# U.S. National Climate Assessment
## Climate Scenario Review

**Climate of Alaska**

Brooke C. Stewart, John E. Walsh, Kenneth E. Kunkel, Laura E. Stevens, and Scott E. Stevens

Please return your review by e-mail to Bill Emanuel at wemanuel@usgcrp.gov no later than February 10, 2012.

Please comment on the following general items:

**Does the document address relevant features of the climate of the region?**
The document does a very good job of addressing the relevant features of the climate of the region, except perhaps for historical changes in growing season length. I think it would be useful to have an analysis of historical changes in growing season length, thaw date, and freeze-up in the climate trends section that starts on page 6. This would provide a nice "baseline" for the projected trends in these variables that is presented on page 24 and in Figures 17-19.

**Does the document incorporate the best information available?**
For the most part, but the statements about changes in fire regime on page 9 are not based on recently published syntheses (see my specific comments below).

**Are data and information presented in an accurate and clear manner?**
In general yes, except for the statements related to fire regime on page 9.

**Please provide detailed comments with reference to specific page numbers and paragraphs, figures, or tables.**

Line 38: Delete the first "the" in the sentence?

Line 115: Change "result in" to "have resulted in", as this phenomenon has largely ceased since the mid to late 1990s.

Line 169-170: I'm don't think that Shulski and Wendler (2007) is the most appropriate reference for vulnerability to wildfire. Perhaps cite Kasischke et al. (2010) in this context: Kasischke, E.S., D. Verbyla, T.S. Rupp, A.D. McGuire, K.A. Murphy, J.L. Allen, E.E. Hoy, R. Jandt, P. Duffy, M. Calef, and M.R. Turetsky. 2010. Alaska's changing fire regime – Implications for the vulnerability of its boreal forests. *Canadian Journal of Forest Research* 40:1313-1324. doi:10.1139/X10-098.

Line 263: It is not clear to me what you mean by "three of the most severe fire years". A suggested change to the sentence that starts on this line is: "During the 2000s, an average of 767 000 ha!year–1 burned in interior Alaska (17% of the landscape), which is 50% higher than in any previous decade since the 1940s (Kasischke et al. 2010)."

Lines 264 through 267: I'm not sure I agree that warmer springs and a lengthening of the growing season were responsible for the large fires of the 2000s. First of all, were the springs in the 2000s substantially earlier than the springs of the 1990s? I haven't seen any evidence of this. In fact, my casual observation is that the autumns in the 2000s were extended in interior Alaska in comparison with the 1990s, but that the springs were not earlier in the 2000s than in the 1990s. Also, I don't agree with the suggestion that "the springtime vegetative growth and fuel supply" associated with a lengthening growing season plays much of a role in large fire years. The key thing that causes an outbreak of fires is a blocking high that lasts longer than 10 days and substantially dries out the soil. The large fire years occur when these conditions happen, lots of fires get started, and the rains don't arrive to put out the fires. It is the amount of area burned later in the summer that has increased over the last several decades, not the amount of area burned early in the season. Besides the lack of rain, it is also thought that deeper active layers allow fires to persist in the organic horizons of black spruce forests. See Kasischke et al. (2010).

Lines 271-274: I don't agree with these last two sentences. Also, don't know how the content of the last sentence can be attributed to Balshi et al. (2009). I looked through Balshi et al., and lightning/thunderstorm activity was never mentioned. In fact, Kasischke et al. (2010) state in their abstract that "Over the past 60 years, there was a decrease in the number of lightning-ignited fires, an increase in extreme lightning-ignited fire events, an increase in human-ignited fires, and a decrease in the number of extreme human-ignited fire events." If the growing season has lengthened over the last 60 years, then the conclusion of Kasischke et al. (2010) is at odds with the last sentence of this paragraph.

Line 602: This line states "2000-2009", but Figure 22 states "2000-2006". Please reconcile.

Line 603: I did not understand the reference to Fig. 19 in this line, as Fig. 19 was compiled for 15 models. Do you mean Fig. 10, which was compiled for 5 models?

Line 683: It would be good to cite Larsen et al. (2009) in this sentence: Larsen, P.H., S. Goldsmith, O. Smith, M.L. Wilson, K. Strzepek, P. Chinowsky, and B. Saylor, 2008: Estimating future costs for Alaska public infrastructure at risk from climate change. *Global Environmental Change*, **18(3)**, 442-457.

**Please provide any additional suggestions or recommendations.**
The information on recent decadal-scale changes about growing season length in Alaska have been somewhat confusing and not clearly stated. It would be really helpful to have spatial maps of historical changes in growing season length, spring thaw, and fall freeze as well as decadal

scale spatially averaged plots of the variables for specific regions of the state. My experience is that more and more people are incorrectly representing these changes based on some early incomplete analyses.