

September 27, 2007

N3615 (2350)

Docket No. EPA-HQ-OAR-2005-0172  
U.S. Environmental Protection Agency  
Mail code 6102T  
1200 Pennsylvania Ave., N.W.  
Washington, D.C. 20460

Dear Sir/Madam:

These comments are submitted on behalf of the National Park Service (NPS) in response to the U.S. Environmental Protection Agency's (EPA) July 11, 2007, proposal to revise the primary and secondary National Ambient Air Quality Standards (NAAQS) for ozone (O<sub>3</sub>).

#### Primary NAAQS

EPA is soliciting comments on revising the primary standard from 0.08 parts per million (ppm) to a level within the range of 0.070-0.075 ppm to provide increased protection for children and other "at risk" populations against O<sub>3</sub>-related adverse health effects. The proposed standard would be based on an 8-hour average, as is the current standard. In addition, EPA proposes to specify the level of the primary standard to the nearest thousandth ppm to avoid problems with rounding conventions that make the current 0.08 ppm standard effectively 0.084 ppm. EPA is soliciting comments on alternative levels down to 0.060 ppm and up to and including retaining the current 8-hour standard of 0.08 ppm.

NPS commends EPA for proposing to set a more stringent primary ozone NAAQS to protect public health. Visitors to national parks expect clean, clear, healthy air, but instead sometimes experience significantly polluted air. NPS has established, and implemented on occasion, a system to issue air quality health advisories because of high ozone concentrations at several national parks, including Acadia, Grand Canyon, Great Smoky Mountains, Mammoth Cave, Rocky Mountain, Sequoia/Kings Canyon, and Shenandoah National Parks to warn visitors. Visitors expecting to hike or perform other strenuous activities may be advised to limit outdoor activity and are warned of the potential health risks from ozone. In 2007, ozone monitors in or adjacent to 10 national park areas recorded ozone concentrations equal to or exceeding the 8-hour standard,

including Abraham Lincoln Birthplace National Historic Site (KY), Assateague Island National Seashore (MD), Cumberland Gap National Historic Site (KY), Death Valley National Park (CA), Great Smoky Mountains NP (NC, TN), Joshua Tree National Park (CA), Mojave National Preserve (CA), Padre Island National Seashore (TX), Sequoia and Kings Canyon National Parks (CA), and Yosemite National Park (CA). In the years 2000-2006, exceedances were recorded at 10-14 national park areas in any given year. Therefore, we appreciate EPA's recognition of the importance of tightening the standard, but we have some significant concerns with the agency's proposal. EPA's Congressionally chartered body of independent scientific advisers, the Clean Air Scientific Advisory Committee (CASAC), stated in its October 2006 letter to the EPA Administrator that "... the CASAC unanimously recommends a range of 0.060 to 0.070 ppm for the primary ozone NAAQS."<sup>1</sup> CASAC noted a number of studies supporting a lower standard and noted that controlled clinical studies of healthy adult volunteers showed adverse lung function effects in some individuals at 0.06 ppm, and "people with asthma, and particularly children, have been found to be more sensitive and to experience larger decrements in lung function in response to ozone exposures than would healthy volunteers."<sup>2</sup> CASAC reiterated their comments in a March 2007 letter to the Administrator stating that the level of the primary ozone standard should be lowered from 0.08 ppm to no greater than 0.070 ppm.<sup>3</sup>

In proposing a range of 0.070-0.075 ppm for the primary standard, EPA appears to be disregarding the advice of CASAC to consider a range of 0.060-0.070 ppm, and to establish a standard no greater than 0.070 ppm. We understand that CASAC is specifically charged in section 109 of the Clean Air Act with giving advice to the Administrator on the setting and revising of NAAQS. If EPA's proposal differs from CASAC's recommendations, EPA needs to specifically indicate why it chose not to follow the advice of its independent scientific advisers. NPS strongly recommends that EPA follow the advice of CASAC and adopt a standard within the range 0.060-0.070 ppm. In the years 2000-2006, 14-23 parks of 39 monitored had a 4th-highest daily maximum 8-hour ozone concentration greater than 0.070 ppm in a given year. Adopting a standard no greater than 0.070 ppm would protect thousands of national park visitors and employees each year.

## Secondary NAAQS

### *Need for Revised Standard*

EPA proposes to revise the secondary standard from its current form, which is identical to the primary standard of 0.08 ppm and is based on an 8-hour average. EPA proposes two options, the first of which would be to replace the current standard with a cumulative, seasonal standard expressed as an index of the annual sum of weighted

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<sup>1</sup> Dr. Rogene Henderson, CASAC Chair, Letter to the Honorable Stephen L. Johnson regarding CASAC's Peer Review of the Agency's Second Draft Staff Paper (October 24, 2006).

<sup>2</sup> Id at pp. 3-4.

<sup>3</sup> Dr. Rogene Henderson, CASAC Chair, Letter to the Honorable Stephen L. Johnson regarding CASAC's Review of the Agency's Final Staff Paper (March 26, 2007).

hourly concentrations cumulated over 12 hours a day (8 a.m. to 8 p.m.) during the consecutive 3-month period within the O<sub>3</sub> season. EPA proposes a maximum index value within the range of 7-21 ppm-hours. The second option is to make the secondary standard identical to the proposed primary 8-hour standard.

EPA's July 2007 Staff Paper concludes that, based on vegetation effects that have been observed to occur under current ambient exposure conditions and those predicted to occur under the scenario of just meeting the current secondary standard, the current secondary standard is inadequate to protect the public welfare from known and anticipated adverse welfare effects. Widespread foliar injury has been documented in areas meeting the current standard; field and chamber studies indicate that O<sub>3</sub>-induced significant growth reductions are also occurring at levels below the current standard. Ozone also reduces plants' ability to sequester carbon, an effect that could significantly impede future strategies to address rising carbon dioxide levels and climate change. The Staff Paper notes that rising carbon dioxide will increase plant productivity and subsequent carbon sequestration, but ozone, by reducing plant productivity, will offset some increases in carbon sequestration. A recent modeling analysis by Sitch and colleagues supports this hypothesis. According to their calculations, in 1901 plant growth was responsible for storing 113 billion metric tons of carbon worldwide. By 2100, this figure is predicted to be 171 billion metric tons, but without ozone it would be more than 200 billion metric tons.<sup>4</sup>

Recent research, completed after EPA's review, also support the need for a standard to protect vegetation, and we recommend that EPA consider these more recent studies when setting the secondary standard. Studies in Great Smoky Mountains National Park found that ambient ozone caused substantial growth reductions in mature trees in a mixed deciduous forest. This response was due in part to increased O<sub>3</sub>-induced water loss and led to seasonal losses in stem growth of 30-50 percent for most species in a high-ozone year.<sup>5</sup> Increasing ambient ozone levels also resulted in depletion of soil moisture in the rooting zone and reduced late-season streamflow in the watersheds.<sup>6</sup> In addition to documenting severe growth effects at ambient levels, these studies suggest that ozone will amplify the adverse effects of increasing temperatures on forest growth and forest hydrology, and may exacerbate the effects of drought on forest growth and stream health. A more protective secondary standard that would reduce O<sub>3</sub>-induced water loss in trees would not only benefit the trees but would benefit stream and watershed health.

Other recent research support EPA's findings that current ozone exposures cause significant biomass losses in seedlings of various tree species. Exposure-based regression models predicted up to 31 percent growth loss in aspen in certain areas of its

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4 Sitch S, Cox PM, Collins WJ, Huntingford C. 2007. Indirect radiative forcing of climate change through ozone effects on the land-carbon sink. *Nature* 448: 791-794.

5 McLaughlin SB, Nosal M, Wullschleger SD, Sun G. 2007. Interactive effects of ozone and climate on tree growth and water use in a southern Appalachian forest in the USA. *New Phytologist* 174: 109-124.

6 McLaughlin SB, Wullschleger SD, Sun G, Nosal M. 2007. Interactive effects of ozone and climate on water use, soil moisture content and streamflow in a southern Appalachian forest in the USA. *New Phytologist* 174: 125-136.

North American range in 2001-2003.<sup>7</sup> Injury can occur at very low ozone levels, a conclusion supported by EPA's Staff Paper. At a Class I air quality area in Maine, Moosehorn National Wildlife Refuge, the SUM06 threshold for visible foliar injury was as low as 10 ppm-hours (equivalent to a W126 of 8 ppm-hours).<sup>8</sup> A similar study at a remote Class I air quality area in northern Michigan, Seney National Wildlife Refuge, found foliar injury to sensitive species at seasonal SUM06 values as low as 5 ppm-hours (equivalent to a W126 of 4 ppm-hours).<sup>9</sup> And although the U.S. Forest Service Forest Inventory and Analysis Program has not found visible injury in its surveys in the Intermountain West, NPS has documented visible injury to coneflower in Rocky Mountain National Park in both 2006 and 2007. The affected coneflowers were growing in areas that typically have adequate moisture – sheltered areas in valleys and along streams. This finding suggests that ozone effects may be more widespread than thought previously and that throughout the Intermountain West, areas of prime wildlife habitat, including riparian areas, wetlands, and sheltered valleys, may have sufficient moisture throughout the growing season for considerable ozone uptake and injury to occur to sensitive species.

#### *Alternative Form for the Secondary Standard*

As noted above, EPA's review conclusively demonstrates that the current standard is inadequate to protect sensitive vegetation. In addition, the EPA Staff Paper provides abundant evidence that it is appropriate to establish an alternative cumulative secondary standard for ozone that is distinctly different in averaging time, form, and level from the currently existing or potentially revised 8-hour primary standard. In the previous 1997 review of the ozone standard, the Administrator recognized that "a SUM06 seasonal standard is more biologically relevant and therefore, ... also appropriate to consider" (62 FR 38877). The current review again supports the adoption of a cumulative seasonal standard as being more relevant to vegetation effects than an 8-hour standard. CASAC has encouraged the Administrator to "to establish an alternative cumulative secondary standard for ozone and related photochemical oxidants that is distinctly different in averaging time, form and level from the currently existing or potentially revised 8-hour primary standard."<sup>10</sup> On the basis of recommendations from EPA staff and CASAC, EPA proposes to use the W126 metric for the revised standard, as opposed to the SUM06 metric proposed in the 1997 review. CASAC notes that

"the [CASAC] Ozone Panel views the three-month growing season W126 index as a potentially more biologically-relevant index than the 3-month growing season SUM06 index. This is because the W126 index has no absolute minimum

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7 Percy KE, Nosal M, Heilman W, Dann T, Sober J, Legge AH, Karnosky DF. 2007. New exposure-based metric approach for evaluating O<sub>3</sub> risk to North American aspen forests. *Environmental Pollution* 147: 554-566.

8 Davis DD. 2007. Ozone-Induced Symptoms on Vegetation within the Moosehorn National Wildlife Refuge in Maine. *Northeastern Naturalist* 14: 403-414.

9 Davis DD. 2007. Ozone Injury to Plants within the Seney National Wildlife Refuge in Northern Michigan. *Northeastern Naturalist* 14: 415-424.

10 Dr. Rogene Henderson, CASAC Chair, Letter to the Honorable Stephen L. Johnson regarding CASAC's Peer Review of the Agency's Second Draft Staff Paper (October 24, 2006).

ozone concentration threshold and only lightly weights the lower ozone concentrations.”<sup>11</sup>

NPS supports both the conclusion that a seasonal, cumulative metric is needed to protect vegetation, and that the W126 is a more appropriate metric than the SUM06.

#### *Level for the Secondary Standard*

In its Staff Paper, EPA notes that appropriate W126 ranges have been identified for various vegetation effects endpoints, and that these ranges could be used to inform a standard. The W126 ranges include 13-17 ppm-hours for crops, 7-13 ppm-hours for growth effects to tree seedlings in natural forest stands, and 5-9 ppm-hours for visible foliar injury to natural ecosystems. From these values EPA chose 7 ppm-hours for the lower bound of its proposed range for the standard. The upper bound of its proposed range, 21 ppm-hours, was based on a conclusion from the 1997 standards review which concluded that a SUM06 standard of 25 ppm-hours (equivalent to a W126 of 21 ppm-hours) would allow a 10 percent yield loss to occur in no more than 50 percent of the studied agricultural crop cases.

CASAC has recommended that a secondary standard should be set in a range from 7 to 15 ppm-hours. CASAC notes that

“it *does not* agree with Staff’s recommendations that the upper bound of the range should be as high as 21 ppm-hours. Rather, the Panel recommends that the upper bound of the range considered should be no higher than 15 ppm-hour...”<sup>12</sup>

CASAC’s recommendation was based on the comments of its Ozone Review Panel Members, one of whom noted

“In fact the SUM06 equivalent (25 ppm-hrs) to a W126 at 21 ppm-hrs was considered in 1997 and discarded as not being a substantial improvement over the 8-hour maximum of 0.084 ppm. If staff proposes lowering the primary standard to (well) below 0.080 ppm, as is clearly warranted by the current health assessment, then to also recommend a secondary standard at a level that was discarded in 1997, for adding insufficient benefits to the 0.084 ppm primary standard, seems like a predetermination that a separate secondary standard will not be seriously considered once again.”<sup>13</sup>

NPS strongly supports CASAC’s recommendation that the upper bound of the range for the standard should not exceed a W126 of 15 ppm-hours. Further, NPS strongly recommends a value for the secondary standard that is representative of the low end of the range recommended by CASAC. Figures 1-3 illustrate the relative benefits of various

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11 Id.

12 Dr. Rogene Henderson, CASAC Chair, Letter to the Honorable Stephen L. Johnson regarding CASAC’s Review of the Agency’s Final Staff Paper (March 26, 2007).

13 Id. App C, p. C-25.

standard levels to vegetation in national parks. W126 values were calculated for 2005, using on-site data where available, and interpolated data for other sites. For example, Figure 1 highlights 291 parks in the contiguous U.S. that currently experience W126 values exceeding 7 ppm-hours. A standard of 7 ppm-hours would theoretically require ozone reductions that would benefit these parks. The remaining 47 parks (not shown on the map) are already below 7 ppm-hours and would not receive additional benefits. At this W126 level for the standard, vegetation would receive a high level of protection. Some visible injury might be expected to occur, but the potential for growth effects would be very low. Most of these parks contain aspen, black cherry, or ponderosa pine, all species predicted to have significant growth effects at current W126 levels.

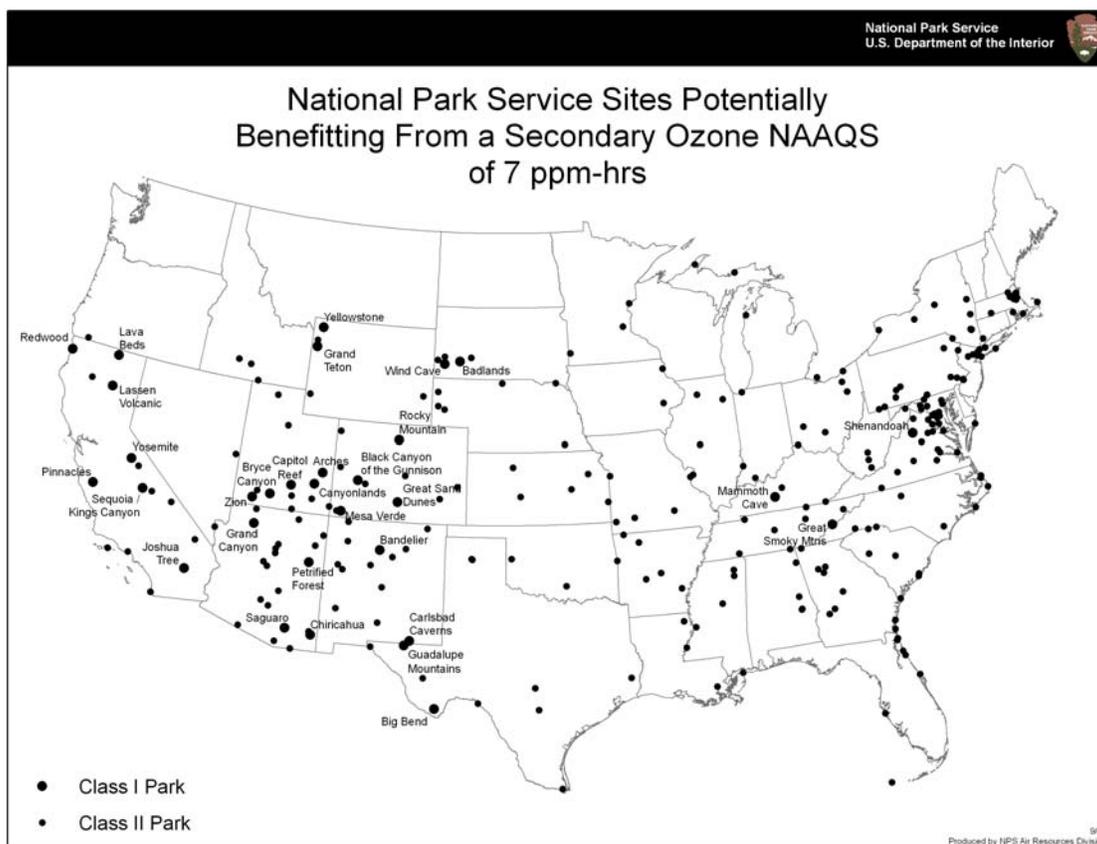


Figure 1. National Park Service sites in the contiguous U.S. that currently have W126 values > 7 ppm-hours and would potentially benefit from a secondary ozone NAAQS of 7 ppm-hours. W126 values are from 2005 interpolated ozone data.<sup>14</sup>

Figure 2 highlights the 276 parks that currently experience W126 levels exceeding 9 ppm-hours, and would potentially benefit from a secondary ozone NAAQS of 9 ppm-hours. In increasing the level of the standard to 9 ppm-hours, the benefits of the lower 7 ppm-hours standard will be lost to 15 parks, including Yellowstone National Park and a number of parks in the upper Midwest, all containing ozone-sensitive aspens.

<sup>14</sup> NPS Air Resources Division 2007.

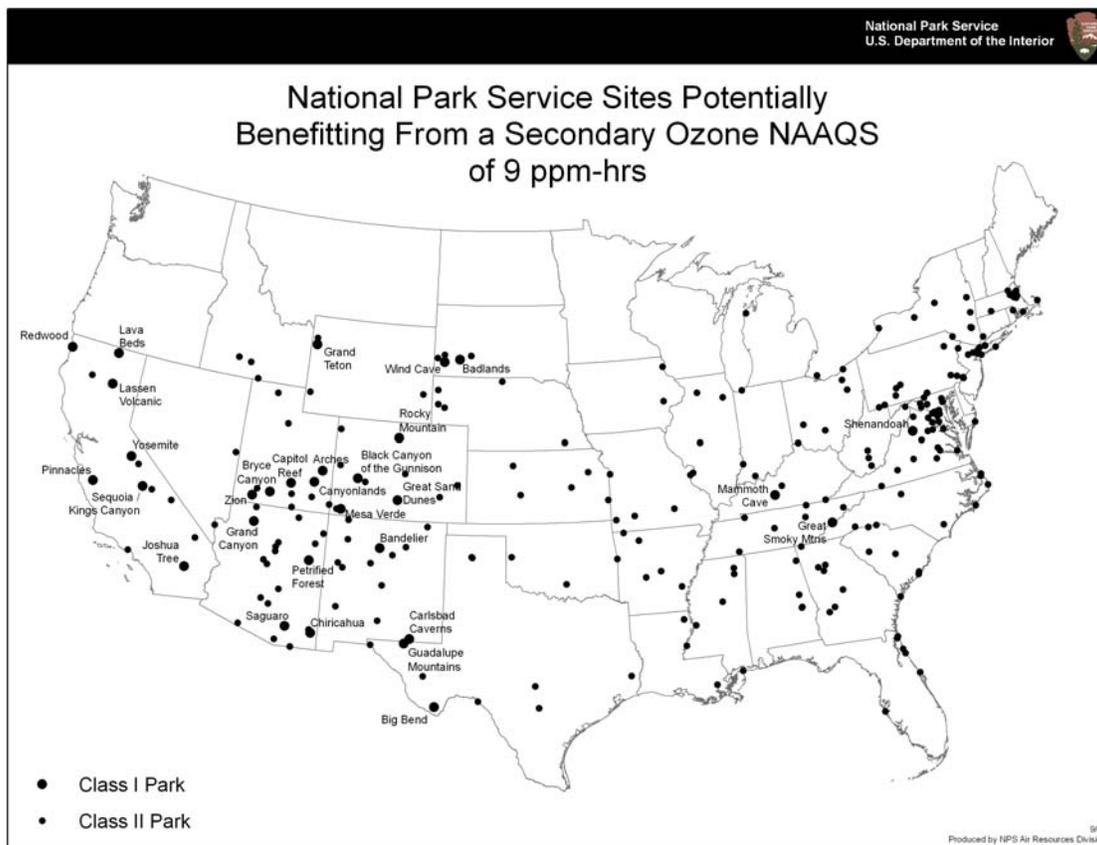


Figure 2. National Park Service sites in the contiguous U.S. that currently have W126 values > 9 ppm-hours and would potentially benefit from a secondary ozone NAAQS of 9 ppm-hours. W126 values are from 2005 interpolated ozone data.

Figure 3 highlights the 126 parks that currently experience W126 levels above 15 ppm-hours. The majority of parks, 212 parks, would receive no additional protection from a 15 ppm-hours standard. These parks include Rocky Mountain and Grand Teton National Parks, both of which contain ozone-sensitive aspen and Scouler's willow. Clearly, a large number of parks would potentially benefit from a standard set at a value at the low end of the range recommended by CASAC.

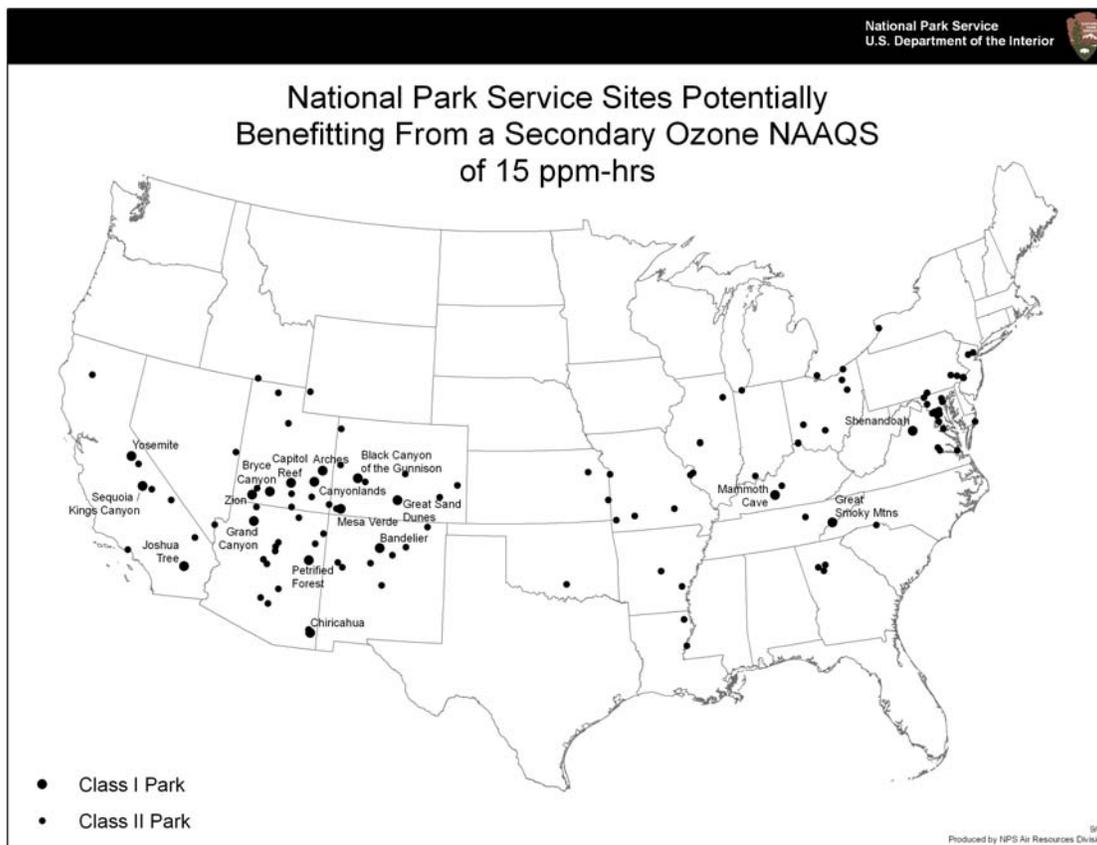


Figure 3. National Park Service sites in the contiguous U.S. that currently have W126 values > 15 ppm-hours and would potentially benefit from a secondary ozone NAAQS of 15 ppm-hours. W126 values are from 2005 interpolated ozone data.

#### *Diurnal and Seasonal Window for the Standard*

EPA proposes to set a cumulative standard over 12 hours a day (8 a.m. to 8 p.m.) during the consecutive 3-month period within the ozone season with the maximum index value, in accordance with recommendations from CASAC. We agree that the maximum consecutive 3-month period within the ozone season is a reasonable averaging time for vegetation in many areas of the country. In addition, for many areas of the country, the daytime 12-hour window is an appropriate period over which to cumulate diurnal ozone exposures. However, as the Staff Paper points out, there is evidence to suggest that in some species in some areas, ozone uptake occurs outside this 12-hour window. Research in Great Smoky Mountains National Park found that, because of O<sub>3</sub>-induced delays in stomatal closure, 24-hour average sap flow was more closely related to ozone exposures than the 12-hour average sap flow. In other words, ozone injury caused stomates to remain open beyond daylight hours and, in addition to losing water during this time, the plants also continued to uptake ozone.<sup>15</sup> Observations of coneflowers from Great Smoky Mountains National Park found that stomata of sensitive plants were less responsive than

<sup>15</sup> Id.

those of insensitive plants to light intensity and vapor pressure deficit,<sup>16</sup> suggesting that some sensitive plants may continue to uptake ozone outside of the 12-hour daylight window. In addition, ozone exacerbates this effect by injuring stomatal guard cells and thereby further slowing stomatal response and closure. This effect may persist after ozone exposure. Experiments with a Mediterranean evergreen broadleaf, *Arbutus unedo*, documented sluggish stomatal response 10 days after cessation of ozone exposure, an effect referred to as a “memory effect” by the researcher.<sup>17</sup> EPA’s Staff Paper notes other research documenting ozone uptake outside the 12-hour diurnal window.

Nevertheless, NPS agrees with EPA and CASAC that, for most areas and species, the 12-hour daylight period is sufficient and appropriate to characterize ozone uptake for the cumulative standard. There may be specific areas (e.g., very dry, hot areas where stomates are primarily open at night) where a different window may better characterize ozone exposure. It may be appropriate to give States discretion, in these instances, to shift or extend the 12-hour window for calculating exposure in these areas.

#### *Annual vs. 3-year Averaging Period for the Standard*

EPA is soliciting comments on specifying the cumulative standard as a 3-year average of the annual sums of the W126 versus a one-year W126. NPS agrees with CASAC that

“Multi-year averaging to promote a “stable” secondary Ozone NAAQS is less appropriate for a cumulative, seasonal secondary standard than for a primary standard based on maximum eight-hour concentrations.”<sup>18</sup>

While we also agree with CASAC that “if multi-year averaging is employed to increase the stability of the secondary standard, the level of the standard should be revised downward to assure that the desired threshold is not exceeded in individual years,”<sup>19</sup> we recommend that the standard be expressed as a 1-year standard to provide requisite protection to vegetation. In its Staff Paper EPA notes that, in perennial species, ozone can produce a “carry-over” effect that continues to affect the plant in years following high ozone exposures. Averaging W126 values over 3-years has the potential to underestimate the effect of a single high ozone year, whereas in that one year the plant may be sufficiently injured to experience long-lasting growth and reproductive effects in later years.

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16 Grulke NE, Neufeld HS, Davison AW, Roberts M, Chappelka AH. 2007. Stomatal behavior of ozone-sensitive and -insensitive coneflowers (*Rudbeckia laciniata* var. *digitata*) in Great Smoky Mountains National Park. *New Phytologist* 173: 100-109.

17 Paoletti E. 2005. Ozone slows stomatal response to light and leaf wounding in a Mediterranean evergreen broadleaf, *Arbutus unedo*. *New Phytologist* 2005: 439-445.

18 Dr. Rogene Henderson, CASAC Chair, Letter to the Honorable Stephen L. Johnson regarding CASAC’s Review of the Agency’s Final Staff Paper (March 26, 2007).

19 *Id.*

### *Alternative Approaches for the Standard*

EPA has asked for comment on the appropriateness of establishing, in effect, multiple national standards that would afford differing degrees of protection for ozone-related impacts on different types of vegetation with differing intended uses. EPA notes that the level of ambient ozone requisite in a Class I area may be lower than the level that is required in a cropland area. NPS believes that such a program may be appropriate and supports our Congressional direction to conserve unimpaired the resources (ecosystems and ecosystem components) within our areas for future generations, noting that in addition to Class I areas, NPS and other land management agencies have mandates for protection of resources on all the lands they manage. NPS recommends that EPA adopt one national secondary standard for the protection of natural vegetation and implement the standard in protected areas of national interest, including national parks, national wilderness areas, national monuments, national seashores, and other areas of special national or regional natural, recreational, scenic, or historic value. We would like to work with EPA if they pursue a process to define geographic areas for the standard to assure that our resources are given sufficient protection. Should EPA pursue this approach for secondary standards, EPA needs to specifically recognize that implementing a secondary air quality for ozone which applies in specific geographic areas would require that all reasonable emissions control measures be implemented in all areas that influence the ozone levels where that standard applies, irrespective of whether the secondary standard applies in the area where those emissions are generated.

### *Implementation and Monitoring Strategies*

NPS recognizes that implementing more protective primary and secondary standards will pose unique challenges, and would like to offer assistance to EPA in developing implementation strategies for the revised standards. As noted above, we would like to work with EPA to identify protected areas of national interest and the ozone-sensitive resources in those areas. In addition, we would like to help EPA identify areas where the secondary standard may be violated. At present, continuous monitoring of hourly ozone concentrations, using methods stated in 40 CFR part 50, is required to demonstrate non-compliance with a standard. EPA is not proposing any specific changes to these existing monitoring requirements or to quality assurance requirements. However, EPA notes in its proposed rule that the existing monitoring requirements are oriented towards the primary standard, with a focus on urban areas. Violations of the secondary standard may go undetected in rural areas with sensitive vegetation that are only sparsely monitored. At present, EPA requires monitoring only in Metropolitan Statistical Areas (MSA), but States, EPA, NPS, and other entities have limited monitoring in less-populated areas, including national parks. The level of monitoring in non-urban areas and especially natural areas such as Class I areas in national parks and wilderness areas, however, is inadequate to identify all areas that might violate a secondary standard.

Even if funds for additional monitors were available, monitoring with currently required method in many natural areas would be impracticable. Many natural areas, especially wilderness areas, do not have electrical power available. This limits the ability to operate

certified reference and equivalent method instrumentation and to meet the shelter temperature requirements for ambient air monitoring. Alternatively, we recommend that EPA consider accepting other monitoring methods and instruments for an initial determination that the secondary standard is being violated. A cumulative standard such as the W126 is much less sensitive to individual high hourly ozone values or to outlier hourly values than is an 8-hour standard. Measurement methods with higher minimum detection limits and slightly less accuracy would yield equivalent cumulative ozone values in the ppm-hour range. Possible methods and instruments include passive samplers, low-power UV-absorption instruments, semiconductor sensor instruments, color-change detection methods, or electrochemical detection methods. Many of these methods would not provide hourly values as currently required but, as noted above, individually recorded hourly values are not truly needed for a cumulative standard.

A much broader network of monitors could be used in natural and remote locations if the methods and instruments were better suited to the limits imposed on power, access, shelters, noise, and cost. Direct measurements in areas have the advantage of being quantitative, verifiable, and of a quantifiable accuracy and precision. In some areas, more traditional methods could be used to verify violations of the secondary standard. For example, alternative methods might be used to make preliminary determinations of violations that would be verified by the use of a short-term mobile monitoring station that met reference and equivalent methods requirements. Reducing monitoring costs to allow many additional monitored locations would ultimately improve the protection of natural resources and decrease the uncertainty in the extent of ozone exposures.

Unfortunately, even alternative monitoring methods may be unfeasible in certain natural and remote areas, either because of access issues or prohibitions on equipment placement, e.g., in wilderness. Particularly in the western U.S., if more than a small fraction of natural areas is to be protected, computer modeling by itself or in combination with spatial interpolation may provide the only means of identifying areas that potentially violate the secondary standard. Although EPA's analysis in the Staff Paper found that such an approach tended to underestimate ozone exposure, particularly in the West, NPS recommends that, in the absence of other viable options, EPA allow such approaches for unique remote or wilderness areas. NPS would like to work with EPA to investigate the applicability of alternative monitoring, modeling, and interpolation techniques for estimating ozone exposures and identifying areas that may violate the secondary standard.

### *Recommendations for Research*

NPS concurs with CASAC's finding that support for Federally-funded ozone environmental effects research has been neglected in recent years, and that there should be a significant future investment in effects research. NPS recommends that support for research, especially in federally protected lands, be increased so that data for plant response to ozone are representative of the natural vegetation species the standard is intended to protect, in a variety of ecosystem types.

NPS also recommends that EPA continues to develop alternative monitoring, modeling, and interpolation techniques for estimating ozone exposures in natural wildland areas.

### Conclusions

For the primary ozone standard, NPS strongly recommends that EPA follow the advice of CASAC and adopt a standard within the range 0.060-0.070 ppm.

For the secondary ozone standard,

- NPS strongly recommends that EPA adopt a seasonal, cumulative form for the standard and agrees with EPA that the W126 metric is an appropriate metric for the standard. NPS agrees with CASAC that retaining the current form of the 8-hour standard for the secondary standard is inappropriate and inadequate for characterizing ozone exposures to vegetation.
- NPS agrees with CASAC that EPA should not consider a value for the secondary standard greater than 15 ppm-hours. NPS's analysis concludes that W126 level in the lower end (e.g., 7-9 ppm-hours) of CASAC's proposed range of 7-15 ppm-hours would provide significant protection to vegetation in many more national parks.
- NPS agrees that the 12-hour diurnal window and the 3-month growing season period are appropriate averaging times for the standard. However, we note that the 12-hour diurnal period from 8 a.m. to 8 p.m. may not be appropriate for certain areas and suggest that EPA allow States discretion to shift or extend that 12-hour period as needed.
- NPS recommends that the W126 be implemented as a 1-year standard, rather than a 3-year average standard to provide protection against high-ozone years.
- Regarding EPA's request for comments on alternative standards, NPS recommends that one national standard be set to protect natural vegetation, and that the standard be implemented in areas of special national interest with ozone-sensitive resources.
- NPS recommends that, in order to extend protection from the secondary standard to many additional natural areas, alternative ozone monitoring methods and ozone estimation techniques be accepted for demonstrating violations of the standard.
- NPS strongly supports CASAC's recommendations for increased Federally-funded research on ozone effects, especially to natural vegetation in protected areas.

If you have any questions, please contact Chris Shaver at (303) 969-2074.

Sincerely,

Mary A. Bomar  
Director, National Park Service