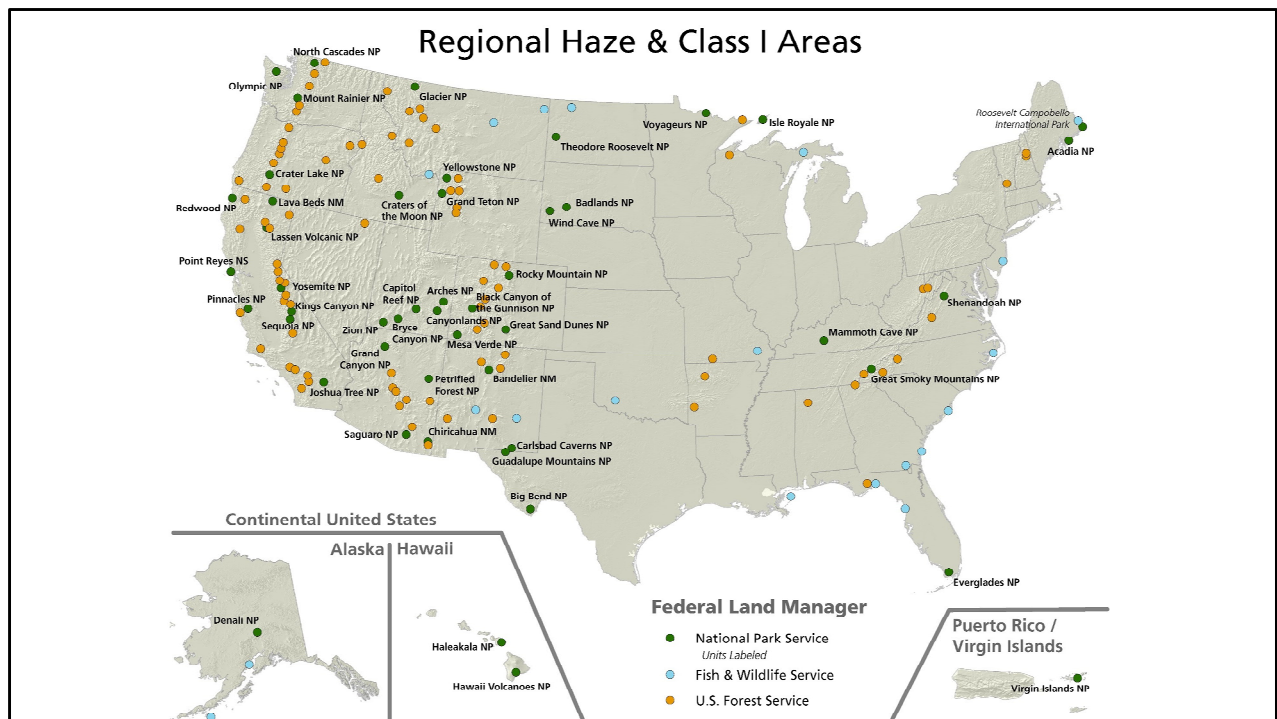


Yosemite NP, California and Great Smoky Mountains NP, Tennessee and North Carolina

Left to right images illustrate hazy to clear conditions.

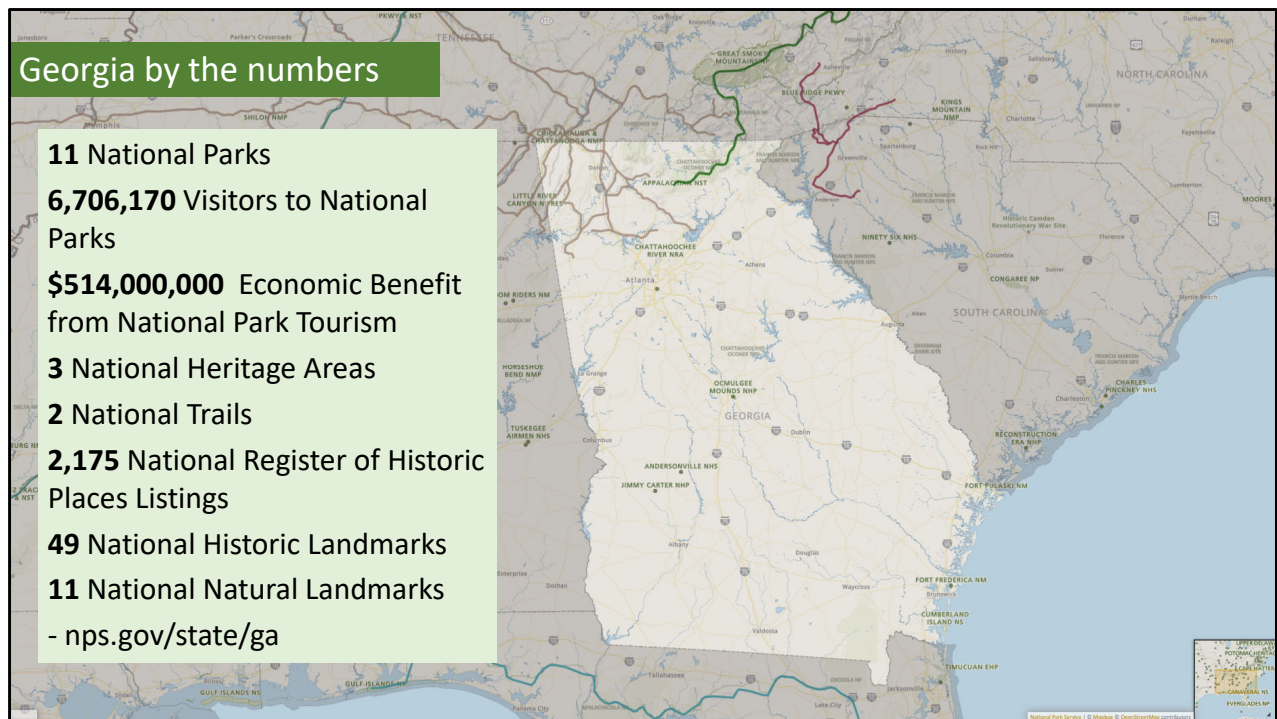
Haze obscures the color and detail in distant features.

*NPS photos*



As you know, the NPS is one of three Federal Land Managers (FLMs) with responsibility for the 156 Class I areas with visibility as an important attribute nationwide. The NPS manages 48 Class I areas. We are not lucky enough to have a Class I site in Georgia where the Class I areas are managed by USFS and FWS. Our closest Class I area, and the one most directly affected by emissions from Georgia, is Great Smoky Mountains National Park in North Carolina & Tennessee.

*NPS map of Class I areas, 2020*



Units managed by the National Park Service in Georgia:

1. Andersonville National Historic Site, Andersonville, GA
  2. Appalachian National Scenic Trail, Maine to Georgia, CT,GA,MA,MD,ME,NC,NH,NJ,NY,PA,TN,VA,VT,WV
  3. Chattahoochee River National Recreation Area, Atlanta, GA
  4. Chickamauga & Chattanooga National Military Park, Fort Oglethorpe, GA,TN
  5. Cumberland Island National Seashore, Saint Marys, GA
  6. Fort Frederica National Monument, St. Simons Island, GA
  7. Fort Pulaski National Monument, Savannah, GA
  8. Jimmy Carter National Historical Park, Plains, GA
  9. Kennesaw Mountain National Battlefield Park, Kennesaw, GA
  10. Martin Luther King, Jr. National Historical Park, Atlanta, GA
  11. Ocmulgee Mounds National Historical Park, Macon, GA
- Trail Of Tears National Historic Trail, AL,AR,GA,IL,KY,MO,NC,OK,TN

[nps.gov/state/ga](https://nps.gov/state/ga)

*NPS map, 2022*





NPS Class I Area

*most affected by Georgia*

**GREAT SMOKY MOUNTAINS  
NATIONAL PARK**



Great Smoky Mountains National Park straddles the border between North Carolina and Tennessee. With over 520,000 acres, it is world renowned for its diversity of plant and animal life, the beauty of its ancient mountains, and the quality of its remnants of Southern Appalachian mountain culture. This is America's most visited national park, with over 14 million visits annually in 2021, providing nearly \$1 billion in the local economy. It's one of the most biologically diverse national parks in the National Park system (with approximately 20,000 known species). The park is a UNESCO World Heritage Site and an International Biosphere Reserve.

The park's enabling legislation from 1926 states the park was established for the enjoyment of the people.

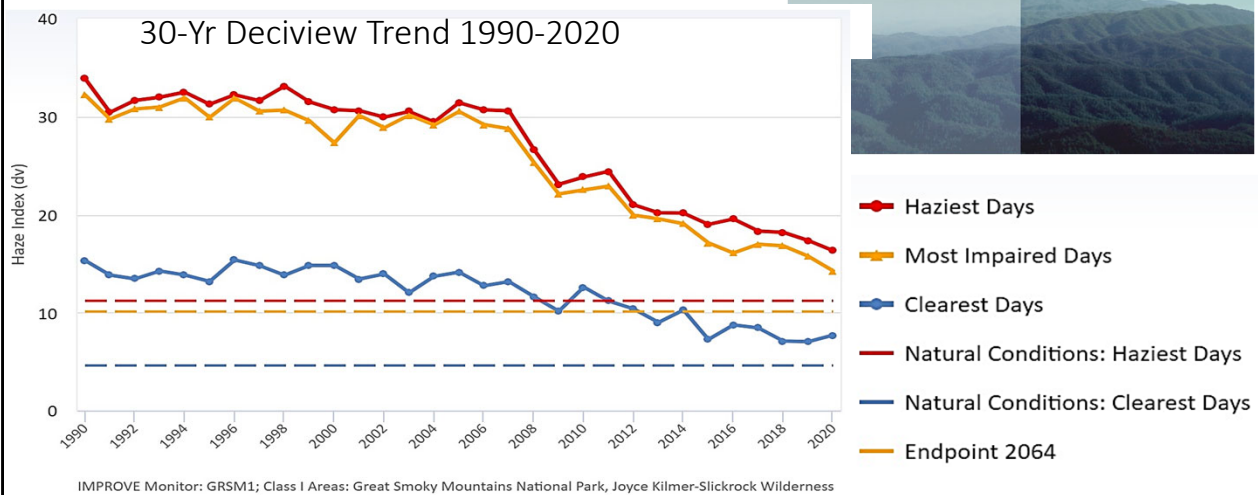
The park's significance is rooted in its scenery. Great Smoky Mountains National Park is the finest example of the ruggedness, magnitude, height, and scenic grandeur of the southern Appalachian Mountains, known for its historic landscapes, panoramic mountain vistas and the changing of the seasons.

Air quality is the number one *Fundamental Resource Value* listed in the park's Foundation Document. The Foundation Document identifies the park's purpose, significance, fundamental resources and values. Air quality contributes to the ecological health of the park's flora and fauna and is critical to maintaining quality visitor experiences.

*NPS photo of a summer view near the Boulevard Trail in Great Smoky Mountains NP, June 2016.*

## Great Smoky Mountains National Park & Joyce Kilmer-Slickrock Wilderness

### The Views are Getting Clearer!



There is a long history of visibility monitoring at Great Smoky Mountains National Park (over 40 years!).

Great Smoky Mountains National Park and Joyce Kilmer-Slickrock Wilderness (managed by the U.S. Forest Service) are both represented by air quality data collected by the IMPROVE visibility monitoring station at Look Rock in the northwestern portion of Great Smoky Mountains National Park.

Monitoring data show significant improvement on the haziest (by 17 deciviews), most impaired, and clearest days since the late 1990's. The regional haze metric is now based on most-impaired days rather than haziest but, it is still interesting to see the range of visibility conditions experienced by park visitors and monitored in the park.

Progress has been made since the first Regional Haze planning phase, and we want to continue to make significant progress over this second planning phase by implementing reasonable, cost-effective emission reductions that can be achieved now.

*Long term visibility trend graph from:*

[FED Haze Analysis - Express Tools \(colostate.edu\)](https://vista.cira.colostate.edu/Improve/express/)

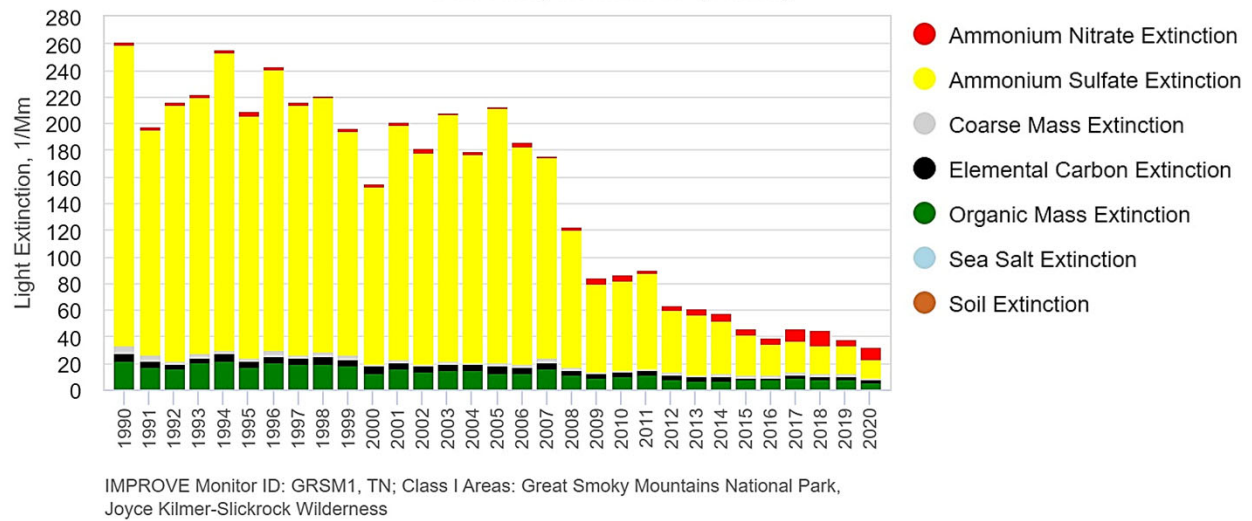
*Visibility comparison graphic developed using WinHaze:*

<http://vista.cira.colostate.edu/Improve/winhaze/>

## Great Smoky Mountains National Park & Joyce Kilmer-Slickrock Wilderness

### Annual Total Haze, 2020 (Most Impaired Days)

Great Smoky Mountains NP (GRSM1)



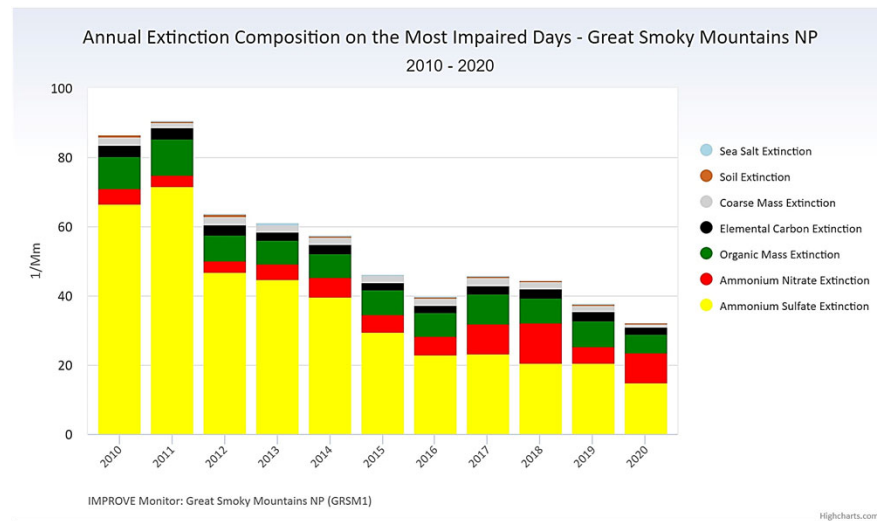
Looking at the full IMPROVE record for annual light extinction by pollutant on the 20% most-impaired days since 1990 highlights the massive reductions in ammonium sulfate as well as the recent increase in the importance of ammonium nitrate light extinction.

*Most-impaired days annual light extinction composition stacked bar graph from: [FED Haze Analysis - Express Tools \(colostate.edu\)](#)*



## Great Smoky Mountains National Park & Joyce Kilmer-Slickrock Wilderness

# As Impairment Drops Composition Changes



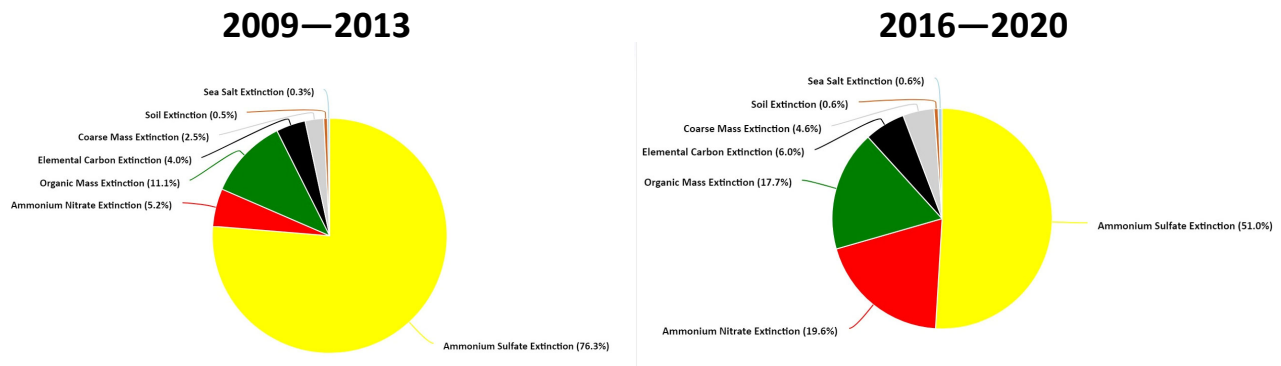
Annual contributions to light extinction by particle mass type on the most-impaired days from 2010 through 2020. The relative and absolute contribution of ammonium nitrate to light extinction on the most-impaired days generally increased during this period.

This annual extinction bar graph shows that over the past last 11 years, as overall impairment improves (decreases), the chemical composition of haze is changing on the 20% most-impaired days. Ammonium sulfate continues to drop, but ammonium nitrate is increasing both in the absolute and relative contribution to light extinction on the 20% most-impaired days.

*Most-impaired days annual light extinction composition stacked bar graph from: [FED Haze Analysis - Express Tools \(colostate.edu\)](#)*

## Great Smoky Mountains National Park & Joyce Kilmer-Slickrock Wilderness

### Ammonium Nitrate is Increasingly Important

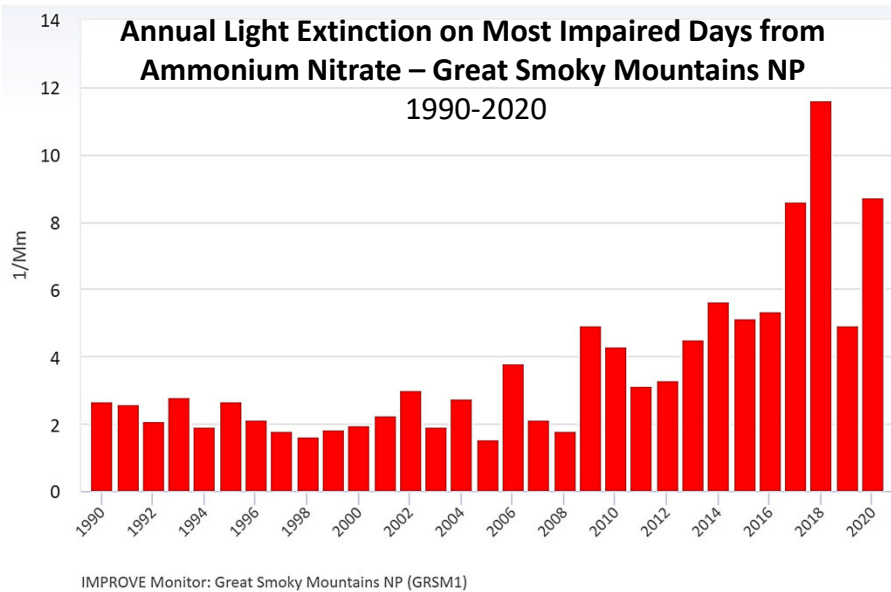


Percent contributions to light extinction by particle mass type on the most-impaired days during two five-year periods, 2009–2013 (left) and 2016–2020 (right). The contribution of ammonium nitrate to light extinction increased from 5% during 2009–2013 to 19% during 2016–2020.

The relative or percent contribution of ammonium nitrate to light extinction has significantly increased over the past 10 years. During the five-year period around the 2011 VISTAS base year, ammonium nitrate accounted for less than 5% of total light extinction. In the most recent five-year period (2016–2020) that has increased to 19%.

*Most-impaired days haze composition pie charts from: [FED Haze Analysis - Express Tools \(colostate.edu\)](https://colostate.edu/FED-Haze-Analysis-Express-Tools)*

## Great Smoky Mountains National Park & Joyce Kilmer-Slickrock Wilderness



Monitored ammonium nitrate light extinction is increasing at GRSM1

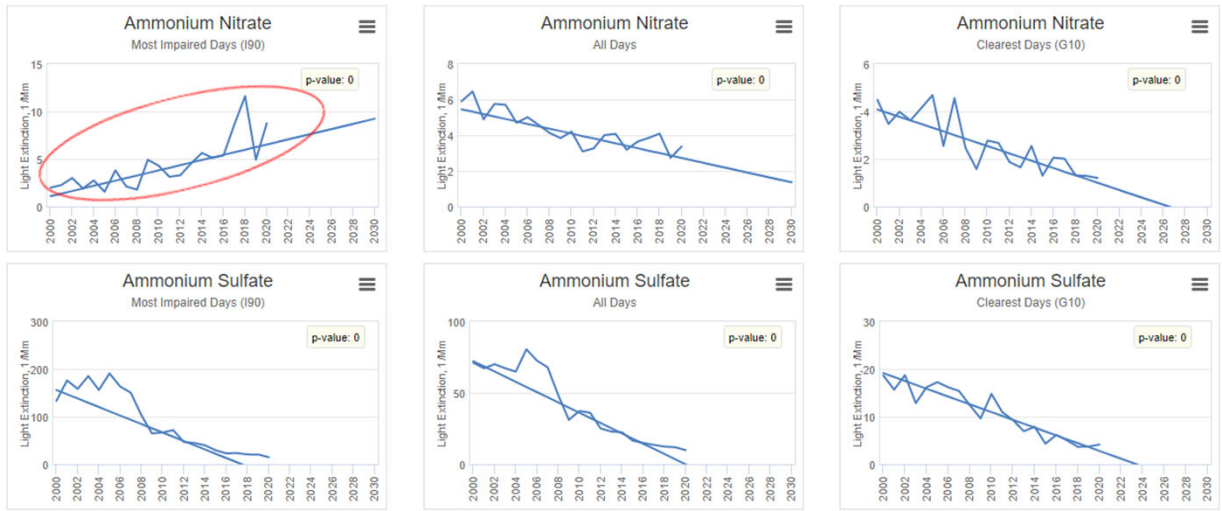
In the past 30 years of monitoring, the annual light extinction on the 20% most impaired days from ammonium nitrate measurements at the park has significantly increased with the biggest changes over the past 10 years.

GRSM = Great Smoky Mountains National Park

Chart prepared by NPS 2022 from [FED Haze Analysis - Express Tools \(colostate.edu\)](https://colostate.edu/fed-haze-analysis-express-tools)

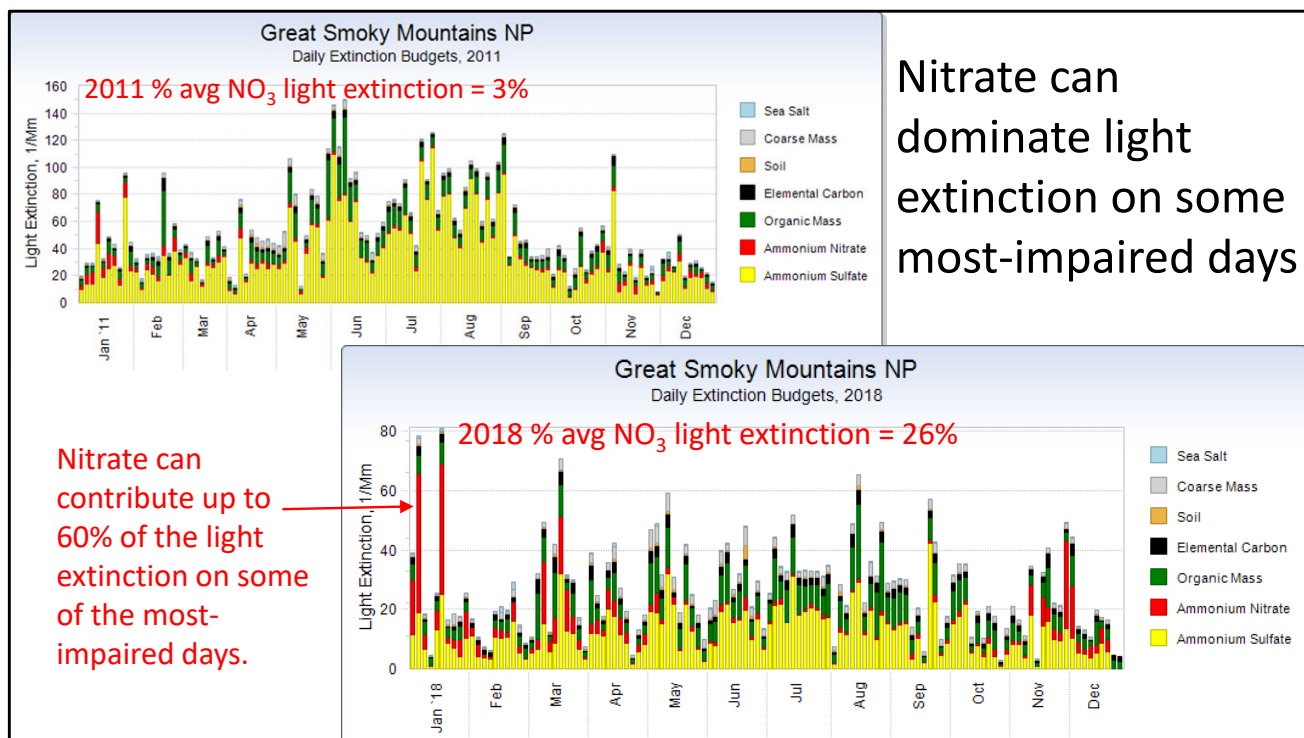
## Great Smoky Mountains National Park & Joyce Kilmer-Slickrock Wilderness

**Nitrate is increasing on the MIDs since 2000.  $\text{NO}_3$  and  $\text{SO}_4$  are decreasing on all other days.**



Annual extinction of nitrate and sulfate for GRSM for most impaired days from: [FED Haze Analysis - Express Tools \(colostate.edu\)](#)



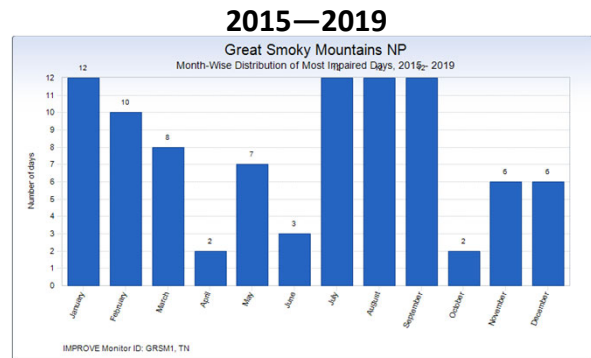
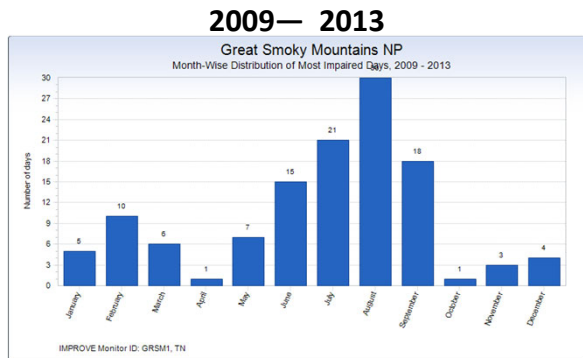
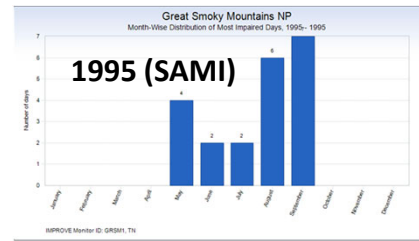


Individual sample days in 2011 were rarely dominated by extinction from ammonium nitrate. However, there were several days in 2018 (as an example) when light extinction from ammonium nitrate was the single biggest contributor to haze (up to 60% on some days).

Sample day light extinction composition stacked bar graph from: [FED Haze Analysis - Express Tools \(colostate.edu\)](https://colostate.edu/FED-Haze-Analysis-Express-Tools)

## Great Smoky Mountains National Park & Joyce Kilmer-Slickrock Wilderness

# Seasonal Changes for Most Impaired Days



Monthly distribution of the most-impaired days during two five-year periods, 2009-2013 (left) and 2015-2019 (right). The number of most-impaired days occurring in the cooler months (January-April and October-December) was higher during 2015-2019 (46 days) than in 2009-2013 (30 days). (<http://vista.cira.colostate.edu/Improve/aqr-summary/>). Note in 1995, most-impaired days only occurred May-Sep.

The annual distribution of when the most-impaired days occur has changed.

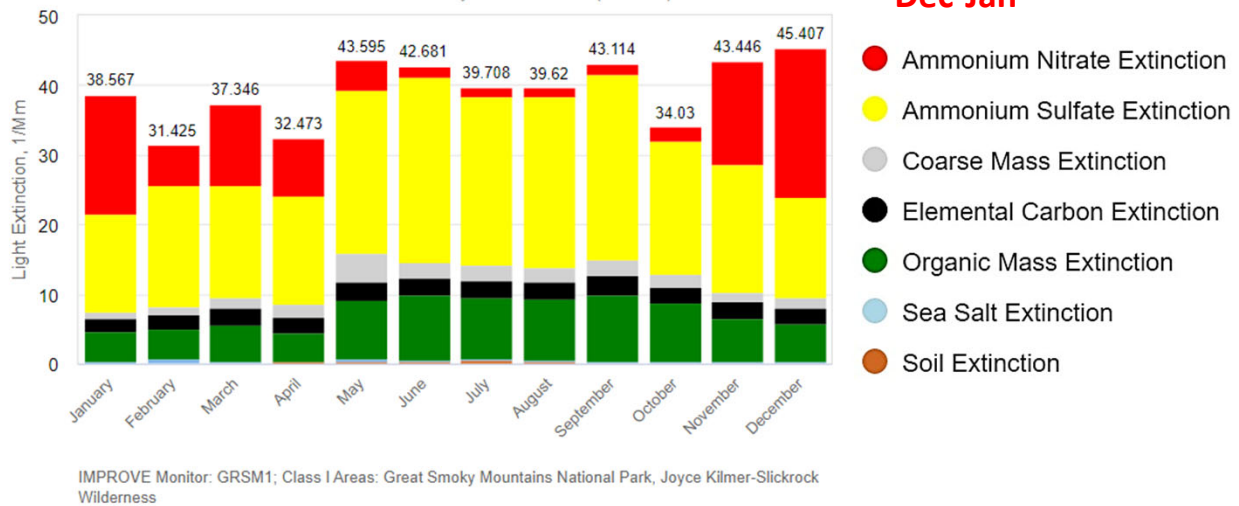
Historically, the most-impaired days were concentrated during the summer months. For example, in 1995 all of the 20% most-impaired days occurred between May and September. As recently as 2009-2013 (the five-year period surrounding the 2011 base year used for VISTAS modelling) the most-impaired days were still concentrated during the warmer months (June-September). However, in the most recent five-year period, the 20% most-impaired days are shown to occur anytime of year and frequently include days in the winter months.

This is one reason that reliance on an older and outdated base year in the VISTAS modeling analysis (which holds the set of most impaired days evaluated constant into the future) is not likely to capture the majority of high nitrate days observed in the current IMPROVE monitoring data record or in the future year of 2028.

Month-wise distribution of most-impaired days bar graphs from: [FED Haze Analysis - Express Tools \(colostate.edu\)](http://vista.cira.colostate.edu/Improve/aqr-summary/)

## Great Smoky Mountains National Park & Joyce Kilmer-Slickrock Wilderness

Monthly Extinction Composition, Most Impaired Days, 2016 - 2020  
Great Smoky Mountains NP (GRSM1)



**Since 2016, nitrate is the largest contributor to light extinction in Dec-Jan**

Monthly extinction composition at GRSM over the past five years show that nitrate is the largest contributor to haze on the most impaired days in January and December, with December the most impaired month.

Monthly extinction composition for GRSM for most impaired days from from: [FED Haze Analysis - Express Tools \(colostate.edu\)](#)

## Need to Include NO<sub>x</sub>/Nitrate (1 of 4)

- Ammonium nitrate is a significant anthropogenic haze causing pollutant at Great Smoky Mountains NP.
- EPA acknowledges the importance of nitrate as an anthropogenic source of haze in their recent clarification memorandum, noting that:

*In “nearly all Class I areas, the largest particulate matter (PM) components of anthropogenic visibility impairment are sulfate and nitrate, caused primarily by PM precursors SO<sub>2</sub> and NO<sub>x</sub> respectively.”* Given this, the EPA “generally expects” states to analyze both SO<sub>2</sub> and NO<sub>x</sub> when determining control measures.

Ammonium nitrate from NO<sub>x</sub> emissions is a significant anthropogenic haze causing pollutant. Over the past 10-years the importance of ammonium nitrate on the 20% most-impaired days has increased for Great Smoky Mountains NP. As SO<sub>2</sub> emissions continue to decline and the seasonality of most-impaired days shifts, NO<sub>x</sub> emissions are increasingly important for many VISTAS Class I areas.



### Need to Include NO<sub>x</sub>/Nitrate (2 of 4)

The VISTAS rationale to exclude NO<sub>x</sub> emissions from reasonable progress considerations is based on:

1. A 2011 modeling base year—the subset of 20% most impaired days from the base year are carried forward into the 2028 future year analysis.
2. An assumption that the 2011 distribution of most-impaired days is reflective of current trends. Monitoring data show this is not the case.
3. Georgia's SIP compared VISTAS modeling (2011 base year) to EPA modeling (2016 base year) to confirm the original VISTAS conclusions.

The NPS acknowledges that VISTAS modelling was done correctly and does not recommend re-modelling. Instead, we recommend that the model results should be evaluated and considered in light of recent monitoring data. The modelling methods used the VISTAS states follow EPA guidance and are technically sound. However, the time period selected for the analysis is no longer reflective of current information and this was not factored into the decision-making process.

The importance of ammonium nitrate and the distribution of the most-impaired days has changed significantly since the 2011 base year. As a result, 2028 projections based on the 2011 most-impaired days (which were ammonium sulfate dominated and occurred during the summer) miss the importance of nitrogen oxide emissions and ammonium nitrate extinction during the cooler months of the year that are now among the most-impaired days. By virtue of how the modeling is done, these shifts are not captured in the VISTAS modeling analysis which is based on the 2011 MID.

## Need to Include NO<sub>x</sub>/Nitrate (3 of 4)

### **Model Predictions vs. Monitoring Data:**

- Modeling is useful in determining the relative effectiveness of overall control strategies (i.e., using RRFs to calculate RPGs) in a future year.
- Georgia used model results alone to determine that nitrate, a major component of anthropogenic impairment, does not warrant consideration in this round.
- Again, current visibility data and emission information contradicts this conclusion.

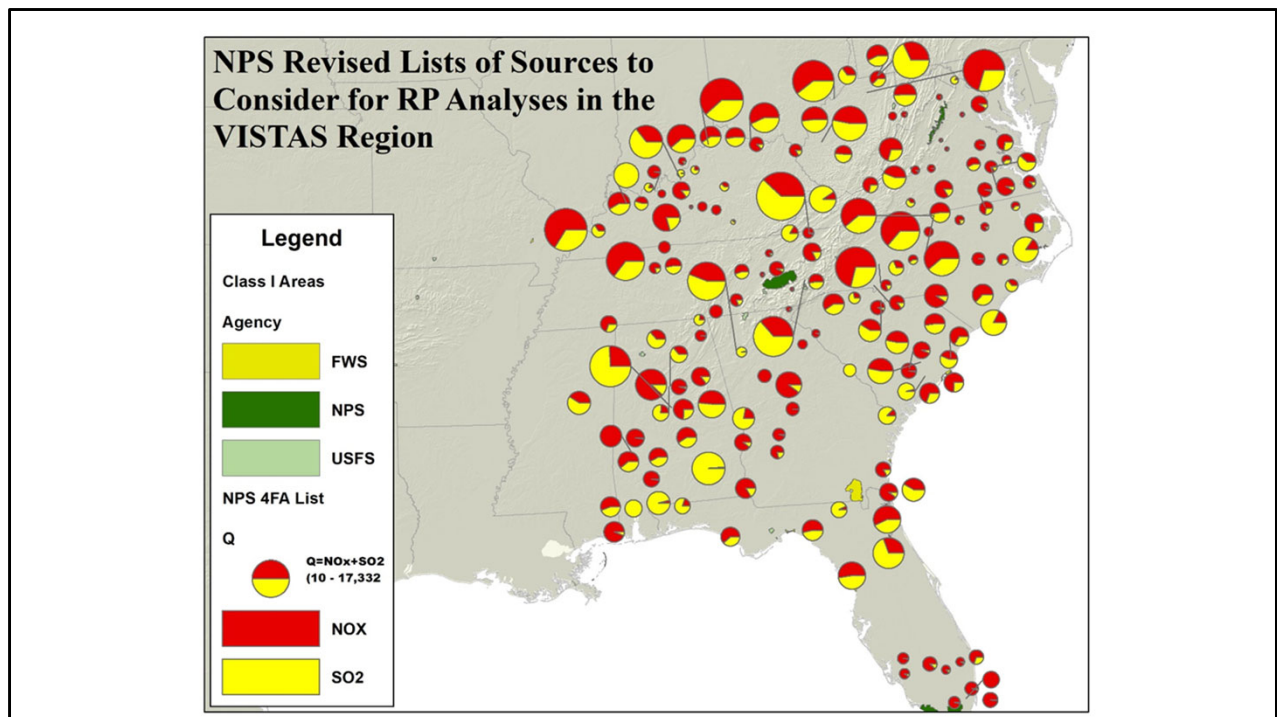
## Need to Include NO<sub>x</sub>/Nitrate (4 of 4)

NO<sub>x</sub> emissions from Georgia sources are not trivial (based on both current and 2028 inventories).

- **206,140** total TPY NO<sub>x</sub> emissions in 2028 from all Georgia source sectors (excluding biogenic)
- **67,197** TPY NO<sub>x</sub> emissions in 2028 from all Georgia EGU and non-EGU point sources

The NPS recommends that monitoring information from the past ten years be used to ground truth modeling results and inform RP analyses and decisions. In doing so, we note that the VISTAS 2011 base-year modeling is under predicting sulfate and nitrate. We recommend that Georgia and other VISTAS states use a weight of evidence approach that incorporates recent monitoring information in their RP decisions. We recommend that Georgia evaluate NO<sub>x</sub> emission reduction opportunities in this round of Regional Haze SIP development.

Emissions information source: Appendix B-1a. VISTAS II Task 2A - Emission Inventory Updates Report (AOI and PSAT); Table 5-1. 2028 Pollutant Emissions by State, All Sectors Combined (except Biogenic), & Table 4-5. Georgia 2028 Point EGU and Non-EGU Emissions Comparison

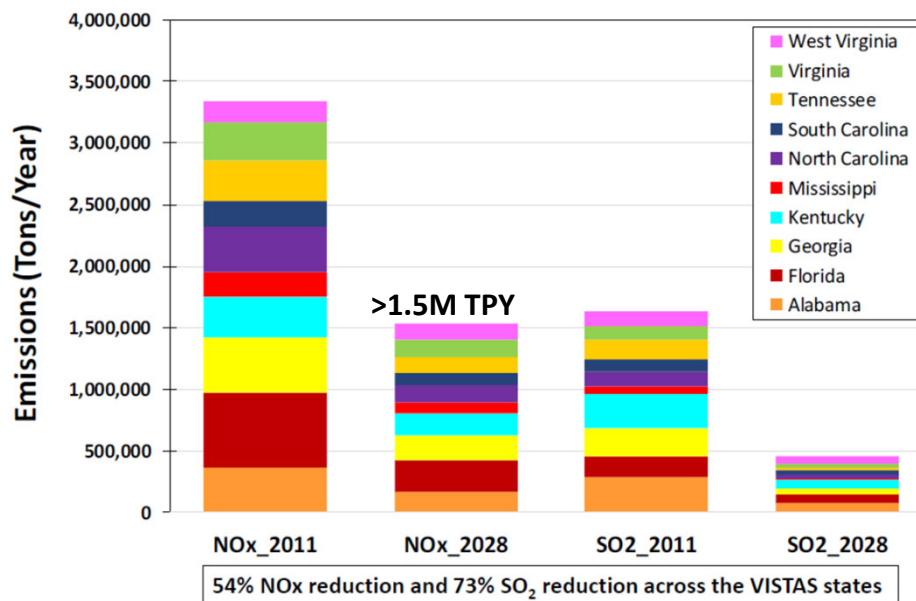


This map shows the most recent emissions inventory data (2020-CAMD/2017-NEI) for VISTAS sources identified by the earlier (2020) NPS Q/d methodology. Although we are now recommending VISTAS states consider alternate approaches to source selection using the VISTAS EWRT\*Q/d results, this map illustrates the current distribution and scale of NO<sub>x</sub> and SO<sub>2</sub> stationary sources in the region. There are NO<sub>x</sub> emission reduction opportunities from stationary sources in the VISTAS region including in Georgia.

*NPS produced map, April 2021*



## VISTAS States Emissions: 2011 vs. 2028



25

VISTAS emissions projections for 2028 show that there will be 1.5 million tons of NO<sub>x</sub> (3 times the amount of SO<sub>2</sub>) at the end of this planning period. Increasing trends in nitrate haze on most-impaired days will likely continue. We encourage Georgia to expand focus from SO<sub>2</sub> and use four-factor analyses to explore opportunities to further reduce NO<sub>x</sub> emissions in this planning period.

*VISTAS Graphic (Slide 9 from 8/4/2020 EPA, FLM, RPO Briefing presentation)*

## Need to Include NO<sub>x</sub>/Nitrate

- The NPS recommends that Georgia improve the SIP by evaluating and implementing reasonable NO<sub>x</sub> emission reduction opportunities.
- Reducing NO<sub>x</sub> emissions would have additional regional co-benefits for ozone and acid deposition:
  - Great Smoky Mountains NP remains in two maintenance areas for the O<sub>3</sub> NAAQS and,
  - The park needs additional N reductions to restore pH-impaired streams and nitrogen saturated soils (303d impaired streams for low pH).

## Source Selection—Georgia Process

- **Step 1—Underlying methodology AOI analysis**
  - Georgia applied a 2% of total EWRT\*Q/d impact as an individual facility screening threshold.
  - Sources selected in this step were ‘tagged’ in PSAT modeling.
- **Step 2—PSAT Modeling:**
  - Georgia applied a 1% of total EGU + Non-EGU impact as an individual facility screening threshold.
  - Sources that exceeded the threshold in this step were selected for four-factor analysis.
- **Result—Georgia selected **3** sources for four-factor analysis:**
  - Georgia Power Bowen, Brunswick Cellulose LLC, and International Paper - Savannah

## Source Selection—Overarching Concerns

- The *individual facility percent-of-total-impact* metrics are arbitrarily high and inherently less protective of the more-impacted Class I areas in the VISTAS region.
- For example, the absolute value of the AOI threshold for selecting an individual facility is **80 times** higher in the most-impacted Class I area than in the least-impacted Class I area in the VISTAS region.
- The threshold to identify a source affecting Great Smoky Mountains NP is **19 times** higher than was needed to identify a source affecting Everglades NP in Florida.

Our source selection concern stems from the choice to select individual facilities contributing 1% or more to the total of EGU+Non-EGU impacts at a Class I area.

Identifying sources based on this metric biases the results against the more visually impacted Class I areas. In fact, source emissions would have to be **80 times** larger to identify a source for analysis in the most visually impaired VISTAS Class I area (Dolly Sods Wilderness Area) compared to the least visually impaired Class I area (Everglades NP). The threshold to identify a source affecting Great Smoky Mountains NP is **19 times** higher than was needed to identify a source affecting Everglades NP in Florida.

# Source Selection—Technical Feedback

## Underlying methodology AOI analysis: \*More sophisticated than simple Q/d

- The NPS developed updated lists of facilities using the EWRT\*Q/d & two threshold metrics:
  - The first metric captured all facilities that comprise 80% of the total EWRT\*Q/d impact for each Class I area—Recommended approach for Georgia
  - The second considered an absolute value threshold

## PSAT Modeling:

- Use of Relative versus Absolute Model Results:
  - VISTAS states used absolute value modeling results to exclude individual facilities from consideration for which reasonable reduction measures may be available. We recommend models are more appropriately used in a relative sense to
    - (1) establish overall RPGs or
    - (2) identify the most important group of sources for a state to consider, not exclude most sources from analysis for which otherwise reasonable controls may be available.
- In general, based on the Model Performance Evaluation, the model generally underpredicts both nitrate and sulfate.

We acknowledge that an EWRT\*Q/d approach is more robust than a simple Q/d approach because it also considers extinction and meteorology on the 20% MID. Accordingly, we updated our approach using the VISTAS EWRT\*Q/d results and evaluated two alternative threshold metrics that could be used in lieu of the VISTAS individual facility percent-of-total-impact thresholds.

- **Clarification Note:** While we agree with using AOI approaches as opposed to a simple Q/d, this is not a wholesale endorsement of the VISTAS methods. We still have technical objections to the reliance on an outdated base year that underpins the AOI & CAMx analyses. Because of this, the outdated MIDs used in the analysis likely underestimate the role of  $\text{NO}_3/\text{NO}_x$  into the future, which contradicts current IMPROVE data. This affects the facility selection process by failing to account for the role of ammonium nitrate on the recent MID and biases the analysis against selecting  $\text{NO}_x$  sources. Adjusting the selection thresholds does not address this issue. Regardless, we agree that it is more sophisticated than a simple Q/d approach and we used the VISTAS EWRT\*Q/d in our revised source screening analyses.

Our first approach, and the one applied to Georgia used a threshold that captures 80% of the total Class I Area impact (e.g., 80% of the TCI) for sulfate & nitrate, as was recommended in the 2016 draft regional haze guidance. This produced a list of all the facilities that contribute up to 80% of the cumulative AOI impact in NPS VISTAS Class I areas. We are calling these results the “80% cut-off results.” The second alternative approach applied an absolute value threshold—we are not recommending this approach for Georgia. For more information see our May 2021 comments on the VISTAS analyses.

**\*\*NOTE:** GA EPD clarified during our discussion that the RRFs were applied to the PSAT source apportionment modeling results to correct for modeling bias. This is not clear in the draft SIP. The SIP clarifies that RRFs were used when calculating RPGs, but does not discuss efforts to reduce modeling bias in the PSAT runs. Georgia noted they would clarify this in the draft SIP.



## Source Selection—NPS Recommendations

- The NPS recommends that Georgia consider 3 additional facilities in the reasonable progress determinations. NPS recommendations are based on:
  - The NPS lists of sources that contribute up to 80% of the AOI impact at Class I areas
  - Original NPS source recommendations based on Q/d
  - Source information in the CAMD database

Reminder, our final list of recommendations considered NPS Class I areas. Other FLMs may have additional input.

## Georgia Draft SIP Feedback

# Source Selection—NPS Recommendations

New NPS recommended list of sources for Georgia:

	Facility Name	NPS Class I Area	On NPS Q/d List?	On NPS GRSM 80% of AOI List?	Number of VISTAS C1As with Source on Individual C1A 80% List	Exceeds GA's 2% AOI Threshold?	C1As GA's AOI Threshold Exceeded?	Tagged in PSAT?	Exceeds GA's 1% PSAT Threshold?	C1As GA's PSAT Threshold Exceeded?	Selected by GA for 4FA?
1	Ga Power Company - Bowen	GRSM	Yes	Yes	11	Yes	COHU	Yes	Yes	COHU, OKEF, WOIS	Yes
2	Ga Power Company - Scherer	GRSM	Yes		7						
3	Brunswick Cellulose LLC	GRSM	Yes		2	Yes	WOIS	Yes	Yes	WOIS	Yes
4	International Paper Co - Temple Inland	GRSM		Yes	5	Yes	COHU	Yes			
5	Ga Power Company - Plant Wansley	GRSM		Yes	9						
6	International Paper - Savannah	NA	No	No	7	Yes	OKEF, WOIS	Yes	Yes	OKEF, WOIS	Yes

*\*Note: this list is reduced from the 30 Georgia sources identified by the VISTAS AOI data as contributing to 80% of AOI impact at any VISTAS Class I areas.*

NOTE: One source, International Paper-Savannah, does not show up on an NPS List, but was included here because the source was evaluated by Georgia for impacts to FWS Class I areas.

Using the 80% of total AOI impact to VISTAS Class I areas identifies 30 Georgia facilities affecting visibility in Class I areas in the VISTAS region. This final list of 5 sources recommended by the NPS (plus one additional selected by Georgia) removes sources that likely have lesser impacts in NPS Class I areas (i.e., were not on the 80% of the AOI or original Q/d lists for NPS Class I areas). Sources highlighted in green were selected by Georgia for four-factor analysis. Additional sources that were excluded from the NPS list may be identified by other FLM agencies.

The table highlights that Plant Bowen exceeded Georgia's 2% of sulfate or nitrate AOI impact at only one Class I area, Cohutta Wilderness, but exceeded Georgia's PSAT 1% of sulfate or nitrate visibility impairment at three Class I areas. This underscores the inconsistency in the two-step individual facility percent-of-impact thresholds. The 2% threshold used in the AOI screening step is both arbitrarily high and likely overly aggressive in screening potentially important sources for individual Class I areas.

Acronyms:

- GRSM, Great Smoky Mountains NP (North Carolina & Tennessee)
- SHEN, Shenandoah NP (Virginia)
- MACA, Mammoth Cave NP (Kentucky)

## Georgia Power Co. Plant Bowen (1 of 6)

- Plant Bowen consists of four tangentially-fired electric generating units (EGUs):
  - Unit 1: 805.8 MW (1971);
  - Unit 2: 788.8 MW (1972)
  - Unit 3: 952.0 MW (1974)
  - Unit 4: 952.0 MW (1975)
- Of 1,156 power plants in EPA's Clean Air Markets Database (CAMD) in 2021, Bowen ranked #41 for SO<sub>2</sub> emissions (6,699 tons) and #25 for NO<sub>x</sub> emissions (6,248 tons).

## Georgia Draft SIP Feedback

### Georgia Power Co. Plant Bowen (2 of 6)

#### Visibility Impacts:

- **#1** Georgia facility contributing to haze in VISTAS Class I areas (based on AOI and PSAT).
- Using the NPS recommended screening threshold to capture 80% of the total Class I area AOI impact, this source:
  - Makes the 80% of total AOI impact list for **11 VISTAS Class I areas, including Great Smoky Mountains NP.**
  - Ranks **7 of 92 sources** that fall on the Great Smoky Mountains NP's list.
  - Ranks **11 of 238 VISTAS state sources** for cumulative impact to VISTAS Class I areas.

### Georgia Power Co. Plant Bowen (3 of 6)

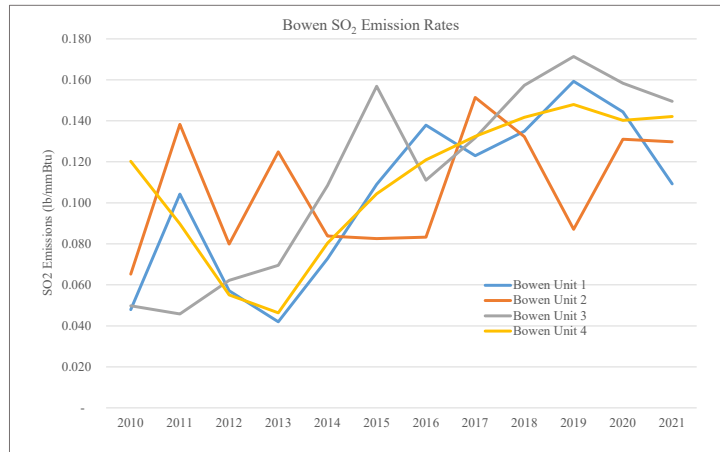
- Georgia concluded that the MATS alternative SO<sub>2</sub> limit of 0.20 lb/MMBtu for Units 1-4 is RP for Bowen.
  - Georgia's four-factor analysis evaluated fuel switching to lower sulfur coal and replacement of the existing scrubber with a dry FGD.
  - Why didn't Georgia evaluate scrubber upgrades/optimization?
- In July 2021, EPA clarified that the 0.2 lb/MMBtu MATS limit does not automatically constitute "effectively controlled:"

Clarification memo §2.3 *"[States] should further consider information specific to the source, including recent actual and projected emission rates, to determine if the source could reasonably attain a lower rate. It may be difficult for a state to demonstrate that a four-factor analysis is futile for a source just because it has an "effective control" if it has recently operated at a significantly lower emission rate."*

## Georgia Draft SIP Feedback

# Georgia Power Co. Plant Bowen (4 of 6)

**SO<sub>2</sub>** emission rates at the Bowen Units have been increasing for the last decade



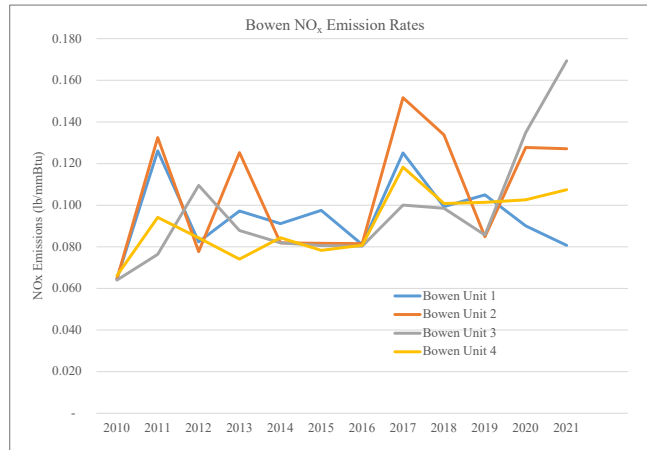
2010–2021 CAMD



## Georgia Draft SIP Feedback

# Georgia Power Co. Plant Bowen (5 of 6)

**NO<sub>x</sub>** emission rates at the Bowen Units have been increasing for the last decade



2010–2021 CAMD

## Georgia Power Co. Plant Bowen (6 of 6)

- CAMD data suggest that the Bowen units could achieve:
  - A SO<sub>2</sub> emission rate of 0.04–0.07 lb/MMBtu, potentially reducing SO<sub>2</sub> emissions by 3,130 to 4,646 tons annually.
  - A NO<sub>x</sub> emission rate of 0.07 lb/MMBtu, potentially reducing NO<sub>x</sub> emissions by 2,710 tons annually.
- The NPS recommends that Georgia:
  - Evaluate options to optimize current pollution control equipment efficiency for the Bowen units.
  - Establish emission limits for SO<sub>2</sub> and NO<sub>x</sub> that reflect the capabilities of the emission controls currently installed on the Bowen units.

Note, we evaluated both the calculated control efficiencies as well as the current NO<sub>x</sub> and SO<sub>2</sub> emission rates as compared to similar well-controlled EGUs in CAMD in developing these recommendations.

## Georgia Power Co. Plant Wansley (1 of 5)

- Plant Wansley consists of two tangentially-fired coal electric generating units (EGUs):
  - Unit 1: 865 MW (1976)
  - Unit 2: 865 MW (1976)
- **#5** Georgia facility contributing to haze in VISTAS Class I areas (based on AOI).
- Using the NPS recommended screening threshold (80% of the total Class I area AOI impact) Plant Wansley:
  - Makes the 80% of total AOI impact list for **9 VISTAS Class I areas, including Great Smoky Mountains NP.**
  - Ranks **44 of 92 sources** on the Great Smoky Mountains NP's list.
  - Ranks **52 of 238 VISTAS state sources** for cumulative impact to VISTAS Class I areas

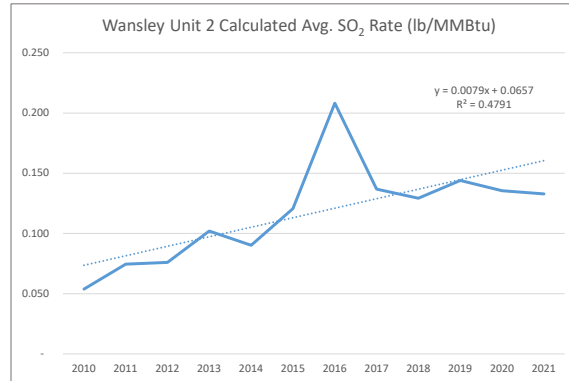
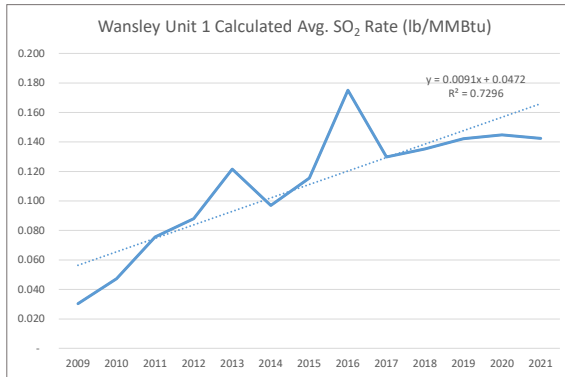
## Georgia Power Co. Plant Wansley (2 of 5)

- As noted in the SIP, Georgia screened Plant Wansley from further analyses by scaling the AOI results.
  - Are these assumed reductions federally enforceable?
- Plant Wansley units 1 and 2 are currently controlled with wet lime FGD for SO<sub>2</sub> and LNB + SCR for NO<sub>x</sub>.
- Similar to our analysis for Plant Bowen, we reviewed CAMD emissions data for Plant Wansley Units 1 and 2.

## Georgia Draft SIP Feedback

# Georgia Power Co. Plant Wansley (3 of 5)

**SO<sub>2</sub>** emission rates at the Wansley Units have been increasing for the last decade

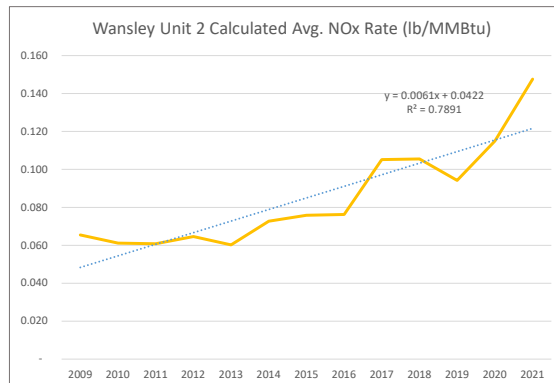
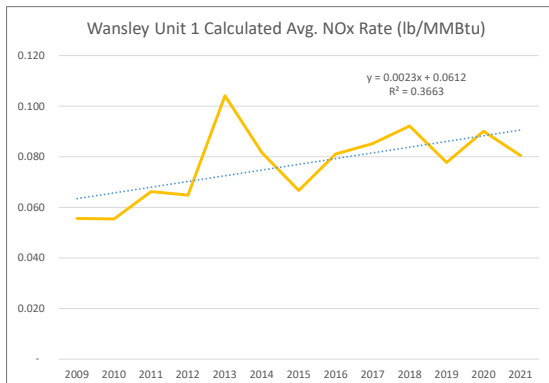


2010–2021 CAMD

## Georgia Draft SIP Feedback

# Georgia Power Co. Plant Wansley (4 of 5)

**NO<sub>x</sub>** emission rates at the Wansley Units have been increasing for the last decade



2010–2021 CAMD



## Georgia Power Co. Plant Wansley (5 of 5)

- CAMD data suggest that the Wansley units could achieve:
  - A SO<sub>2</sub> emission rate of 0.04 - 0.07 lb/MMBtu
  - A NO<sub>x</sub> emission rate of 0.06 - 0.07 lb/MMBtu
- The NPS recommends that Georgia establish emission limits for SO<sub>2</sub> and NO<sub>x</sub> that reflect the capabilities of the emission controls currently installed on the Plant Wansley units.

Note, we evaluated both the calculated control efficiencies as well as the current NO<sub>x</sub> and SO<sub>2</sub> emission rates as compared to similar well-controlled EGUs in CAMD in developing these recommendations.

### Georgia Power Co. Plant Scherer (1 of 3)

- **#7** Georgia facility contributing to haze in VISTAS Class I areas (based on AOI).
- Using the NPS recommended screening threshold (80% of the total Class I area AOI impact) Plant Scherer:
  - Makes the 80% of total AOI impact list for **7 VISTAS Class I areas**.
  - \*This facility is not on the Great Smoky Mountains NP's 80% of AOI list, likely because NO<sub>x</sub> emissions are the primary concern. It is on the original NPS Q/d list.
  - Ranks **75 of 238 VISTAS state sources** for cumulative impact to VISTAS Class I areas
- Of 1,156 power plants in EPA's Clean Air Markets Database (CAMD) in 2021, Plant Scherer ranked #165 for SO<sub>2</sub> emissions (795 tons) and #38 for NO<sub>x</sub> emissions (5,389 tons)

## Georgia Power Co. Plant Scherer (2 of 3)

- Plant Scherer currently consists of three tangentially-fired coal electric generating units (EGUs):
  - Unit 1: 891 MW (1982)
  - Unit 2: 891 MW (1984)
  - Unit 3: 891 MW (1987); tentatively scheduled to retire by 2028
  - Unit 4 is scheduled to retire in 2022
- Georgia screened Plant Scherer from four-factor analyses.
  - NO<sub>x</sub> emissions are the primary concern.
- Plant Scherer units 1 through 3 are currently controlled with wet lime FGD for SO<sub>2</sub> and SCR for NO<sub>x</sub>.

### Georgia Power Co. Plant Scherer (3 of 3)

The NPS reviewed CAMD emissions data for Plant Scherer Units 1 through 3:

- For  $\text{SO}_2$ : the scrubbers on units 1 – 3 are operating at 97% - 98% control efficiency on low-sulfur PRB coal and achieving average annual emission rates below 0.02 lb/mmBtu.
  - Units 1 – 3 are very effectively controlled for  $\text{SO}_2$ .
  - No additional analysis is recommended.
- For  $\text{NO}_x$ : the SCR systems on Units 1 – 3 are operating at 51% - 77% control efficiency and achieving average annual emission rates of 0.12 – 0.15 lb/mmBtu.
  - Units 1 – 3 are not effectively controlled for  $\text{NO}_x$ .
  - The NPS recommends that Georgia complete an analysis to investigate options for improving SCR performance for the Scherer units still in operation.

Note, we evaluated both the calculated control efficiencies as well as the current  $\text{NO}_x$  and  $\text{SO}_2$  emission rates as compared to similar well-controlled EGUs in CAMD in developing these recommendations.

## Georgia Draft SIP Feedback

### International Paper Co - Temple Inland (1 of 2)

- **#3** Georgia facility contributing to haze in VISTAS Class I areas (based on AOI).
- Using the NPS recommended screening threshold (80% of the total Class I area AOI impact) Temple Inland:
  - Makes the 80% of total AOI impact list for **5 VISTAS Class I areas, including Great Smoky Mountains NP**.
  - Ranks **40 of 92 sources** on the Great Smoky Mountains NP's list.
  - Ranks **37 of 238 VISTAS state sources** for cumulative impact to VISTAS Class I areas

## Georgia Draft SIP Feedback

### International Paper Co - Temple Inland (2 of 2)

- Temple Inland was selected for PSAT tagging but was screened by Georgia based on the PSAT threshold.
- Temple Inland is currently a significant source of NO<sub>x</sub> and SO<sub>2</sub> emissions (Q = 3,094 TPY, 2017 NEI)
- The NPS recommends that Georgia conduct four-factor analyses for SO<sub>2</sub> and NO<sub>x</sub> for the Temple Inland facility.



## Georgia Draft SIP Feedback

### Brunswick Cellulose LLC (1 of 1)

- **#4** Georgia facility contributing to haze in VISTAS Class I areas (based on AOI).
- Georgia completed an SO<sub>2</sub> four-factor analysis for this facility and determined that a fuel switch from TDF to NG with limits on fuel oil usage is RP for power boiler #4.
  - We agree that a fuel switch will address SO<sub>2</sub> emissions—it will not address NO<sub>x</sub> emissions.
- Brunswick Cellulose is currently a significant source of NO<sub>x</sub> emissions with 1,445 TPY NO<sub>x</sub> (2017 NEI)
- The NPS recommends that Georgia conduct a four-factor analysis for NO<sub>x</sub> emissions from this source.

\*Note, a previous version of this slide incorrectly noted the current fuel combusted in Boiler #4 as coal. This has been corrected to reflect tire-derived fuel.

## Georgia Draft SIP Feedback

### International Paper Co - Savannah (1 of 1)

- Georgia determined that in lieu of add-on controls, removing coal as a fuel is RP for power boiler #13.
  - We agree that a fuel switch will address SO<sub>2</sub>—it will not address NO<sub>x</sub>.
  - This facility is also a source of NO<sub>x</sub> emissions: 1,300 TPY NO<sub>x</sub> (2017 NEI)
- Scrubber costs were estimated at approximately \$3,000/ton. Georgia concluded that add-on SO<sub>2</sub> emission control devices for the sources at IP Savannah “would not be reasonable based on existing and future controls and the fact that Georgia is well below the URP.”
- The NPS recommends revising the URP language in the draft SIP and updating the four-factor analyses to consider NO<sub>x</sub> emissions.

This source was not on the NPS lists but was selected by Georgia for four-factor analyses.

The URP is not a “safe harbor” to reject otherwise cost-effective controls. We recommend that this language is revised in the draft SIP.

We additionally recommend that Georgia identify a cost threshold for sources evaluated in the SIP to fully document criteria that form the basis for control determinations.

## Conclusions & Recommendations

### - General

- Include impacts to Great Smoky Mountains NP in SIP
- Evaluate and implement reasonable NO<sub>x</sub> emission reduction opportunities in the round 2 regional haze SIP.
- Revise the source selection approach and address additional sources.
- Establish a cost threshold similar to those established by other states in this round of regional haze planning to thoroughly document decisions.



*NPS Photo by Victoria Stauffenberg, Great Smoky Mountains National Park.*

## Conclusions & Recommendations

- *Source specific*

- Georgia Power Co. Plants Bowen and Wansley
  - Evaluate ways to optimize current pollution control equipment
  - Establish SO<sub>2</sub> and NO<sub>x</sub> emission limits reflective of the existing control capabilities
- Georgia Power Co. Plant Scherer
  - Analyze options for improving SCR performance for the Scherer units still in operation
- International Paper Co. Temple Inland
  - Conduct four-factor analyses for SO<sub>2</sub> and NO<sub>x</sub>
- Brunswick Cellulose LLC
  - Conduct a four-factor analysis for NO<sub>x</sub> emissions from this source
- International Paper Co. Savannah
  - Update the four-factor analyses to include NO<sub>x</sub> emissions



## National Park Service RHR - Round 2

- Thank you for meeting with us!
- Please share:
  - Anticipated SIP schedule
  - How you will respond to NPS comments
  - \* Note – CAA requirement to summarize FLM conclusions in public notice
- Please let us know:
  - When public comment period opens
  - If/when a public hearing will be held
- The NPS will:
  - Email call summary & any add'l information
    - By **June 22, 2022**
  - Share our comments with EPA Region 4

The NPS will submit an email summary of our June 14, 2022 consultation call along with final review comments by June 22<sup>nd</sup>, 2022. The NPS requests that the state notify us when the draft SIP will be open for public review and comment, and alert us to any public hearing dates.

Please note that the CAA requires states include a summary of FLM conclusions and recommendations in the public notice. We tuned in to this requirement in December, 2021 and are now sharing it with states. The CAA language is:

*§7491. Visibility protection for Federal class I areas  
(d) Consultations with appropriate Federal land managers*

*Before holding the public hearing on the proposed revision of an applicable implementation plan to meet the requirements of this section, the State (or the Administrator, in the case of a plan promulgated under section 7410(c) of this title) shall consult in person with the appropriate Federal land manager or managers and shall include a summary of the conclusions and recommendations of the Federal land managers in the notice to the public.*

<https://www.govinfo.gov/content/pkg/USCODE-2013-title42/html/USCODE-2013-title42-chap85-subchapl-partC-subpartii-sec7491.htm>

Note: GA EPD staff shared during the call that they intend release the draft SIP for public comment on Friday, June 24, 2022, two days after the close of FLM consultation. GA EPD is aware of the requirement to summarize FLM comments in the notice and plans to include written FLM comments in a SIP appendix during public comment. There is added time pressure with an upcoming August 2022 deadline that EPA has signaled will trigger “findings of failure to submit.” NPS submitted preliminary feedback to GA EPD following the consultation call on June 14, 2022 and will follow up with detailed consultation feedback by June 22, 2022.

*NPS photo of a black bear cub at Great Smoky Mountains NP.*

## NPS Contacts

### Great Smoky Mountains National Park

- Jim Renfro; jim\_renfro@nps.gov

### NPS Southeast Region

- Denesia Cheek; denesia\_cheek@nps.gov

### Air Resources Division

- Melanie Peters; melanie\_peters@nps.gov
- Andrea Stacy; andrea\_stacy@nps.gov
- Don Shepherd; don\_shepherd@nps.gov

Please reach out to us with any questions.

For any formal notifications of public documents, please include the above list of NPS staff.

NPS acknowledges and very much appreciates the emission reductions that Georgia has made since the beginning of the Regional Haze program. We also see that there is still significant progress to be made before we can reach the goal of unimpaired visibility. We welcome future opportunities to engage with GA EPD and work together on efforts to reduce haze causing pollution and promote clean air and clear views in our national parks.

*NPS photo of night sky at Clingmans Dome, March 2018 by Thom McManus, Great Smoky Mountains NP.*