



March 22, 2010

Mr. Ken Salazar, Secretary  
Department of the Interior  
1849 C Street, NW  
Washington, DC 20240

Mr. Gary Locke, Secretary  
Department of Commerce  
1401 Constitution Ave NW  
Washington, DC 20024

RE: 1) Comments from the Society for Conservation Biology (SCB) on Docket ID No. EPA-HQ-OAR-2005-0172 Comments on the Proposal to Reconsider and Revise Ozone Standards

2) EPA must consult with the Secretaries of Commerce and the Interior as it prepares to set Clean Air Act standards in order to fulfill its Section 7 duties under the Endangered Species Act.

Dear Secretaries,

On behalf of the Society for Conservation Biology, I am writing to share with you our comments to the Administrator of the Environmental Protection Agency on her reconsideration of proposed rules on ground level Ozone and to ask that you prepare to assist her, as the law and Obama Administration policy require, as she reviews both her previous record of decision and the comments she has received in this round.

There are some very powerful steps you can take together concerning these rules and any national rule addressing allowable air pollution.

The first is to bring your expertise to bear in helping EPA set its secondary standards that are meant to prevent harm to wildlife, ecosystems, visibility around parks, and other values specifically listed in the Clean Air Act. You should also do this with President Obama's Executive Order of October 5, 2009 and his initiatives and your own on the subject of climate change in mind.

The second is to assist the Administrator in preparing a Biological Assessment that makes use of the best available scientific and commercial data in "identifying any endangered or threatened species which is likely to be affected by such action". In this context, that "B.A." should also set forth what the EPA believes will be the impact of the proposed rules and any reasonable and prudent alternatives to them, the likely impact of any incidental taking, and the reasonable and prudent measures ... necessary or appropriate to minimize such impact so as to expedite the



completion of a Biological Opinion that will allow for the best and most expeditious possible reduction in the pollutants involved and the exposure of listed species to them.

We should point out that the EPA's program implementing the Global Change Research Act may provide area-specific data and projections that will help in the process of considering the regional or near-local effects of pollution on wildlife, plants, and ecosystems-- not only such things as cardio-pulmonary or food chain impacts of pollutants but also climate change impacts of air pollutants or air pollution discharges that eventually act as water pollutants, as in the case of ocean acidification.

We look forward to learning of your progress in this regard and to providing any help that we or our more than 10,000 conservation professionals working in a wide array of disciplines worldwide can provide.

Sincerely,

John M. Fitzgerald, J.D.  
Policy Director  
Society for Conservation Biology

Cc: Ms. Lisa Jackson, Administrator  
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Delivered by Email and Registered Mail:

RE: 1) Comments from the Society for Conservation Biology (SCB) on Docket ID No. EPA-HQ-OAR-2005-0172 Comments on the Proposal to Reconsider and Revise Ozone Standards

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## SYNOPSIS

**The precautionary principle will help EPA in adopting both primary and secondary standards. EPA may be able to set secondary standards to prevent serious threats to the welfare of wildlife and ecosystems using the current record or by drawing on new scientific findings available to it through the interagency consultation process which requires EPA to consult formally with the Secretaries of the Interior and Commerce to fulfill its three distinct duties under section 7(a)(1) and (2) of the Endangered Species Act when proposing any agency action that may affect listed species, such as setting Clean Air Act Standards.**

## INTRODUCTION

The Society for Conservation Biology is taking this opportunity to submit comments in response to the Notice of Intent for a Proposed Rule Related to Reconsideration of the primary and secondary national ambient air quality standards (NAAQS) for ozone (O<sub>3</sub>) set in March 2008.

Normally this action by the EPA in revising its regulation based upon the pre-existing record would be based on that record of decision only; but in this case, if EPA consults with the Secretaries of the Interior and Commerce under the Endangered Species Act, then it should be

able to complete that process efficiently and should be able to use further information and guidance gleaned from that interagency consultation to improve and support its final actions. Furthermore, without such formal consultation, neither EPA nor those who rely upon its standards will be covered and protected from liability under the ESA through the issuance of incidental taking statements that would normally be issued after consultation under section 7(b)(4) for harm done to listed species by ozone at levels permitted by the EPA. That such harm is taking place will be demonstrated below.

Therefore, the EPA should develop and present a biological assessment in a transparent, public, and prompt manner posing its proposed actions and alternatives to them, using the precautionary principle to reduce irreparable harms to the extent that any substantial scientific uncertainty exists.

The Society for Conservation Biology is an international professional organization dedicated to promoting the scientific study of the phenomena that affect the maintenance, loss, and restoration of biological diversity. The Society's membership comprises a wide range of people interested in the conservation and study of biological diversity: resource managers, educators, government and private conservation workers, and students make up the more than 10,000 members worldwide.

## BACKGROUND

Ozone is currently regulated pursuant to the Clean Air Act (CAA), designated as one of six “criteria pollutants”.<sup>1</sup> Acceptable levels of the criteria pollutants are set at primary and secondary national ambient air quality standards (NAAQS). Of the six pollutants, particle pollution and ground-level ozone are the most widespread health threats.<sup>2</sup> EPA calls these pollutants “criteria” air pollutants because it regulates them by developing human health-based and/or environmentally-based criteria (science-based guidelines) for setting permissible levels.<sup>3</sup>

Ozone is formed by the reaction of sunlight on air containing hydrocarbons and nitrogen oxides. Ozone is a key component of smog. There is documented evidence of significant reductions in agricultural yields due to ground-level ozone exposure, which interferes with photosynthesis and stunts growth in some plant species.<sup>4</sup> This, of course, has important implications for ecosystems and threatened and endangered species of plants and animals. Further, ozone has strong oxidizing properties and is a primary irritant for humans, affecting the eyes, lungs, and other

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<sup>1</sup> These include particle pollution (often referred to as particulate matter), ground-level ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead.

<sup>2</sup> EPA Office of Air & Radiation, available at <http://www.epa.gov/air/urbanair/>, accessed March 2010.

<sup>3</sup> *Id.*

<sup>4</sup> See, e.g., Health Aspects of Air Pollution, World Health Organization-Europe (2003); NASA Earth Observatory, *Rising Ozone Levels Poses Challenge to U.S. Soybean Production, Scientists Say* (July 2003); Randall Mutters, *Statewide Potential Crop Yield Losses From Ozone Exposure*, California Air Resources Board (1999).

organs; it also facilitates the buildup of atherosclerotic plaques, a form of heart disease.<sup>5</sup> These same effects are likely to take place in wild animals as well.

One precursor of ozone is Nitrogen Oxide (NO<sub>x</sub>). An EPA determination of the primary standard of ozone precursor NO<sub>x</sub> took place in January 2010. NO<sub>x</sub> secondary standards will be proposed by the end of the year.<sup>6</sup> In that secondary determination EPA should take into account on the record in careful detail, the effects on ecosystems and listed species and consult with the Secretary under the ESA.

Another ozone precursor, Volatile Organic Compounds (VOCs) are widespread and found in numerous settings. VOCs are in a wide variety of chemical materials, transportation equipment, industrial processes and commercial and household solvents and coatings.<sup>7,8</sup> Not all of these are relevant to listed or other wild species' exposures but for those that are, consultations based on informed biological assessments are warranted.

## OZONE STANDARDS

Primary standards for the criteria pollutants, such as ozone, are generally established at levels necessary to protect the public health to an adequate margin of safety.<sup>9</sup> Secondary standards are established that are “requisite” to protect public welfare from “any known or anticipated effects associated with the pollutant in the ambient air” including effects on crops, vegetation, wildlife, buildings and national monuments, and visibility’.<sup>10,11</sup> The law requires EPA to review the standards of all designated pollutants **at least** once every five years to determine whether

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<sup>5</sup> L. L. Smith, Oxygen, Oxysterols, Ouabain, and Ozone: a Cautionary Tale, *Free Radical Biology & Medicine*, 318, 318 (2004), abstract available at [http://www.sciencedirect.com/science?\\_ob=ArticleURL&\\_udi=B6T38-4CDWN7C-4&\\_user=9038195&\\_coverDate=08%2F01%2F2004&\\_rdoc=1&\\_fmt=high&\\_orig=search&\\_sort=d&\\_docanchor=&\\_view=c&\\_acct=C000050221&\\_version=1&\\_urlVersion=0&\\_userid=9038195&md5=d46785bd14980a1c15536f0869824cd7](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6T38-4CDWN7C-4&_user=9038195&_coverDate=08%2F01%2F2004&_rdoc=1&_fmt=high&_orig=search&_sort=d&_docanchor=&_view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=9038195&md5=d46785bd14980a1c15536f0869824cd7)

<sup>6</sup> Phone interview with Kyndall Barry, Designated Federal Officer, U.S. EPA Science Advisory Board, U.S. Environmental Protection Agency, March 11, 2010.

<sup>7</sup> HAPs are regulated under the National Emissions Standards for Hazardous Air Pollutants (NESHAPs), and are classified as air pollutants not covered by NAAQS that may cause an increase in fatalities or in serious, irreversible, or incapacitating illness. Sources must use the Maximum Achievable Control Technology (MACT), 42 U.S.C. § 7412, 40 C.F.R. Parts 61 and 63. Additionally, VOCs emissions from point or stationary sources require VOC Reasonably Available Control Technology (RACT). Finally, all new major sources and major modifications of existing sources are subject to federal New Source Review (NSR) requirements, which require VOC controls at the Lowest Achievable Emission Rate (LAER).

<sup>8</sup> There are also VOC regulations to protect the water supply, as provided for in the Safe Drinking Water Act (SDWA);<sup>8</sup> VOCs are regulated pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).<sup>8</sup> Additionally, The United States Department of Labor and its Occupational Safety and Health Administration (OSHA) regulate VOC exposure in the workplace.

<sup>9</sup> 42 U.S.C. § 7409(b).

<sup>10</sup> See *id.* § 7409.

<sup>11</sup> 42 U.S.C. § 7409(a),(d); U.S. EPA, Fact Sheet: Final Revisions to the National Ambient Air Quality Standards for Ozone at 5 (2008), available at [http://www.epa.gov/airnow/ozone/final\\_ozone\\_naaqs\\_factsheet.pdf](http://www.epa.gov/airnow/ozone/final_ozone_naaqs_factsheet.pdf), accessed March 2010.

revisions to the standards are appropriate.<sup>12</sup> Given the rapid escalation of climate change and our knowledge of it, review of GHGs and forcing agents should be expedited as much as possible.

A Senate Committee on Public Works Report<sup>13</sup> regarding “adequate margin of safety” in setting NAAQS primary standards stated the following:

In setting such [National ambient air quality] standards the [Administrator] should consider and incorporate not only the results of research summarized in air quality criteria documents, but also the need for margins of safety. Margins of safety are essential to any health related environmental standards if a reasonable degree of protection is to be provided against hazards which research has not yet identified.

Senate Committee on Public Works, Report No.91-1196 (1970), pp.9-10.

EPA proposes that the level of the 8-hour primary ozone standard, which was set at 0.075 ppm in the 2008 final rule, should instead be set at a lower level within the range of 0.060 to 0.070 ppm.

Secondary standards are established that are “requisite” to protect public welfare from “any known or anticipated effects associated with the pollutant in the ambient air”.<sup>14</sup> The statute further states:

All language referring to effects on welfare includes, but is not limited to, effects on soils, water, crops, vegetation, man-made materials, animals, wildlife, weather, visibility, and climate, damage to and deterioration of property, and hazards to transportation, as well as effects on economic values and on personal comfort and well-being, whether caused by transformation, conversion, or combination with other air pollutants.

CAA §302(h).

EPA further proposes that the secondary O<sub>3</sub> standard should be a new cumulative, seasonal standard expressed as an annual index of the sum of weighted hourly concentrations, cumulated over 12 hours per day during the consecutive 3-month period within the O<sub>3</sub> season with the maximum index value, set at a level within the range of 7 to 155 ppm-hours.

State air pollution control agencies that have ozone non-attainment areas within their jurisdiction are required under the CAA to develop State implementation plans (SIPs) that will lead to attainment of NAAQS for ozone.

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<sup>12</sup> See *id.* § 7409.

<sup>13</sup> Congressional Research Service Report for Congress, Air Quality Standards: The Decision-Making Process II, 97-722 ENR

<sup>14</sup> 42 U.S.C. § 7409(b)(2).

## CURRENT SITUATION

Tropospheric (lower atmosphere) ozone is a major pollutant. Human activities do not create ozone directly, but add pollutant gases such as carbon monoxide (CO), nitrogen oxides (NO<sub>x</sub>), methane, and volatile organic compounds (VOCs), which in turn form ozone. As stated by Molina, et al.:<sup>15</sup>

These “ozone precursor” gases undergo complex photochemical reactions and form ozone in the initial 10–15 km above the ground. Because of the large increase in methane, CO, VOCs, and NO<sub>x</sub> since the preindustrial era, tropospheric ozone has increased by ≈30%,<sup>16</sup> and its contribution to global warming is as much as 20% of that due to CO<sub>2</sub>.<sup>17</sup> Tropospheric ozone is toxic to humans and plants including crops. The recent ozone report published by the Royal Society notes that in 2000 ozone damage to crops was estimated from \$14–26 billion annually, threatening food security in developing and developed nations.<sup>18</sup> Ozone may reduce the effectiveness of land-based carbon sinks.<sup>19</sup>

### *Reducing Abrupt Climate Change at 4.*

The Society encourages EPA to set both standards at the lowest possible practicable level given both the direct damage caused by ground level ozone and given the damage caused by the pollutants that make up ozone even before they are converted to ozone by the action of the sun and heat.

The EPA’s proposed standard of 0.060 ppm may not be as effective or strict as a standard that could be supported by the evidence on the record or the best available scientific and commercial data that a consultation would support. We are also concerned about whether EPA has adequately considered the full range of options and impacts concerning the secondary standard. We have not seen evidence that these were subject to consultation under the ESA, so we recommend initiating consultation now and then determining the level at which you have

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<sup>15</sup> Mario Molina, et al., Tipping Elements in Earth Systems Special Feature: *Reducing Abrupt Climate Change Risk Using the Montreal Protocol and Other Regulatory Actions to Complement Cuts in CO<sub>2</sub> Emissions*, *Proceedings of the National Academy of Sciences, Early Edition* (published on line before print October 12, 2010), available at <http://www.pnas.org/content/106/49/20616.full>, accessed March 2010.

<sup>16</sup> Molina, citing D. T. Shindell, G. Faluvegi, N. Bell, G. A. Schmidt, An Emissions-based View of Climate Forcing by Methane and Tropospheric Ozone, *Geophysical Research Letters*, (February 15, 2005) available at <http://www.agu.org/pubs/crossref/2005/2004GL021900.shtml>, accessed March 2010.

<sup>17</sup> Molina, citing P. Forster, et al., *Climate Change 2007: The Physical Sciences Basis Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, pp 129 – 234, Changes in atmospheric constituents and radiative forcing, ed, S. Solomon, et al. Cambridge University Press, (2007).

<sup>18</sup> Molina, citing Ground-level Ozone in the 21st Century: Future Trends, Impacts and Policy Implications, Royal Society (2008).

<sup>19</sup> Molina, citing Ground-level Ozone in the 21st Century: Future Trends, Impacts and Policy Implications, Royal Society (2008).



evidence to support a standard and revisiting these in less than five years as new evidence is gathered.

There is growing evidence of ozone's deleterious effects on plants and crop yields and on wildlife and invertebrates. There is also daily growing evidence of the serious toll that GHGs and black soot are taking through climate change. The climate mitigation role that forests and other ecosystem have played and can play depends on the extent that they are not harmed or killed off by ground level ozone and the increasing ambient heat and drought brought to many areas by climate change.<sup>20</sup>

## **ARGUMENT**

Considering the above, the Society believes that EPA, after consulting with the Secretaries of the Interior and Commerce, should set the strictest practicable standards for ozone for the following reasons:

1. To use EPA's authority to assist in the recovery of listed species and avoid degrading critical habitats, jeopardizing their existence or causing unnecessary harm to listed species or the ecosystems on which they depend.
2. To minimize ozone's direct effects on non-listed wildlife, sensitive natural vegetation and sensitive ecosystems as intended for secondary standards under the Clean Air Act.
3. Because setting stricter standards for ozone presents an opportunity to contribute to climate change mitigation.<sup>21</sup>

## **Consultation**

Crucial to setting the standard itself is the process by which EPA will establish and adjust these standards. A prudent process should involve affirmative consultation under the ESA but also with professional societies, agencies, and other experts on this matter. The process should have adequate resources to provide a full modern biological assessment. Most importantly, the consultation must begin as soon as possible so as not to delay unnecessarily the implementation of better ozone standards.

EPA should also determine, over the medium term, how it can compensate those who bring unique sets of data, analysis or perspectives to such processes. As a matter of law, EPA must consult with the Secretaries of the Interior and Commerce and present to them a biological

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<sup>20</sup> See, e. g., Society for Conservation Biology, *Mitigating and Preparing for Climate Change: Eleven Conservation Principles For Decision-makers*, (Nov. 2009), available at <http://www.conbio.org/activities/policy/ClimateChange.cfm>

<sup>21</sup> President Obama's Executive Order of October 5, 2009 would seem to direct EPA to review such actions as this and to use such opportunities to the fullest extent possible to address climate change and energy efficiency.



assessment of the effects of the proposed action (as well as practicable alternatives to the action) upon species listed as threatened or endangered.

The additional burden of preparing a biological assessment upon EPA is to be expected and manageable, considering that the Clean Air Act of 1970 mandated a duty to determine through EPA's own research, the impact of pollutants and proposed air standards upon wildlife, domestic animals, plants, water, weather, and climate. The ESA of 1973 merely built upon this general foundation.<sup>22</sup> Those ESA consultations should, again, make determinations on the following:

1. Avoiding jeopardy to listed species
2. Not degrading any critical habitat
3. Applying EPA's authority so as to expedite the recovery of listed species

After consultation, the Secretaries may render a Biological Opinion that includes specific requirements. For example, in this case EPA may need to work with States to ensure that specific areas that have vulnerable ozone-sensitive species receive the protection of stricter ambient standards.

In the absence of consultations and a Biological Opinion and reasoned and supported incidental taking statements those states (and the entities emitting pollutants that cause incidental takes of listed species) may be liable for committing unpermitted takings unless they apply for one or more Endangered Species Act Section 10 incidental taking permits and prepare Habitat Conservation Plans to mitigate ozone's impacts in relevant areas.

## Effects on Non-Critical Habitats and Wildlife

### Plants

First, as stated on the USDA website, "Ground-level ozone causes more damage to plants than all other air pollutants combined."<sup>23</sup> Vegetation exposure to ozone reduces photosynthesis, growth, and other plant functions.<sup>24</sup> Although under normal circumstances plants are able to detoxify O<sub>3</sub>, when uptake of O<sub>3</sub> is too large for the plant to compensate, growth and yield may be reduced.<sup>25</sup> Continued ozone exposure can cause many symptoms including chlorosis

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<sup>22</sup> 42 U.S.C. 7602(h).

<sup>23</sup> Agricultural Research Service, United States Department of Agriculture, *available at* <http://www.ars.usda.gov/Main/docs.htm?docid=12462>, accessed March 2010.

<sup>24</sup> Benjamin S. Felzer, et al., Impacts of Ozone on Trees and Crops, 339 *Comptes Rendus Geosciences*, 784, 784 (October 2007), Abstract *available at* [http://www.sciencedirect.com/science?\\_ob=ArticleURL&\\_udi=B6X1D-](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6X1D-4R003TW-)

[4R003TW-2&\\_user=10&\\_coverDate=10%2F31%2F2007&\\_rdoc=1&\\_fmt=high&\\_orig=search&\\_sort=d&\\_docanchor=&view=c&\\_searchStrId=1227917406&\\_rerunOrigin=scholar.google&\\_acct=C000050221&\\_version=1&\\_urlVersion=0&\\_userid=10&md5=b0a66af968088175c751d823a45f638b](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6X1D-4R003TW-2&_user=10&_coverDate=10%2F31%2F2007&_rdoc=1&_fmt=high&_orig=search&_sort=d&_docanchor=&view=c&_searchStrId=1227917406&_rerunOrigin=scholar.google&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=b0a66af968088175c751d823a45f638b), accessed March 2010.

<sup>25</sup> Michael H. Unsworth and William E. Hogsett, Global Climate Change and Agricultural Production. Direct and Indirect Effects of Changing Hydrological, Pedological and Plant Physiological Processes at 8 (1996), *available at* <http://www.fao.org/docrep/W5183E/w5183e0a.htm#ozone>, accessed March 2, 2010.

(inability to produce enough chlorophyll) and necrosis (premature cell death).<sup>26</sup> Significant effects of ozone on crop yield have been researched by the National Crop Loss Assessment Network (NCLAN) (Heagle study, 1989). NCLAN results show that species such as soybean, cotton and peanut are the most sensitive to lost yield caused by ozone.<sup>27</sup>

As a specific example, although rice is the eighth most important crop in the developed world - and by a factor of two - the leading crop in the developing world,<sup>28</sup> it is becoming increasingly clear that tropospheric ozone concentrations reduce rice height, biomass and root activity.<sup>29</sup> There are wild plants that undoubtedly have the same sort of responses to ground level ozone, so in the setting of the secondary standard, this is directly germane. There is also a case to be made for its relevance to the primary standard. For example, the impact of ground level ozone in curtailing food crops is a very serious human health threat, as malnutrition leads to the weakened immune systems that in turn lead to widespread and chronic diseases across large numbers of largely poor persons and communities.

Second, another concern is the importance of O<sub>3</sub>/temperature interaction which can particularly affect perennial species, including trees and some agricultural crops by significantly reducing their frost hardiness.<sup>30</sup> Some more sensitive species are snowberry, aspen<sup>31</sup>, bridlewreath, lilac, and gambel oak.<sup>32</sup>

All of these issues and factors must be considered carefully, with the best available science, before any standards are set.

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<sup>26</sup> Agricultural Research Service, available at <http://www.ars.usda.gov/Main/docs.htm?docid=12462>, accessed March 2010.

<sup>27</sup> Agricultural Research Service, United States Department of Agriculture, citing The National Crop Loss Assessment Network, Heagle study, 1989, available at <http://www.ars.usda.gov/Main/docs.htm?docid=12462>, accessed March 2010.

<sup>28</sup> World Resources Institute, Keeping Options Alive: The Scientific Basis for the Conservation of Biodiversity, available at <http://www.wri.org/publication/content/8584>, accessed March 2010.

<sup>29</sup> See, e.g., Z. Chen, et al., Effects of Elevated Ozone on Growth and Yield of Field-grown Rice in Yangtze River Delta, China, Journal of Environmental Sciences, Chinese Academy of Sciences (2008), abstract available at [http://www.ncbi.nlm.nih.gov/pubmed/18595399?ordinalpos=1&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed\\_ResultsPanel.Pubmed\\_SingleItemSuppl.Pubmed\\_Discovery\\_RA&linkpos=1&log\\$=relatedarticles&logdbfrom=pubmed](http://www.ncbi.nlm.nih.gov/pubmed/18595399?ordinalpos=1&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_SingleItemSuppl.Pubmed_Discovery_RA&linkpos=1&log$=relatedarticles&logdbfrom=pubmed), accessed March 2010.

<sup>30</sup> Unsworth and Hogsett at 8.

<sup>31</sup> EPA and the Secretaries should consider the ecological effects of ozone and its constituent parts, such as their effect on both aspen and the microbes and fungi in the same ecosystem. See Rebecca L. Phillips, et al., *Microbial Community Composition and Function Beneath Temperate Trees Exposed to Elevated Atmospheric Carbon Dioxide and Ozone*, 131 *Oecologia* 236 – 44 (April 2002), available at <http://www.springerlink.com/content/jkp5w3v1h435den5/> accessed March 2010.

<sup>32</sup> Michael Treshow, Ozone Damage to Plants, 1 *Environmental Pollution* 155, 155 (1970), abstract available at [http://www.sciencedirect.com/science?\\_ob=ArticleURL&\\_udi=B75CG-48XVFVJ-67&\\_user=9038195&\\_coverDate=10%2F31%2F1970&\\_rdoc=1&\\_fmt=high&\\_orig=search&\\_sort=d&\\_docanchor=&\\_view=c&\\_searchStrId=1227938798&\\_rerunOrigin=google&\\_acct=C000050221&\\_version=1&\\_urlVersion=0&\\_u serid=9038195&\\_md5=20d7e5591359679a1096586da5ebcce1](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B75CG-48XVFVJ-67&_user=9038195&_coverDate=10%2F31%2F1970&_rdoc=1&_fmt=high&_orig=search&_sort=d&_docanchor=&_view=c&_searchStrId=1227938798&_rerunOrigin=google&_acct=C000050221&_version=1&_urlVersion=0&_u serid=9038195&_md5=20d7e5591359679a1096586da5ebcce1) accessed March 2010.

## Wildlife

Ozone at concentrations found in urban air pollution are known to have significant physiological effects on humans and other mammals.<sup>33</sup> Ozone levels in wilderness habitats downwind of urban sources can potentially have stressful physiological effects on wildlife.<sup>34</sup> As stated by Mautz and Dohm, “Defensive physiological and behavioral reactions to ozone exposure may interfere with routine activities, and oxidant air pollution may be in part responsible for observed wildlife population declines.”<sup>35</sup> For example, it is well documented that ozone exposure depresses feeding, voluntary movement and behavior in laboratory rodents. What little is known about these effects on amphibians is troubling, in light of the sensitivity of amphibians to numerous environmental and health stressors.<sup>36</sup> Current research suggests amphibian exposure to ozone depresses feeding activity<sup>37</sup> and can negatively affect their immune system function.<sup>38</sup> This further suggests a possible link between ozone and regional declines in amphibian populations. This information can help to form the biological assessment under the ESA and help to inform EPA’s decision about how to set the secondary standard under the CAA with regard to non-listed species.

## Climate Change

Finally, agricultural crops, grazing success, forests, fish and crucial ecosystems are all sensitive to climate change. Production from related agribusinesses will also be greatly affected.<sup>39</sup> Altered weather patterns can increase crop vulnerability to infection, pest infestations and weed proliferation.<sup>40</sup> Continued seasonal extremes can affect yields, while droughts followed by intense rains can reduce soil water absorption and increase flooding potential.<sup>41</sup>

1. **Agriculture** – Climate change is certain to affect food production by altering biophysical conditions.<sup>42</sup> The Intergovernmental Panel on Climate Change projects with “high confidence” that mainly semi-arid areas (including the western United States) will suffer a decrease in water resources due to sea-level rise and more-intense storms which lead to

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<sup>33</sup> See, e.g., William J. Mautz and Michael R. Dohm, Respiratory and Behavioral Effects of Ozone on a Lizard and a Frog, 136 *Comparative Biochemistry and Physiology - Part A: Molecular & Integrative Physiology* 371, 371-77, (Nov 2004), abstract available at <http://www.ncbi.nlm.nih.gov/pubmed/15556394>, accessed March 2010.

<sup>34</sup> Mautz and Dohm at 371.

<sup>35</sup> *Id.*

<sup>36</sup> Michael R. Dohm, et al., Ozone Exposure Affects Feeding and Locomotive Behavior of Adult *Bufo Marinus*, 5 *Environmental Toxicology and Chemistry* 1209-16 (May 2008), abstract available at <http://www.ncbi.nlm.nih.gov/pubmed/18419187>, accessed March 2010.

<sup>37</sup> Dohm, *Bufo Marinus* abstract.

<sup>38</sup> Michael R. Dohm, et al., Effects of Ozone Exposure on Nonspecific Phagocytic Capacity of Pulmonary Macrophages from an Amphibian, *Bufo Marinus*, 1 *Environmental Toxicology and Chemistry*, 205-10 (Jan. 2005), abstract available at <http://www.ncbi.nlm.nih.gov/pubmed/15683185>, accessed March 2010.

<sup>39</sup> Food and Agriculture Organizations of the United Nations, Climate Change and Food Security: A Framework Document at 27 (2008), available at <ftp://ftp.fao.org/docrep/fao/010/k2595e/k2595e00.pdf> accessed March 2010.

<sup>40</sup> Cynthia Rosenzweig, et al., *Climate Change and Extreme Weather Events: Implications for Food Production, Plant Diseases, and Pests*, 2 *Global Change & Human Health*, 90, 90 (2001).

<sup>41</sup> *Id.* at 91.

<sup>42</sup> Samuel S. Myers, *Global Environmental Change: The Threat to Human Health*, (Lisa Mastny and Robert Engelman, eds.) 181 *WorldWatch Report* (2009).

coastal flooding and inundation of fresh-water aquifers with salt water.<sup>43</sup> These dynamics will further limit already-constrained access to fresh water for irrigation. As Rosenweig, et al., describe the situation.<sup>44</sup>

The combination of long-term change (warmer average temperatures) and greater extremes (heat spells, droughts and floods) suggest that climate change could have negative impacts on U.S. agricultural production...Climate change projections include an increased likelihood of both floods and droughts. Variability of precipitation--in time, space, and intensity--will make U.S. agriculture increasingly unstable and make it more difficult for U.S. farmers to plan what crops to plant and when.

*Climate Change and U.S. Agriculture at v.*

- 2. Forests** – It is likely that changing temperature and precipitation patterns will produce a strong direct impact on both natural and modified forests.<sup>45</sup> Climate change impacts on forestry and a shift in types of production will translate into social and economic impacts through the relocation of forest economic activity.<sup>46</sup> Distributional effects will involve businesses, landowners, workers, consumers, governments, and tourism.<sup>47</sup>
- 3. Fish** – The climate change effect of warming waters and increasing acidification will have deleterious results for marine systems and the fisheries that depend on them. As explained by P. D. Noyes, et al.,<sup>48</sup>

[I]ncreases in the intensity and frequency of storm events linked to climate change could lead to more severe episodes of chemical contamination of water bodies and surrounding watersheds. Changes in salinity may affect aquatic organisms as an independent stressor as well as by altering the bioavailability and in some instances increasing the toxicity of chemicals.

*The Toxicology of Climate Change*, abstract.

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<sup>43</sup> Myers, *Global Environmental Change at 25*, citing IPCC, “Summary for Policymakers,” in S. Solomon et al., eds., *Climate Change 2007: The Physical Science Basis Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*

(Cambridge, UK: Cambridge University Press, 2007); IPCC, *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group 2* (New York: IPCC, 2007).

<sup>44</sup> Cynthia Rosenzweig, et al., *Climate Change and Extreme Weather Events* at 90.

<sup>45</sup> Andrei P. Kirilenko and Roger A. Sedjo, *Climate Change Impacts on Forestry*, 104 *Proceedings of the National Academy of Sciences* (Dec 2007), abstract available at <http://www.pnas.org/content/104/50/19697.long>, accessed March 2010.

<sup>46</sup> *Id.*

<sup>47</sup> *Id.*

<sup>48</sup> P. D. Noyes et al., *The Toxicology of Climate Change: Environmental Contaminants in a Warming World*, 35 *Environment International* 971-86 (Aug 2009) abstract available at <http://www.ncbi.nlm.nih.gov/pubmed/19375165>, accessed March 2010.

Further, rising sea-surface temperatures and increased application and runoff of fertilizers cause such nutrient enrichment of waterways that harmful algae blooms result. These in turn can lead to massive fish kills, shellfish poisonings, disease and death of marine mammals, and human illness and mortality.<sup>49</sup>

- 4. Other Ecosystem Effects** - An explanation of climate change's effects on ecosystems is well stated by P. D. Noyes, et al.:

There is also compelling evidence that increasing temperatures could be deleterious to pollutant-exposed wildlife. For example, elevated water temperatures may alter the biotransformation of contaminants to more bioactive metabolites and impair homeostasis. The complex interactions between climate change and pollutants may be particularly problematic for species living at the edge of their physiological tolerance range where acclimation capacity may be limited.... A paramount issue will be to identify species and populations especially vulnerable to climate-pollutant interactions, in the context of the many other physical, chemical, and biological stressors that will be altered with climate change.

*The Toxicology of Climate Change*, abstract.

This trend will reduce the capacity of these systems to adapt to and to mitigate both ozone itself and climate change attributable to its precursors. These trends must be considered when setting today's standards.<sup>50</sup>

Further, an equally important factor is the rapid advance in recent years of new technology, which should be considered as EPA sets standards. These include: industrial and commercial and building efficiency; renewable energy and smart grid technologies; hybrid and electric cars, and airplane and ship fuel efficiency in design and operation. Moreover, these are likely to be multiplied by the tax and other incentives being offered today. Finally, the President's October 5<sup>th</sup> 2009 Executive Order on Energy and Climate may well result in further ozone reductions through the actions of DOT and other agencies.

As a consequences of these developments, lower ambient standards are very likely achievable. They should be sought at the outset, at regular intervals reevaluated, and be required by rule.

## CONCLUSION

In closing, SCB strongly urges EPA to consult with the Secretaries before promulgating either standard even though a primary standard at or below 0.060 ppm would make progress toward an ozone standard that is both biologically appropriate and practical to meet. Second, we urge you

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<sup>49</sup> Samuel S. Myers, *Global Environmental Change: The Threat to Human Health*, (Lisa Mastny and Robert Engelman, eds.) 181 *WorldWatch Report* (2009).

<sup>50</sup> SCB Climate Policy Principles, and their supporting documents, as cited above, November 2009.

to present additional options on the secondary standard in consultations under the ESA and adjust them as warranted using a precautionary approach.

This rulemaking is an opportunity for the EPA to set federal ozone standards that also contribute to addressing climate change. This action can mitigate climate change and significantly improve the health of humans and most other living things, directly and indirectly.

Please inform us by registered mail or similar correspondence of the time and manner of your initiating consultation with the Secretaries under the ESA. Such consultation will allow the agencies with additional expertise in listed species to work with the EPA to potentially improve the standards and ensure that all parties involved will have the full protection of the law as informed by the best available science.

Thank you for considering our comments.

Sincerely,

John M. Fitzgerald, J.D., Policy Director  
Society for Conservation Biology

Carlos Carroll, Ph.D., Chairman  
Policy Committee  
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Society for Conservation Biology

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