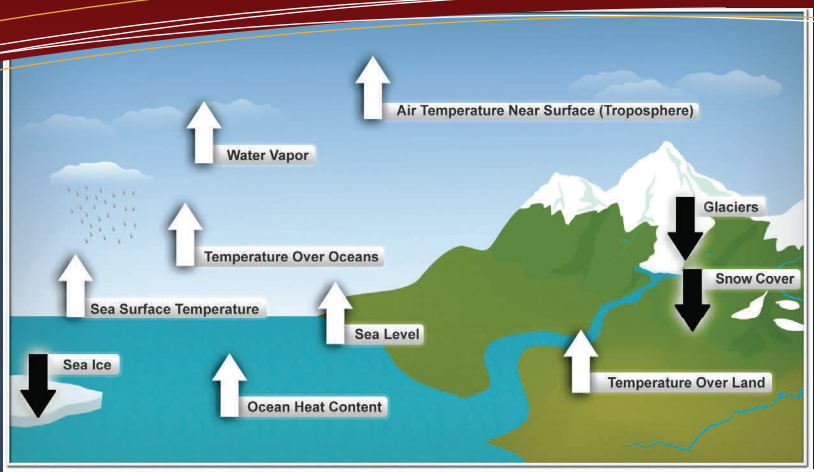
Alaska Fire Science Consortium

Webinar Summary **March 6, 2013**



Ten indicators of a warming world. Figure from the draft NCA report.

Methane:

Did you know that CH_4 is 25 times more potent than CO_2 in inducing atmospheric warming?

Webinar Presenters:

John Walsh, International Arctic Research Center, UAF

Sarah Trainor, Alaska Center for Climate Assessment and Policy, UAF

This webinar summarized climate changes observed and predicted in Alaska and across the U.S. in a draft report released by the National Climate Assessment and Development Advisory Committee. View the webinar at ACCAP's webinar archive site: http://ine.uaf.edu/accap/telecon_archive.htm

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Alaska Climate Webinar: National Climate Assessment, Alaska Chapter

Has the climate really changed as much as predictions a decade ago foretold?[1] The bottom line: according to UAF climate scientist John Walsh, "Global climate . . . change is apparent across a wide range of observations. Much of the climate change of the past 50 years is primarily due to human activities." He pointed out that a consistent pattern of change is emerging, so that the direction and trends of temperature, precipitation, sea-ice extent, etc. can be forecast with greater confidence. The National Climate Assessment (NCA) draft report, now available for comment until April 12, 2013, summarizes climate observations as well as the latest predictions for the U.S.[2] A big unknown is the amount of greenhouse gas, especially CO_2 and methane (CH_4), that will be emitted in the coming decades. Scientists made projections for a best-case low emissions scenario, where humans reduce their production of greenhouse gases by 70%, and for scenarios that keep the status quo of emissions increasing with global population growth.

Temperature rising

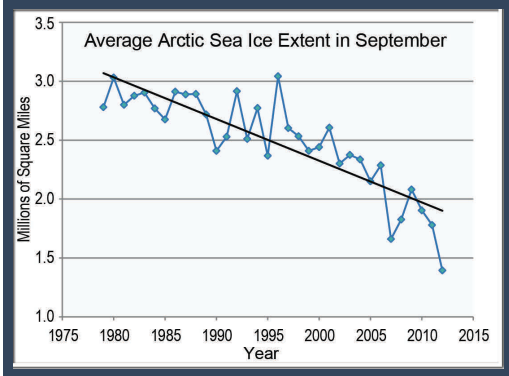
Since 1985, the U.S. has warmed 1.5°F overall, while Alaska warmed 2°F. More dramatic, and important to fire managers, are the longer growing seasons—up by 18–21 days in the western U.S. since 1900 and perhaps by 30 days in parts of Alaska, although few 100-year weather records are available for the state. Interestingly, site variability is high, even in the greater Fairbanks area. UAF forest scientist Glenn Juday found the growing season was a month longer near Ester, but was unchanged at a recording station by North Pole.

The dry get drier and the wet get wetter

What about precipitation? Will that offset the effect of warmer temperatures with respect to forest fire risk? It's true that models call for increased precipitation in Alaska (10–20% more annually), especially in winter. However, greater snowpack does not appear to reduce summer fire risk in Alaska's interior[3]. Any moderating effect of increased summer rainfall on fire risk would likely be negated by higher rates of effective

Warmer but wetter: what does it mean for fire?

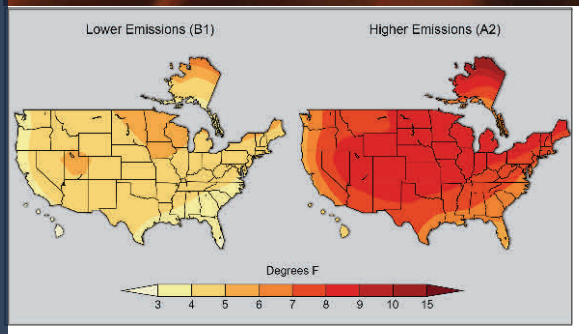
Even with more snow/rain events, boreal forest fuels will dry more rapidly over longer, warmer summer seasons. Deeper active layers will allow subsurface drainage, resulting in drier duff layers.



National Snow and Ice Data Center figure.

Observed Arctic Sea-Ice Decline:

Exceeds the predicted rate of decline and may even disappear in summer by 2050. Curiously, seasonal ice extent in the Bering Sea has increased in the past decade[5].



Projected surface air temperature warming. Change in average surface air temperature by 2070–2099 under scenarios that assumes substantial (B1, left) or no reductions in global emissions (A2, right). Figure from draft NCA report.

- Warmer temperatures
- Longer growing season
- Increased precipitation: events may be larger
- Degrading permafrost
- Sea-ice retreating rapidly
- Fire season earlier and longer

drying and evapo-transpiration with warmer temperatures.

Fire and Ice: Are they related?

Permafrost temperatures are very sensitive to snowpack, which insulates the ground. But warmer temperatures combined with longer snow-free seasons are slowly thawing permafrost, which will result in landscape drying as meltwater runs off. Although deeper active layers would benefit plant growth, increases in forest productivity are offset by drying. In fact, a recent study has shown browning of the Normalized Difference Vegetation Index in portions of the interior boreal forest[4]. Thawing permafrost also releases CH_4—a powerful greenhouse gas. Sea-ice is disappearing even more rapidly, with the no-change rate of emission model predicting an ice-free Arctic Ocean in the summer by 2050. The effect of warm open water vs. cool, reflective ice has a dramatic effect on inland temperatures[6]. This effect has already been felt on Alaska's North Slope, in the form of new record high temperatures, thunderstorms, and late-summer fire activity.

In conclusion:

The combinations of climate change factors are expected to bring Alaska an earlier and longer fire season and more intense fires. The annual area burned is predicted to double by 2050. Managers now need to know where and when to expect the most dramatic changes to plan strategies for resource management and protection.

Watch the recorded webinar, download the slide show, or the draft report at ACCAP's website:

http://ine.uaf.edu/accap/telecon_archive.htm

Literature cited:

1. IPCC. 2007. Climate Change 2007: Physical Science Basis. Cambridge Univ Press.
2. Walsh, J, and D Wuebbles. (Jan. 2013) Chapter 2 draft v.1.1– Our Changing Climate in 3rd NCA Report, pp 25-103.
3. Butteri, M. 2005 (unpublished). Technical Fire Management 19: 34 pp.
4. Baird, RA, D Verbyla and TN Hollingsworth. 2012. Can J ForRes 42:1371-1382.
5. ACCAP Alaska Climate Dispatch, March 2013.

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