



**VIA EMAIL TO:** [research-plan-summary@usgcrp.gov](mailto:research-plan-summary@usgcrp.gov)

February 26, 2008

Dr. Patricia Jellison  
Climate Change Science Program Office  
1717 Pennsylvania Avenue NW  
Suite 250  
Washington, D.C. 20006

**Re: Comments on the Summary of Revised Research Plan for the U.S. Climate Change Science Program**

Dear Dr. Jellison,

Thank you for the opportunity to submit comments on the Summary of Revised Research Plan for the U.S. Climate Change Science Program (“Research Plan”). These comments are submitted on behalf of the Center for Biological Diversity, a non-profit organization with over 40,000 members across the nation that works through science, law, and creative media to secure a future for all species, great or small, hovering on the brink of extinction. Per the instructions at <http://www.climatescience.gov/Library/stratplan2008/summary/pc-instructions-revplan-dec2007.htm>, our comments are as follows.

**I. Background Information**

**Name(s):** Shaye Wolf, Ph.D.  
**Organization(s):** Center for Biological Diversity  
**Mailing Address(es):** 1095 Market Street, Suite 511, San Francisco, CA 94103  
**Phone(s):** 415-436-9682 ext 301  
**Fax(es):** 415-436-9683  
**E-mail(s):** [swolf@biologicaldiversity.org](mailto:swolf@biologicaldiversity.org)  
**Area of Expertise:** Ecology, Biodiversity Conservation, Oceanography, Remote Sensing

**Name(s):** Kassie Siegel  
**Organization(s):** Center for Biological Diversity  
**Mailing Address(es):** P.O. Box 549, Joshua Tree, CA 92252  
**Phone(s):** 760-366-2232 x302  
**Fax(es):** 760-366-2669  
**E-mail(s):** [ksiegel@biologicaldiversity.org](mailto:ksiegel@biologicaldiversity.org)  
**Area of Expertise:** Environmental Law, Climate Change, and Endangered Species

*Tucson • Phoenix • San Francisco • San Diego • Los Angeles • Joshua Tree • Silver City • Portland • Washington, DC*

## **II. Comments**

**General Comment:** The Summary of the Revised Research Plan is extremely brief and general. A more detailed and thorough summary would allow commenters to provide more detailed and more helpful feedback.

Shaye Wolf and Kassie Siegel, Center for Biological Diversity

**Introduction, Page 1, Lines 9-34:** The Global Change Research Act of 1990 (“GCRA”) requires the Climate Change Science Program (“CCSP”) to prepare, and submit to Congress, not less frequently than every 3 years, a Research Plan that “shall contain recommendations for national global change research” and shall establish “the goals and priorities for Federal global change research which most effectively advance scientific understanding of global change and provide usable information on which to base policy decisions related to global change.” 15 U.S.C. § 2934. In addition, the CCSP must prepare, not less frequently than every 4 years, a Scientific Assessment which: (1) integrates, evaluates, and interprets the findings of the Program and discusses the scientific uncertainties associated with such findings; (2) analyzes the effects of global change on the natural environment, agriculture, energy production and use, land and water resources, transportation, human health and welfare, human social systems, and biological diversity; and (3) analyzes current trends in global change, both human-[induced] and natural, and projects major trends for the subsequent 25 to 100 years. 15 U.S.C. § 2936. This Scientific Assessment is to be used by “all Federal agencies and departments” in “responding to human-induced and natural processes of global change pursuant to other statutory responsibilities.” 15 U.S.C. § 2938(b)(2).

Concerned that the CCSP had failed to meet either deadline, the Center for Biological Diversity, Greenpeace, and Friends of the Earth filed suit on November 14, 2006 to compel the CCSP to comply with these critically important statutory obligations. On August 21, 2007, Judge Sandra Armstrong issued an Order in Center for Biological Diversity, et al. v. Brennan, et al., C. 06-7062 (SBA) (N. Dist. Cal.) requiring the CCSP publish the summary of the revised proposed Research Plan in the Federal Register no later than March 1, 2008, and to submit the proposed Research Plan itself to Congress no later than 90 days thereafter. We commend the CCSP for publishing the revised summary of the proposed Research Plan in the Federal Register in advance of the March 1, 2008 Court-ordered deadline. The public, however, should be notified of the existing Court-ordered deadlines, both as they relate to the Research Plan and as to the Scientific Assessment, which must be completed by May 31, 2008 under the same Court Order.

The CCSP has stated that it intends to meet its Scientific Assessment obligations via the issuance of 21 separate reports. As we have commented previously, while the production of 21 Assessment Products, if done well, is no doubt of great scientific value, these Products cannot substitute for a single, coherent, accessible, and updated Scientific Assessment that can be used by agencies and decisionmakers in the innumerable decisions that implicate mitigation of and adaptation to climate change in the United States. For these reasons we urge the CCSP enshrine in the Research Plan the intent to produce a single, coherent, and usable Scientific Assessment by May 31, 2007, as required by the statute and the Court’s August 21, 2007 Order.

Shaye Wolf and Kassie Siegel, Center for Biological Diversity

**Emerging Priorities, Page 5, Line 12:** While “ocean acidification and its consequences” is included in this section on a list of emerging priorities, the Research Plan fails to explicitly include ocean acidification at any point in the Research and Programmatic Plans section. Ocean acidification is one of the most significant threats to marine ecosystems. As ocean waters absorb anthropogenic carbon dioxide emissions, the acidity of these waters increases, and the availability of carbonate ions for calcifying, or shell-building organisms, decreases. Ocean pH is now changing more rapidly than it has in 650,000 years. If anthropogenic greenhouse gas emissions continue unabated, at some point in the future organisms such as clams, mussels, oysters, starfish, lobsters, and perhaps most importantly, phytoplankton and zooplankton at the base of the foodchain, will become unable to build or maintain shells, with potentially catastrophic consequences. The Earth’s oceans cover over 70% of its surface, submerging the planet’s tallest mountains and deepest valleys, and supporting the majority of all life on earth. The Research Plan should place a far greater emphasis on ocean acidification.

Shaye Wolf and Kassie Siegel, Center for Biological Diversity

**Research and Programmatic Plans, Page 7, Lines 6-8:** The CCSP states that “[i]n the four years since the release of the Strategic Plan, investment in and progress towards CCSP Goals 1 through 3 has been greater than that for Goals 4 and 5.” This is a great understatement. As we have commented previously, the CCSP since 2000 has focused on basic science to the near exclusion of mitigation and policy concerns. In other words, the CCSP under the Bush administration is funding climate change research, but not funding steps to actually address the problem. It is not just simply common sense that the CCSP should focus more on mitigation in the Research Plan: the CCSP has a statutory obligation to do so.

The Research Plan must contain recommendations for collaboration within the Federal Government and among nations to (1) establish, develop, and maintain information bases, including necessary management systems which will promote consistent, efficient, and compatible transfer and use of data; (2) create globally accessible formats for data collected by various international sources; and (3) combine and interpret data from various sources to produce information readily usable by policy makers attempting to formulate effective strategies for preventing, mitigating, and adapting to the effects of global change. 15 U.S.C. § 2934(d) (emphasis added).

The Bush administration has opposed mandatory greenhouse pollution controls for the past seven years. It is apparent that the politics of this opposition have impacted the CCSP’s Research Plan because it lacks any emphasis on actually helping policy makers formulate effective strategies for preventing, mitigating, and adapting to climate change as required by the GCRA. The CCSP must revise the Research Plan to ensure that more is done in this regard. Specific suggestions for doing so are included in the relevant sections below.

Shaye Wolf and Kassie Siegel, Center for Biological Diversity

**Research and Programmatic Plans, Page 8, Lines 36-39:** One of the most important tasks of the CCSP is, as stated here, to “improve methods to integrate our understanding of potential effects of different atmospheric concentrations of greenhouse gases and to develop methods for aggregating and comparing potential impacts across different sectors and settings.” One of the primary reasons this task is so important is that it will inform both mitigation strategies, e.g., the regulation of greenhouse pollutants, and adaptation strategies, e.g. changes in agency management of protected public lands. The Research Plan should make this link explicit, and give greater emphasis to this critically important task.

Shaye Wolf and Kassie Siegel, Center for Biological Diversity

**Research and Programmatic Plans, Page 9, Lines 10-12:** While it is certainly important to understand “carbon cycling and climate change in high latitude regions,” because, as the CCSP admits, “these regions are among the most rapidly-changing areas of the planet,” the CCSP should place a greater emphasis on helping decision makers select policies to slow the rate of change in the Arctic and Antarctic. As demonstrated by the record low minimum Arctic summer sea ice extent in September, 2007, the situation in the Arctic has reached a critical threshold. The CCSP must place greater emphasis on polar research that addresses important policy-relevant data gaps or that directly addresses measures to prevent or delay the onset of a seasonally ice-free Arctic.

Shaye Wolf and Kassie Siegel, Center for Biological Diversity

**Research and Programmatic Plans, Page 9, Lines 22-24 and Page 10, Line 48 to Page 11, Line 12:** We applaud the CCSP for deciding, albeit belatedly, to place “an increased emphasis on the development of an early warning system for the possibility of abrupt climate change to assist managers and decision-makers in planning for seas level rise and other potential rapid changes...” In implementing this task, the CCSP should be mindful of the fact that certainly with regard to Arctic sea ice cover, rapid climate change is already upon us. The CCSP should focus on ways to slow and then reverse ongoing rapid changes, as well as ways to avoid other extreme and catastrophic events. The CCSP has both a moral and statutory obligation to do much more in this regard. To blithely state that the CCSP will now to turn its attention to the “possibility of abrupt climate change,” when such change is already being manifested in the Arctic sea ice melt, is to greatly understate the nature and scale of the problem.

Shaye Wolf and Kassie Siegel, Center for Biological Diversity

**Research and Programmatic Plans, Page 10, Lines 4-17:** Black carbon, or soot, is one of the most important greenhouse pollutants, particularly in the Arctic. Because black carbon has both a high warming impact and a short atmospheric lifetime, controlling black carbon presents a critically important mitigation opportunity, especially for the Arctic. The Research Plan currently discusses aerosols generally, but does treat black carbon with any specificity. Much greater emphasis should be placed on black carbon. On November 5-7, 2007, the Norwegian Institute for Air Research hosted a second in a series of Short-lived Pollutants and Arctic Climate Workshops (<http://niflheim.nilu.no/spac>). The first was held January 8-9, 2007 at NASA's Goddard Institute for Space Sciences (GISS) in New York

(<http://www.giss.nasa.gov/meetings/arctic2007/>). The portion of the summary from the second workshop pertaining to black carbon makes it clear that the science clearly supports implementation of a northern hemisphere black carbon reduction strategy with an emphasis on reducing black carbon from sources that deposit in the Arctic particularly in the winter and spring, as a mitigation strategy (<http://niflheim.nilu.no/spac/nilu-workshop/summary/wednesday-wrapup/>). The summary also recommends that priority be placed on the following research needs:

#### Short term research projects

- Source region, sector, and season specific recommendations for the optimal reductions in emissions of short-lived pollutants can be made within two years where they are not already known. Determine the effect of individual mitigation strategies on Arctic climate.
- Identify the impact of short-lived pollutants on the Arctic cryosphere particularly in regions where melting has been most dramatic.
- Determine and account for the post-deposition lifetime of black carbon on multi-year Arctic snow and ice and the impact on melting.
- Determine the global and Arctic-specific boreal forest fire climate impacts.
- Assess the role of short-lived pollutants in the early 20th century high-latitude warming period.
- Assess arctic climate impacts from short-lived pollutant emissions associated with increased shipping activity and resource exploitation within the Arctic.
- Assess the relative role of the short-lived pollutants and the associated impacts (including clouds) on the Arctic surface heat budget.

#### Long term research projects

- Evaluate potential Arctic climate feedbacks from increased Arctic warming and melting, focusing on processes that effect short lived pollutants (e.g., wetlands emissions and cloud changes)
- Assess the role of short-lived pollutants on the dynamics and accelerated mass loss of the Greenland ice sheet and Arctic glaciers.

These topics should be incorporated into the Research Plan.

Shaye Wolf and Kassie Siegel, Center for Biological Diversity

**Research and Programmatic Plans, Page 11, Lines 14-28:** Either in the ecological forecasting initiative or elsewhere as appropriate, the CCSP should incorporate the knowledge gaps and research priorities identified by the IPCC in Working Group II of the Fourth Assessment Report:

#### **Uncertainties:**

- inadequate representation of the interactive coupling between ecosystems and the climate system and, furthermore, of the multiple interacting drivers of global change. This prevents a fully integrated assessment of climate change impacts on ecosystem services;

- major biotic feedbacks to the climate system, especially through trace gases from soils in all ecosystems, and methane from labile carbon stocks such as wetlands, peatlands, permafrost and yedoma;
- how aggregation within current DGVMs with respect to the functional role of individual species and the assumption of their instantaneous migration biases impact estimates;
- the net result of changing disturbance regimes (especially through fire, insects and land-use change) on biotic feedbacks to the atmosphere, ecosystem structure, function, biodiversity and ecosystem services;
- the magnitude of the CO<sub>2</sub>-fertilisation effect in the terrestrial biosphere and its components over time;
- the limitations of climate envelope models used to project responses of individual species to climate changes, and for deriving estimations of species extinction risks;
- the synergistic role of invasive alien species in both biodiversity and ecosystem functioning;
- the effect of increasing surface ocean CO<sub>2</sub> and declining pH on marine productivity, biodiversity, biogeochemistry and ecosystem functioning;
- the impacts of interactions between climate change and changes in human use and management of ecosystems as well as other drivers of global environmental change.

### **Research priorities:**

- Identify key vulnerabilities in *permafrost–soil–vegetation interactions* at high latitudes, and their potential feedback to the biosphere trace-gas composition. Recent estimates suggest that terrestrial permafrost contains more than 1,000 PgC, which is increasingly emitting CO<sub>2</sub> and more importantly, methane (e.g., Walter et al., 2006; Zimov et al., 2006). The implications of this for abrupt and significant climate forcing are significant (e.g., Schellnhuber, 2002; iLEAPS, 2005; Symon et al., 2005, p. 1015; Lelieveld, 2006; Zimov et al., 2006).
- More robust modelling of interactions between biota and their geophysical environment using several independently developed DGVMs and Earth-system models. Validation (Price et al., 2001) beyond model intercomparisons is required, especially also with respect to the methane cycle. The goal should be to narrow uncertainties relating to the vulnerability of the carbon sequestration potential of ecosystems including more realistic estimates of lagged and threshold responses (e.g., Scheffer et al., 2001; iLEAPS, 2005).
- More emphasis on precipitation projections (e.g., Handel and Risbey, 1992) and resulting *water regime* effects. These should emphasise interactions between vegetation and atmosphere, including CO<sub>2</sub>-fertilisation effects, in mature forests in the Northern Hemisphere, seasonal tropical forests, and arid or semi-arid grassland and savannas (e.g., Jasienski

et al., 1998; Karnosky, 2003).

- Improved understanding of the role of *disturbance regimes*, i.e., frequency and intensity of episodic events (drought, fire, insect outbreaks, diseases, floods and wind-storms) and that of alien species invasions, as they interact with ecosystem responses to climate change itself and pollution (e.g., Osmond et al., 2004; Opdam and Wascher, 2004).
- Development of integrated *large spatial-scale remote sensing with long-term field studies* (May, 1999b; Krüger et al., 2000; Morgan et al., 2001b; Osmond et al., 2004; Opdam and Wascher, 2004; Symon et al., 2005, p. 1019) to better address scale mismatches between the climate system and ecosystems (Root and Schneider, 1995).
- Studies on impacts of rising atmospheric CO<sub>2</sub> on *ocean acidification*, and warming on coral reefs and other marine systems (Coles and Brown, 2003; Anonymous, 2004), and widening the range of terrestrial ecosystems for which CO<sub>2</sub>- fertilisation responses have been quantified (e.g., Bond et al., 2003).
- Validating species-specific *climate envelope models* by testing model projections against the plethora of range shifts observed in nature (e.g., Walther et al., 2001; Chapter 1).
- Advances in understanding the relationship between *biodiversity* and the *resilience* of ecosystem services at a scale relevant to human well-being, to quote Sir Robert May (1999a): “The relatively rudimentary state of ecological science prevents us from making reliable predictions about how much biological diversity we can lose before natural systems collapse and deprive us of services upon which we depend.”
- Improve identification of environmental key factors influencing ecosystem structures that determine functionality and provisioning services of ecosystems together with quantitative information on *economic impacts* (including implications for adaptation costs – Toman, 1998a; Winnett, 1998; Kremen, 2005; Symon et al., 2005, e.g., p. 1019).
- *Integrative vulnerability* studies on adaptive management responses to preserve biodiversity (including conservation and reservation management) and ecosystem services in relation to pressures from land-use change and climate change (Kappelle et al., 1999; Lorenzoni et al., 2005; Stenseth and Hurrell, 2005; Symon et al., 2005).

(Above from Fischlin, A., G.F. Midgley, J.T. Price, R. Leemans, B. Gopal, C. Turley, M.D.A. Rounsevell, O.P. Dube, J. Tarazona, A.A. Velichko, 2007: Ecosystems, their properties, goods, and services. *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, 211-272:249.)

Shaye Wolf and Kassie Siegel, Center for Biological Diversity

Thank you for the opportunity to comment on the Summary of the Research Plan. If you have any questions about the comments submitted below, please do not hesitate to contact Kassie Siegel at (760) 366-2232 x302, or [ksiegel@biologicaldiversity.org](mailto:ksiegel@biologicaldiversity.org), or Dr. Shaye Wolf at (415) 436-9682 x 301 or [swolf@biologicaldiversity.org](mailto:swolf@biologicaldiversity.org).

Sincerely,



Shaye Wolf, Ph.D.  
Center for Biological Diversity  
(415) 436-9682 ext 301



Kassie Siegel, Director  
Climate, Air, and Energy Program  
Center for Biological Diversity  
(760) 366-2232 ext 302