TACCIMO
Template for Assessing Climate Change Impacts and Management Options

TACCIMO Literature Report

Literature Report - Annotated Bibliography Format

Report Date: September 03, 2013

Content Selections

Plant Communities

Alpine & Boreal Forests

R1: Northern

Temperate Forests

R1: Northern

How to cite the information containted within this report

Each source found within the TACICMO literature report should be cited individually. APA 6th edition formatted citations are given for each source. The use of TACCIMO may be recognized using the following acknowledgement:

"We acknowledge the Template for Assessing Climate Change Impacts and Management Options (TACCIMO) for its role in making available their database of climate change science. Support of this database is provided by the Eastern Forest Environmental Threat Assessment Center, USDA Forest Service."

Best available scientific information justification

Content in this Literature report is based on peer reviewed literature available and reviewed as of the date of this report. The inclusion of information in TACCIMO is performed following documented methods and criteria designed to ensure scientific credibility. This information reflects a comprehensive literature review process concentrating on focal resources within the geographic areas of interest.

Suggested next steps

TACCIMO provides information to support the initial phase of a more comprehensive and rigorous evaluation of climate change within a broader science assessment and decision support framework. Possible next steps include:

1. Highlighting key sources and excerpts
2. Reviewing primary sources where needed
3. Consulting with local experts
4. Summarizing excerpts within a broader context

More information can be found in the user guide. The section entitled Content Guidance provides a detailed explanation of the purpose, strengths, limitations, and intended applications of the provided information.

Where this document goes

The TACCIMO literature report may be appropriate as an appendix to the main document or may simply be included in the administrative record.

Brief content methods

Content in the Literature Reports is the product of a rigorous literature review process focused on cataloguing sources describing the effects of climate change on natural resources and adaptive management options to use in the face of climate change. Excerpts are selected from the body of the source papers to capture key points, focusing on the results and discussions sections and those results that are most pertinent to land managers and natural resource planners. Both primary effects (e.g., increasing temperatures and changing precipitation patterns) and secondary effects (e.g., impacts of high temperatures on biological communities) are considered. Guidelines and other background information are documented in the user guide. The section entitled Content Production System fully explains methods and criteria for the inclusion of content in TACCIMO.

Resource Area (Factor): Plant Communities

Alpine & Boreal Forests

R1: Northern

Crookston, N. L., Rehfeldt, G. E., Dixon, G. E., & Weiskittel, A. R. (2010). Addressing climate change in the forest vegetation simulator to assess impacts on landscape forest dynamics. Forest Ecology and Management, 260, 1198-1211.

"Fig. 9 shows that Abies grandis should be only mildly affected by climate change except for one of the scenarios (HADCM3 B2), which shows it to nearly die out. All scenarios predict less total basal area in a changed climate than for the base run. Projections for Abies lasiocarpa suggest that suitability of climate should deteriorate sharply by about 2070 according to four scenarios, but all scenarios predict much less basal area than the base case. Basal area of Pinus contorta would also decline greatly while that for Picea engelmanni is projected to be highly variable. Pseudotsuga menziesii, however, would thrive under all scenarios, particularly for the GFDLCM21 A2 climate, under which growth should be better than in the base case."

Hall, M. H. P. & Fagre, D. B. (2003). Modeled climate-induced glacier change in Glacier National Park, 1850-2100. BioScience, 53(2), 131 – 140.

"The model [VEGPRED (a companion model written to analyze current vegetation distribution along gradients of summer mean temperature and soil moisture)] predicts that vegetation will move up the mountain [in Glacier National Park, Montana] and increase in area from 30.70 km2 in 1980 to 44.72 km2 in the linear temperature–extrapolation scenario and to 50.77 km2 in the carbon dioxide–doubling scenario. The pattern is more varied than we hypothesized, however. Rather than predicting clear bands of vegetation progressing altitudinally, the model predicts considerable spatial variation in the distributions. This reflects, in particular, the variation in soil moisture resulting from the different solar exposure of various facets of the terrain."

Klasner, F. L. & Fagre, D. B. (2002). A half century of change in alpine treeline patterns at Glacier National Park, Montana, U.S.A. Arctic, Antarctic, and Alpine Research, 34 (1), 49 – 56.

"The observed 3.4% increase in area of trees [from examining sequential aerial photography] over a 46-yr (1945-1991) period in our study area [the McDonald Creek drainage of Glacier National Park, Montana] occurred in specific locations with identifiable characteristics. Each study site incorporated a gradient of vegetation, from alpine tundra to krummholz or patch-forest. Change occurred in areas with previously existing krummholz or patch-forest and the rate of change was greatest immediately surrounding existing patches. The spatial patterns resulting from increases in tree area produced a more abrupt transition from treeline to alpine tundra in Glacier National Park, without producing a noticeable shift in treeline position. This could result from altered microclimate and soil characteristics, because patches of trees create favorable conditions for tree growth and establishment in their immediate vicinity (Billings, 1974; Tranquillini, 1979; Stevens and Fox, 1991).
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Temperate Forests

R1: Northern

Beaubien, E., & Hamann, A. (2011). Spring Flowering Response to Climate Change between 1936 and 2006 in Alberta, Canada. BioScience, 61(7), 514-524. doi:10.1525/bio.2011.61.7.6

"The plants [in Alberta, Canada] responded to warming temperatures [over the period 1935-2006] by blooming earlier in spring, with the most pronounced changes in the earliest blooming species (A. patens [Anemone patens] and P. tremuloides [Populus tremuloides]). These species' flowering dates advanced by approximately two weeks, whereas the later-blooming species' flowering dates advanced between zero and six days over the study period."

"[In Alberta, Canada]The phenology response of two early-blooming species—A. patens [Anemone patens] and P. tremuloides [Populus tremuloides]—appears to be unexpectedly sensitive to these temperature changes. Their bloom times changed twice as fast as did the frost events, thus shifting their bloom period closer to the receding winter and increasing the danger of damage from late-spring frost."