



# Recreation and Tourism Sector Midwest Technical Input Report National Climate Assessment

## Outdoor Recreation and Tourism

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WHITE PAPER PREPARED FOR THE U.S. GLOBAL CHANGE RESEARCH PROGRAM  
NATIONAL CLIMATE ASSESSMENT  
MIDWEST TECHNICAL INPUT REPORT

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At the request of the U.S. Global Change Research Program, the Great Lakes Integrated Sciences and Assessments Center (GLISA) and the National Laboratory for Agriculture and the Environment formed a Midwest regional team to provide technical input to the National Climate Assessment (NCA). In March 2012, the team submitted their report to the NCA Development and Advisory Committee. This white paper is one chapter from the report, focusing on potential impacts, vulnerabilities, and adaptation options to climate variability and change for the recreation and tourism sector.



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## Summary

- Climate variability and change have both direct and indirect implications for outdoor recreation and tourism. Direct implications stem from changes in key climatic variables that may directly impact the feasibility of outdoor recreation and tourism activities, or levels of satisfaction with them. Indirect implications result from projected changes in the natural environment, as a result of climate variability and change, which will cause secondary impacts on visitor behavior and experience.
- Climate variability and change have implications for both the supply of outdoor recreation and tourism resources and settings, and the demand for outdoor recreation and tourism activities and experiences.
- Anticipating the reaction of outdoor recreation and tourism participants to climate variability and change is complicated. Weather and climate are but one of a series of factors that influence outdoor recreation and tourism decisions. Moreover, changing climatic and environmental conditions, resulting changes in the feasibility and safety of activities, and alterations in the level of enjoyment associated with activity participation, may cause participants to alter one or more of the frequency, duration, timing, and/or location of future activity, or to shift participation to an entirely different activity altogether.

## Defining Outdoor Recreation and Tourism

The terms recreation and tourism are notoriously difficult to define and differentiate, and the semantics of these seemingly simple words have been discussed at length in a variety of text books and industry publications. For the purposes of this chapter, tourism will be taken to refer to travel some distance (typically 50 miles) away from home for some length of time between 24 hours and one year, for the purpose of business or leisure, whereas outdoor recreation will be assumed to have no spatial or temporal boundaries or restrictions. Thus, outdoor recreation may take place anywhere, from an individual’s back yard to a local park to a distant location, i.e., while engaging in tourism.

## The Importance of Travel and Tourism to the US Economy

The contribution of the travel and tourism industry to the US economy is significant. Travel and tourism is the nation’s largest services export industry, and accounts for 2.7% of the nation’s gross domestic product. In 2011, travel and tourism activity generated \$1.9 trillion in economic output, with the \$813 billion spent directly by domestic and international travelers in the nation stimulating an additional \$1.1 trillion in indirect and induced economic activity. In addition, the travel and tourism industry supports approximately 14.4 million jobs. The 7.5 million jobs directly related to travel and tourism generated \$194.5 billion in payroll in 2011, while another 6.9 million individuals worked in positions indirectly related to travel and tourism, in industries such as construction, finance, etc. These 14.4 million travel and tourism jobs represent one in every nine forms of employment across the nation. In terms of tax revenue, travel and tourism directly generated \$124 billion for local, state and federal governments in 2011 (US Travel Association, 2012). Figure 1 illustrates the contribution of travel and tourism to the economies of the Midwest states in terms of visitor spending, tax receipts, direct jobs created, and payroll generated.

## Outdoor Recreation and Tourism (ORT) and Climate Variability and Change (CVC)

According to Hall and Higham (2005, p. 21), “[I]n terms of the future of tourism, as well as the societies within which we live, there are probably few policy and development concerns as significant as global climate change.” These authors go on to note that,

“Understanding and responding to climate change represents one of the more important, complex and challenging issues facing the contemporary tourism and recreation industries” (Higham & Hall, 2005, p. 307). The complexity to which Hall and Higham alludes results from a combination of factors related not only to the difficulties associated with projecting climate change and its potential impacts on the natural environment, but also to the added complication of incorporating the human reaction to such change into the analysis.

## Direct and Indirect Implications of CVC for ORT

Climate variability and change have both direct and indirect implications for ORT activity. The direct implications of CVC for ORT activity relate to changes in key climatic variables that may directly impact the visitor experience. For example, changes in temperature, precipitation, wind speed, humidity, or snow depth may have a direct effect on (i) the feasibility of ORT activities, and/or (ii) levels of safety associated with participation in ORT activities, and/or (iii) the quality of the experiences of those who do participate in them. Modifications to climatic conditions, resulting changes in activity feasibility and safety, and alterations in the level of enjoyment associated with activity participation, may cause participants to alter the frequency, duration, timing, and/or location of future activity, or even to shift participation to an entirely different activity altogether.

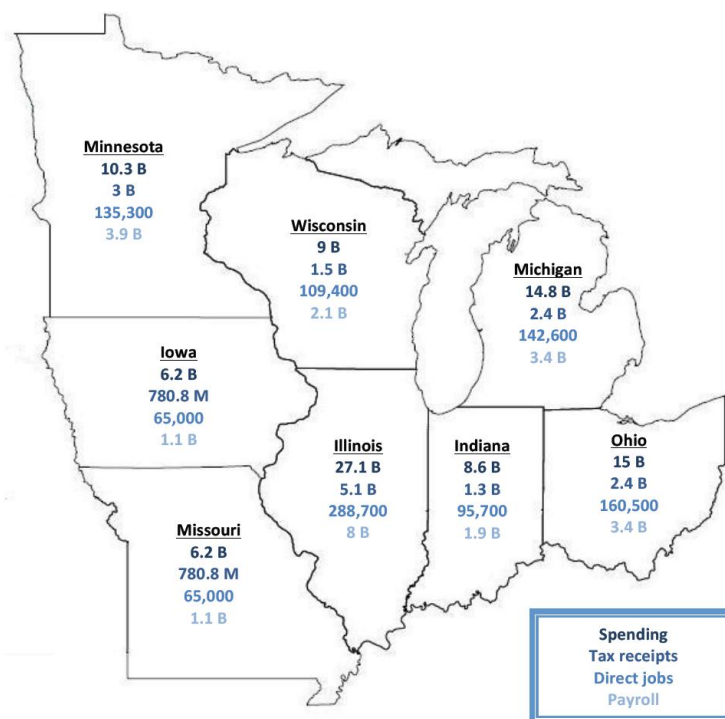


Figure 1. Contribution of Travel and Tourism to the Midwest States’ Economies. Source: U.S. Travel Association, 2012.

Climate variability and change may also alter the distributions and compositions of natural resources such as the flora and fauna found at an ORT destination. Since much ORT activity focuses on the viewing, photographing, hunting and/or fishing of such species, the implications of shifting habitat zones are profound. Such shifts in the quality and quantity of wildlife and vegetation may cause indirect, or secondary, impacts on ORT activity, as participants alter their activities to account for changes in the natural environment as a result of climate variability and change.

## Implications of CVC for ORT – Supply and Demand Side Factors

As suggested above, CVC will likely have implications for both the natural environment and the visitor experience of that environment. These implications can therefore be separated into consideration of implications for supply (how CVC might impact the natural environment and the associated supply of ORT resources) and demand (how CVC might impact participant demand for activities and destinations). As suggested previously, while projection of climate change and its potential impacts on the natural environment is complex, addition of humans – outdoor recreationalists and tourists – to the equation adds an additional layer of complexity. This additional complexity results from two important human dimensions: (i) the myriad of influences – besides weather and climate – on ORT decisions, including the availability of free time and disposable income; family commitments; economic situations in origins and destinations; prices; exchange rates; political, military and safety considerations in destination regions; media coverage; and, shifting fashions; and (ii) the myriad of response options available to ORT participants, including in which activities (i.e., in what) to participate or to which destinations (i.e., where) to travel, when, for how long, how often, etc. Given the huge number of recreation activities and tourism destinations from which modern consumers choose, the opportunity for substitution, in one or more dimensions, is tremendous, and, as a result, extraordinarily difficult to model effectively.

While the specific adaptive behavior of the ORT participant may be difficult to envisage, it is clear that in general the adaptive capacity of such participants is quite high. As noted above, outdoor recreationalists and tourists control the activities in which they choose to participate and the destinations to which they choose to travel, as well as various aspects of the timing of these choices. Innovations in outdoor clothing and recreational equipment have expanded the range of conditions under which outdoor activities are possible and enjoyable. The modern, technology-based era has also facilitated the phenomenon of last-minute booking, which further increases traveler's flexibility and responsive to unanticipated change. As

discussed in the European context by Nicholls and Amelung (2008), however, the tourism industry itself, i.e., ORT providers, face lower, or at least slower, levels of adaptive capacity, much of which may be attributed to a combination of spatial fixity and sunk costs. Accommodations, food and beverage outlets, and built attractions and facilities such as theme parks and marinas are all fixed entities with considerable capital investments that are not easily liquidated or shifted. Similarly, natural attractions such as national and state parks are static entities with defined boundaries. Faced with minimal opportunity to physically relocate in response to changes in the climate, tourism providers may be forced to consider a variety of alternative adaptation techniques in order to sustain their businesses.

## Implications of Climate Variability and Change (CVC) for Outdoor Recreation and Tourism (ORT) in the Midwest

The projections with regards to climate variability and change for the Midwest area as laid out in other chapters of this report suggest a wide variety of implications for participation in outdoor recreation and tourism activities, as well as for the sustainability of the industry that supports these activities. Table 1 outlines the most significant climate change projections for the Midwest region and the potential implications of these projected changes for ORT. As illustrated, these implications reflect potential changes in both the supply of, and the demand for, ORT settings and associated activities.

Consideration of increasing temperatures raises the interesting question of the existence of thresholds for ORT activity. From a supply perspective, some thresholds are fixed, e.g., current snowmaking technologies within the US generally require conditions below 28°F wetbulb for operation. In the case of consumers, however, scientific knowledge is more limited. For example, though it has been established that the typical tourist prefers an average daily temperature of 21°C (70°F) at their holiday destination (Lise & Tol, 2002), these authors rightly cautioned that this average camouflages variations in preferences by country or region of origin (i.e., nationality), as well as by travelers' ages, incomes, and preferred activities. Thus, it is likely that the acceptable maximum temperature or heat index level above which ORT activity becomes unbearable will also vary with activity and location. Establishment of such thresholds, and identification and understanding of the implications of behavioral responses to them, represents a pressing need within CVC/ORT research. The existence of such thresholds has implications for providers too, for example, the need to consider indoor alternatives for visitors on extremely hot days and increasing demand for air conditioning capabilities.

**Table 1. Projected Climate Changes, and Potential Implications for ORT, in the Midwest**

<i>Projected Change</i>	<i>Potential Implications</i>
<b>Warmer winters with less natural snow and ice</b>	Some activities are directly dependent on sufficiently cold temperatures to generate natural snow or ice, e.g., cross country skiing, ice fishing, snowmobiling. Without natural snow or ice, these activities may become impossible. Other activities, i.e., downhill skiing, rely on a combination of natural and manufactured snow. The ability to make snow will depend on the continuance of sufficiently cool temperatures for this activity. The threat of CVC to the Midwest’s winter sports and tourism sectors is high.
<b>Warmer springs and falls</b>	Warmer springs and falls would likely increase the climatic attractiveness of the Midwest as an ORT venue for activities such as camping, boating and kayaking in these seasons. Certain activities are already available on a year-round basis and the settings for those activities are prepared for visitation in any season, e.g., national and state parks, whereas commercial enterprises may require restructuring to enable them to offer year-round service to ORT participants. For example, lengthening of the spring/fall seasons will have implications for staffing (especially summer activities which currently rely on student labor that will be unavailable outside of school holiday months).
<b>Warmer summers and an increase in the frequency of heat waves</b>	Warmer summers may sound attractive to the typical ORT participant. However, thresholds beyond which ORT activity becomes unattractive due to excess heat remain to be identified and their implications assessed. Warmer summers may place additional constraints on providers in both urban and rural settings, e.g., urban properties may be required to considerably increase their energy usage due to increased air conditioning demands, while smaller rural properties that currently do not offer air conditioning may be forced to install such technology so as to remain competitive in the marketplace. Excessive heat would likely reduce demand for camping facilities.
<b>More frequent and/or more severe extreme weather events</b>	Extreme weather events such as heat waves and storms have direct and indirect implications for ORT activity. Direct implications include the safety of ORT participants due to high winds, flooding, lightning, etc., and the disruption of participation in activities (e.g., having to exit the golf course during a thunder storm) and of actual or planned travel, (e.g., the delay or cancellation of flights, the closure of bridges, etc.). Severe storms and flash flooding might threaten resources such as visitor centers, archaeological sites and trails. Severe weather events might also have implications for the quality and/or aesthetics of the natural environment, thereby indirectly impacting the ORT experience.

Sources: Hayhoe, VanDorn, Croley II, Schlegal & Wuebbles, 2010; Wuebbles, Hayhoe & Parzen, 2010; Kunkel, 2011.

In the bullet points that follow, a sampling of the indirect implications of CVC for ORT, via modifications to the natural environment which serves as the backdrop for ORT activity, is provided. It should be noted that the current volume of scientific work specifically addressing the implications of CVC for ORT in the Midwest region is extremely limited, and thus this summary represents the range and depth of knowledge currently known:

- *Reductions in Great Lakes levels* (projected towards end of century under higher emissions scenarios by some authors, e.g., Hayhoe, VanDorn, Croley II, Schlegal & Wuebbles, 2010) – lower lake levels could have a multitude of implications for ORT. These include: reduced access to the water, e.g., due to the increased inaccessibility of existing public and private boat

- ramps, docks and marina facilities; the increased need for and cost of dredging and channel maintenance; an increase in the presence of hazardous conditions such as newly exposed navigational hazards and sand bars; increased competition between ORT and other lake users, e.g., navigation, power generation, residential, industrial and agricultural use; a decline in the aesthetic appeal of lake-side locations; and, reductions in lake-side property values and a resulting decline in the local tax base.
- *Warming waters and declining water levels in lakes and streams* – such alterations have implications for the habitat of cold-water fish species such as brook trout and walleye, and for warmer-water species such as bass, with the extent of habitat in the Midwest projected to decrease for the former and increase for

the latter. These shifts have concomitant implications for the distribution of these species and the ability to fish them, whether for commercial or recreation purposes.

- *Alterations to shoreline wetlands* – such alterations have implications for the habitat of breeding and migrating waterfowl, with concomitant implications for the distribution of these species and the ability to view, photograph and/or hunt them.
- *The effect of warming air and water temperatures on the presence of algae and invasive species* – warmer conditions may exacerbate existing and generate new problems with algal blooms and with invasive species such as phragmites and zebra mussels. Such species can stress native species and reduce the aesthetic quality of ORT settings, thereby decreasing their attractiveness and negatively impacting the visitor experience.
- *The effect of warming temperatures on the distribution of plants and trees* – fall leaf viewing represents an important component of the tourism economy in many parts of the Midwest, where a good fall season can do much to ameliorate a poorer-than-expected summer. The redistribution of suitable habitat for critical species such as maple and aspen could impact the viability of fall leaf tours by both auto-based individuals and coach-based groups.
- *The effect of warming temperatures in urban areas* – besides the discomfort associated with excess heat and the potential need for increased air-conditioning capabilities, warming in urban areas such as Chicago and Detroit could increase levels of ground-level ozone and hence exacerbate respiratory problems such as asthma among the traveling public. Such conditions have implications not only for leisure visitation but also for business travel, since major urban areas typically rely heavily on corporate activities such as meetings, exhibitions and conventions for a large proportion of their travel business and the comfort of their participants is of paramount importance to event organizers. In both cases, increased demand for indoor recreation opportunities is a real possibility, e.g., movie theatres, casinos, indoor water parks, ballgames in enclosed stadiums, etc.
- *The increased risk of fire due to warmer and/or drier conditions* – fire presents both immediate and secondary implications for ORT activity, from both a safety perspective and the impacts of fire damage on the aesthetic appeal of a location.
- *The increased presence of insects and pests due to warmer and/or wetter conditions* – insects and pests present several implications for ORT activity, including from a health and safety perspective (i.e., the potential for the increased spread of disease) and the perspective of human comfort/the visitor experience, e.g., camping and other outdoor activities are less desirable in the presence of large volumes of mosquitoes or black flies.

## Application of the Tourism Climatic Index (TCI)

The Tourism Climatic Index was first developed by Mieczkowski (1985). The TCI allows quantitative evaluation of a location’s climate for the purpose of general outdoor tourism activity, such as sightseeing, visiting a state or national park, etc. The TCI is based on the notion of “human comfort” and consists of five sub-indices, each represented by one or two climate variables. The five sub-indices and their constituent variables are as follows: (i) daytime comfort index (maximum daily temperature and minimum daily relative humidity), (ii) daily comfort index (mean daily temperature and mean daily relative humidity), (iii) precipitation, (iv) sunshine, and (v) wind speed. The index is weighted and computed as follows:  $TCI = 2*(4CID + CIA + 2R + 2S + W)$ , where CID = daytime comfort index, CIA = daily comfort index, R = precipitation, S = sunshine, and W = wind speed. With an optimal rating for each variable of 5.0, the maximum value of the index is 100. Based on a location’s index value, its suitability for general outdoor tourism activity is then rated on a scale from -30 to 100. Mieczkowski then rated the resulting range of comfort levels as shown in Table 2. The TCI has been combined with projected scenarios of future climate conditions in order to assess potential changes in the climatic attractiveness of locations for general ORT activity in North America (Scott, McBoyle & Schwartzentruber, 2004; Nicholls, Amelung & Viner, 2005), Europe (Amelung & Viner, 2006; Nicholls & Amelung, 2008) and at the global level (Amelung, Nicholls & Viner, 2007). The TCI allows consideration of the direct implications of CVC for ORT supply conditions, though it should be noted that the TCI is not applicable to the winter sports/tourism sectors.

Figure 2 illustrates shifting distributions of climatic attractiveness for the Midwest region and for the wider US for the coming century. The months of January and July are represented, based on the A2A scenario with the HadCM3 GCM, thus the shifts illustrated are towards the more extreme end of the projected change spectrum (a “high

**Table 2. Tourism Climatic Index (TCI) Rating System**

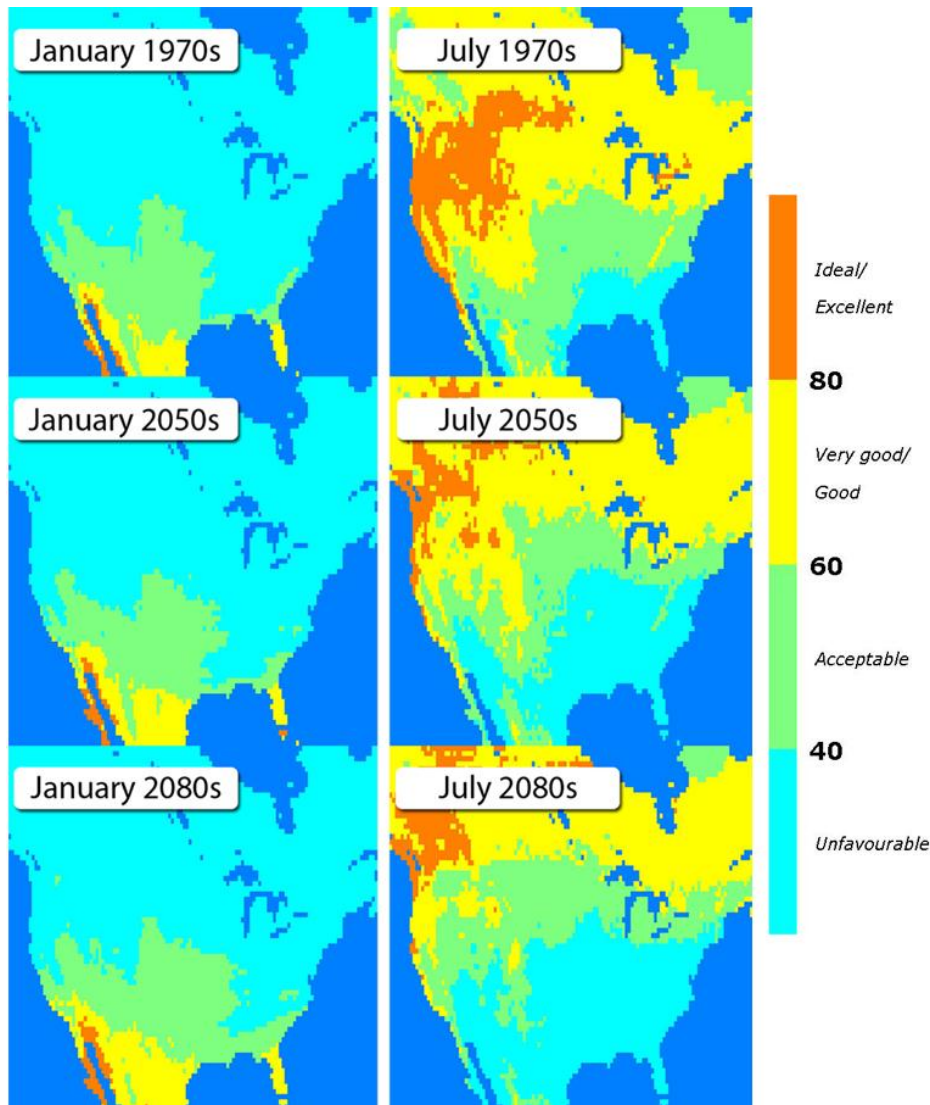
90 – 100	Ideal
80 – 89	Excellent
70 – 79	Very good
60 – 69	Good
50 – 59	Acceptable
40 – 49	Marginal
30 – 39	Unfavorable
20 – 29	Very unfavorable
10 – 19	Extremely unfavorable
Below 9	Impossible

Source: Adapted from Mieczkowski (1985, pp. 228-29).

## Implications for Winter Sports

The Midwest region as defined in this report accounts for nearly one-fifth of ski areas throughout the United States (Table 3) and the winter sports sector is extremely vulnerable to the impacts of climate variability and change. Nevertheless, consideration of the implications of CVC for this sector and region in the literature is minimal. Most of the work on winter sports has been conducted in either a European or a Canadian context, and the majority of that work focuses on supply (i.e., the provision of adequate levels of snow) rather than demand (i.e., winter sports consumers' behaviors) issues.

That being said, one of the earliest pieces of work on the implications of CVC for winter sports was in fact conducted in Michigan (Lipski & McBoyle, 1991). Using two scenarios of projected increases in temperature and precipitation (by 2030) of 6°F and 9%, and 9.7°F and 11%, respectively, they projected changes in the number of reliable winter days, i.e., days with sufficient snow cover for downhill skiing, at three ski areas throughout the state. For those three areas studied, with then current (i.e., 1990) numbers of reliable ski days in the order of 100, 79, and 59, respectively, Lipski and McBoyle projected declines to 62, 41 and 10 reliable days under their first, less extreme scenario, and the complete elimination of the industry,



**Figure 2.** Tourism Climatic Index over the United States for January and July in the 1970s, 2050s, and 2080s.

emissions climate future”). As might have been anticipated, winter conditions are currently and will in the next century likely remain unsuitable for general ORT activity in the Midwest. Of greater interest and potential concern are the projected changes in conditions in the summer period. While current conditions range from acceptable in the southern portions of the Midwest region, through good to very good for most of the region, to ideal to excellent within certain pockets, by the 2080s the distribution of these conditions is projected to shift northwards, with the Midwest experiencing unfavorable conditions across most of its southern portion and acceptable conditions in the north. These projected changes in climatic attractiveness reflect the increasing heat and humidity projected for the area, and the resulting decline in the desirability of being outdoors and engaging in ORT activity.

**Table 3. Ski Areas in the Midwest States**

State	Number of Ski Areas	Percent of US Ski Areas
Illinois	6	1.2%
Indiana	2	0.4%
Iowa	4	0.8%
Michigan	43	8.9%
Minnesota	17	3.5%
Missouri	2	0.4%
Ohio	6	1.2%
Wisconsin	10	2.0%
<b>Total</b>	<b>90</b>	<b>18.4%</b>

Source: National Ski Areas Association, 2011.



i.e., zero reliable days at any one of their study sites, under the second and more extreme scenario. This study did not incorporate the impacts of snowmaking capabilities on the occurrence of reliable days, whereas more recent analyses in other regions have been able to factor in this consideration, thereby providing more realistic indications of impact on skiable days (e.g., Scott, McBoyle & Mills, 2003; Dawson, Scott & McBoyle, 2009). The potential utility of weather derivatives –with pay-offs derived from the development of an index of meteorological variables such as temperature or snowfall – has been briefly explored in an Austrian context, but not in the Midwest or wider US (Bank & Wiesner, 2009).

Winter sports enthusiasts are faced with a number of options in terms of adjusting their travel and outdoor recreation behaviors in light of climate change. Though no analysis of potential reactions has been conducted in the US, a handful of studies have considered the alternatives open to European and Australian skiers, including skiing less often, continuing skiing but in another location, and giving up skiing altogether (König, 1998; Bürki, 2000; Unbehaun, Pröbstl and Haider, 2008; Luthe, 2009). All three options have implications for both the ski and the wider tourism sectors, including possible reductions in travel to and stays at resorts as well as reductions in the purchase of ski-

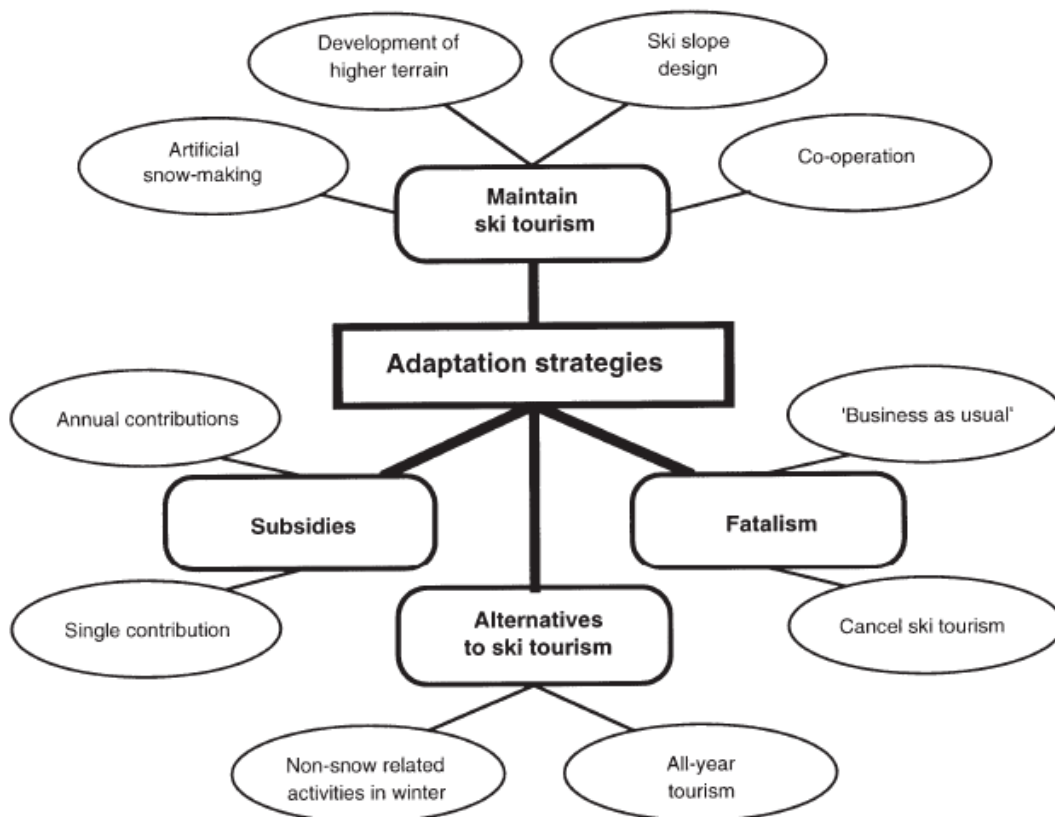
related clothing and equipment.

Understanding of skiers’ reactions to current as well as projected future conditions are complicated by the widely-held belief within the industry that ski activity is impacted as much as, if not more than, by weather conditions at the skier’s place of origin and by the weather forecast for the coming weekend than it is by actual conditions on the slopes. Though this hypothesis has yet to be empirically supported, it does suggest the additional challenges that ski areas may face in recruiting customers under warmer conditions with less natural snow, even if snowmaking technologies are sufficient to keep the slopes themselves open for business.

### Adaptation

It is critical to note that the climate changes projected suggest that there will very likely be both winners and losers from the perspective of the ORT industry. Risks and opportunities arise both directly, as a result of changing climatic conditions within a destination region, as well as indirectly via any one enterprise’s ability to adapt to those changing conditions in situ. For example, while winter sports may be devastated by rising winter temperatures

**Figure 8.** Potential Adaptations to Climate Change in the European Ski Sector.



Source: Bürki, Abegg & Elsasser, 2007.

(which would not only reduce natural snowfall but also limit the ability to manufacture snow), spring, summer and autumn activities might see rising popularity as the shoulder and traditional high (summer) seasons extend in length. This presents considerable risk to the winter sports sector – particularly those activities for which snowmaking is irrelevant (e.g., ice-fishing), has never been feasible (e.g., cross-country skiing) or in the case of downhill ski operations which have chosen not to or are simply financially unable to invest in snowmaking equipment. However, considerable opportunities might also present themselves in terms of providing for other activities in the lengthening spring-summer-fall. Ski areas, for example, are often the perfect venues for spring-summer-fall activities such as hiking, mountain biking, and alpine slides. These opportunities include the potential for new businesses which focus on the kinds of activities typical of this season, as well as the potential for existing businesses to diversify their offerings, whether in terms of the activities offered and/or the timing of those offerings. In both cases – new businesses and diversified existing businesses – considerable capital will likely be required, in addition to the knowledge and skills necessary to provide new and different activities safely and effectively. These needs are problematic given the characteristics typical of the small, family owned and operated enterprises that make up the majority of ORT providers throughout the Midwest region, including limited resources (capital, training, etc.) and a traditional lack of long-term planning, both of which limit adaptive capacity. In addition, experience has shown somewhat of a lack of concern for CVC as a pressing issue among many ORT providers, with rationales for this lack of concern including that CVC is too distant of an issue to be concerned with, especially in light of the current economic climate; that the jargon associated with CVC is too confusing for providers to fully understand; and that the uncertainty associated with CVC is too excessive to warrant genuine concern (Nicholls & Holecek, 2008).

The topic of adaptation has received less attention in the literature to date than impacts and implications. Nevertheless, it is clear that adaptation is a context-specific concept, meaning that to be successful adaptation measures will need to be developed in light of the activity and geographic locale under consideration. For example, Figure 8 represents a suite of suggested adaptation strategies for the downhill ski sector in the European Alps (Bürki, Abegg & Elsasser, 2007). Under the ‘maintain ski tourism’ option, it is immediately clear that for the Midwest, the development of slopes on higher terrain is an unlikely option, since most slopes in this part of the world are already developed on the highest terrain available. The provision of subsidies to the ski industry also seems an unlikely proposition in a US context. The ‘alternatives to ski tourism’ identified seem to offer more promise; though, as noted above, diversification into a year-round entity

**Table 4. National Park Service Sites in the Midwest**

<b>State</b>	<b>National Park Service Site</b>	
<b>Illinois</b>	Lewis & Clark National Historical Trail*	
	Lincoln Home National Historic Site	
	Mormon Pioneer National Historic Trail	
	Trail of Tears National Historic Trail	
<b>Indiana</b>	George Rogers Clark National Historical Park	
	Indiana Dunes National Lakeshore*	
	Lincoln Boyhood National Memorial	
<b>Iowa</b>	Effigy Mounds National Monument	
	Herbert Hoover National Historic Site	
	Lewis & Clark National Historic Trail*	
	Mormon Pioneer National Historic Trail	
	Silos & Smokestacks National Heritage Area	
<b>Michigan</b>	Isle Royale National Park	
	Keweenaw National Historical Park	
	Motor Cities National Heritage Area	
	North Country National Scenic Trail	
	Pictured Rocks National Lakeshore*	
	Sleeping Bear Dunes National Lakeshore*	
	Grand Portage National Monument	
<b>Minnesota</b>	Mississippi National River and Recreation Area*	
	North Country National Scenic Trail	
	Pipestone National Monument	
	Saint Croix National Scenic River	
	Voyageurs National Park*	
	<b>Missouri</b>	California National Historic Trail
		George Washington Carver National Monument
		Henry S. Truman National Historic Site
		Jefferson National Expansion Memorial
		Lewis & Clark National Historic Trail*
Oregon National Historic Trail		
Ozark National Scenic Riverways		
Pony Express National Historic Trail		
Santa Fe National Historic Trail		
Trail of Tears National Historic Trail		
<b>Ohio</b>	Ulysses S. Grant National Historic Site	
	Wilson’s Creek National Battlefield	
	Cuyahoga Valley National Park	
	David Berger National Memorial	
	Dayton Aviation Heritage National Historical Park	
	First Ladies National Historic Site	
	Hopewell Culture National Historical Park	
	James A. Garfield National Historical Site	
	National Aviation Heritage Site	
	North Country National Scenic Trail	
<b>Wisconsin</b>	Perry’s Victory and International Peace Memorial	
	William Howard Taft National Historic Site	
	Apostle Islands National Lakeshore*	
	Ice Age National Scenic Trail*	
	North Country National Scenic Trail	
Saint Croix National Scenic River		

\*Indicates official “Climate Friendly Park”

and the provision of alternative activities (e.g., the construction of a conference center so as to appeal to year-round business travelers, the construction of a spa to appeal both year-round and on rainy or snow-free days, or the development of a golf course or a water park for summer usage) are all capital-intensive investments. Interestingly, anecdotal as well as preliminary research suggests that in the case of winter operators, the more prominent rationale for diversification is not as a means of adapting to observed or anticipated CVC, but as a financial measure (McManus & Bicknell, 2006).

Temporal diversification and the potential lengthening and strengthening of the current shoulder (spring and fall) seasons raises the issue of the extent to which the availability of free time influences ORT behavior. Studies of leisure activity in Michigan have consistently identified the availability of free time, as measured by the timing of weekends and holidays, as the single most important indicators of general leisure travel, as well as participation in specific activities such as skiing and golf (Nicholls, Holecek & Noh, 2008; Shih, Nicholls & Holecek, 2009; Shih & Nicholls, 2011). The existence of more attractive conditions for ORT activity is insufficient to generate additional activity in and of themselves – potential participants must also have the time to do so. Improving conditions in the shoulder seasons may therefore generate an increase in the number of short, close-to-home day or weekend trips with a focus on outdoor activities such as hiking, biking, canoeing, etc.

The timing of longer windows of leisure time, most typically determined by the distributions of school summer holidays, represents an additional temporal constraint. Increased climatic attractiveness and the availability of wider selections of activities in which to engage during spring and fall would only benefit those able to take time to engage in ORT in what are currently the shoulder seasons. The trend towards year-round school in some areas, with an increased number of shorter breaks distributed throughout the year (versus the current trend of one long summer break and a limited number of short breaks over holidays), could benefit ORT providers in a warming world.

The National Park Service (NPS) recognizes the threats associated with climate change via its *Climate Friendly Parks* program (<http://www.nps.gov/climatefriendlyparks>). Table 4 lists the sites managed by the NPS throughout the Midwest region; sites that have been designated as “Climate Friendly” are highlighted with an asterisk. “Climate Friendly” NPS sites engage in a range of mitigation measures designed to reduce their contribution to greenhouse gas emissions.

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