



TACCIMO Literature Report

Literature Report - Annotated Bibliography Format

Report Date: September 03, 2013

Content Selections

Recreation

Quality of Recreational
Experiences

R1: Northern

Visitation Trends

R1: Northern

R2 & R4: Mountain

West

How to cite the information contained within this report

Each source found within the TACCIMO 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): Recreation

Quality of Recreational Experiences

R1: Northern

Pederson, G. T., Gray, S. T., Fagre, D. B. & Graumlich, L. J. (2006). Long-duration drought variability and impacts on ecosystem services: A case study from Glacier National Park, Montana. *Earth Interactions*, 10 (Paper No. 4), 1 – 28.

"The loss of glaciers in Glacier NP [National Park] [in northern Montana] has an obvious cultural resonance value that has not been lost on politicians and pundits who refer to a scenario by which Glacier NP is the "Park formerly known as Glacier" (Henneberger 2004). At the same time, a diminished snowpack reduces some Glacier NP operational expenses and potentially provides a boon for local tourism. "

Visitation Trends

R1: Northern

Pederson, G. T., Graumlich, L.J., Fagre, D. B., Kipfer, T. & Muhlfeld, C. C. (2010). A century of climate and ecosystem change in Western Montana: what do temperature trends portend? *Climatic Change*, 98, 133 – 154. DOI 10.1007/s10584-009-9642-y

"Montana's ecotourism- and agriculture-based economy will likely experience a mixture of positive and negative impacts as a consequence of future climate change. A potential positive impact for ecotourism may arise from weather conditions more amenable to people at the start and end of the traditional summer tourist season—thereby increasing overall tourism numbers and length of visitation season. Conversely, the premiere ski resort industry is likely to see a reduction in profits due to a shortening season over which a high quantity and quality of snowpack is available for skiers (Breiling and Charmanza 1999). With a reduction in snowpack, and increased stream temperatures over the spring and summer, fishing guides may expect increasingly more frequent closures of streams and rivers due to reduced flows and increased thermal stress on aquatic species."

R2 & R4: Mountain West

Richardson, R. B., Loomis, J. B. (2004). Adaptive recreation planning and climate change: a contingent visitation approach. *Ecological Economics*, 50, 83-99. doi:10.1016/j.ecolecon.2004.02.010

"Climate may impact the visitor in two ways. First, the visitor's utility from his or her recreation experience may be directly affected by the weather. Changing temperature, precipitation, and snow depth may affect the visitor's decisions about the frequency or duration of future visits. Second, changes in climate patterns may affect wildlife populations and the composition of vegetation in the park [Rocky Mountain National Park], and these changes may indirectly affect visitation behavior."

"The CCC scenario was included in Survey Versions A and D, and 8.6% of the 442 respondents to those surveys indicated that their visitation behavior would change under the hypothetical climate scenario. The application of their responses to total RMNP [Rocky Mountain National Park] visitation data yields a mean estimate of 1,357,888 additional visitor days, as provided in Table 3 below."

"The Hadley climate scenario was included in Survey Version B, and 11.1% of the 252 respondents to that survey indicated that their behavior [in visiting Rocky Mountain National Park] would change under the hypothetical climate scenario. The application of their responses to total visitation data yields a mean estimate of 1,002,080 additional visitor days, as provided in Table 4 below."

"One example of these scenarios was described as an "Extreme Heat" scenario. It was included in Survey Versions C and D, and 16.25% of the 480 respondents to those surveys indicated that their behavior [in visiting Rocky Mountain National Park] would change under the hypothetical climate scenario. The application of their responses to total visitation data yielded an estimate of 821,187 fewer visitor days, as provided in Table 5 below."

"The results of the contingent behavior analysis indicate that visitation [in Rocky Mountain National Park] would increase by about 13.6% under the climate scenario depicted by the CCC circulation model and by about 9.9% under the scenario depicted by the Hadley model."

"Survey results estimated an 8.75% decrease in visitation [in Rocky Mountain National Park] under the hypothetical Extreme Heat climate scenario."

"More than 70% of respondents indicated that the activities of viewing conifer forests, viewing wildflowers, and driving over Trail Ridge Road were either "important" or "very important" to their decisions to visit RMNP. Over 60% of respondents were from outside of Colorado. These results suggest that summer vacations and the opportunity to view the alpine scenery of RMNP [Rocky Mountain National Park] were the main factors in the visitation decision, and that visitors are less sensitive to slight changes in climate."