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ORIGINAL PAPER

Tourism climatology for camping: a case study of two Ontario parks (Canada)

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Abstract Climate and weather act as central motivators for the travel decisions of tourists. Due to their seasonality, these factors determine the availability and quality of certain outdoor recreational activities. Park visitation in Ontario, Canada, has been identified as a weather sensitive tourism and recreation activity. This study used a survey-based approach to identify and compare stated weather preferences and thresholds, as well as weather-related decision-making for campers at two provincial parks in Ontario, Canada. The two parks were selected for differing physical and environmental characteristics (forested lake versus coastal beach). Statistically significant differences were detected between the two parks in relation to the importance of weather and weather-based decision-making. Specific temperatures that were considered ideal and thresholds that were too cool and too warm were identified for both parks, both during the day and the night. Heavy rain and strong winds were the most influential factors in weather-related decision-making and on-site behavioural adaptations. Beach campers placed greater importance on the absence of rain and the presence of comfortable temperatures compared to forest campers. In addition, beach campers were more likely to leave the park early due to incremental weather changes. The results of this study suggest that beach campers are more sensitive to weather than forest campers.

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1 Introduction

Camping is an outdoor recreational activity and is a form of nature-based tourism that takes place in natural settings where both the recreational activity and visitor experience depend on, and are enhanced by, the natural environment (Eagles et al. 2002). Nature-based tourism is a major component of Canada's tourism industry, within which national and provincial parks represent a significant resource (Eagles 2003). According to the Ontario Ministry of Natural Resources, 9.6 million people visited Ontario's provincial parks in 2011(OMNR 2012). Of these visitors, 4.9 million (51 %) were defined as campers, meaning they spent one or more consecutive nights in the park. Provincial parks in Ontario operate under a self-sustaining financial system, where user fees from tourism fund 78 % of operations, including conservation efforts in this network of protected areas (OPSEU 2012). As a result, any changes in park visitation will have considerable impacts on park management and conservation efforts. A more advanced understanding of how weather, inter-annual climate variability, and eventually how climate change could influence park visitation, will enable more informed park planning and management.

Tourism climatology is the study of climate and tourism in their broadest sense (de Freitas 2003). According to the United Nations World Tourism Organization, tourism is as an activity that involves people "traveling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes" (World Tourism Organization 2011). In regard to leisure travel, recreation is "an act or experience, selected by the individual during [their] leisure time, to meet a personal want or desire, primarily for [their] own satisfaction" (Yukic 1970). Since tourism and recreation are voluntary activities undertaken for personal satisfaction and pleasure (Yukic 1970), de Freitas (2003) has argued that participation will only occur if the participant perceives conditions to be suitable.

Weather and climate are two of the critical elements for the natural resource-base of recreation and are exploited by the tourism industry (Scott et al. 2012). These factors also directly affect tourist spending and satisfaction (Scott et al. 2012). According to Butler (2001), climate and weather determine the length and quality of certain recreational seasons, by controlling when certain activities are available. The relationship between weather and recreation is not universal for all forms of tourism as certain activities have different climatic requirements (Scott et al. 2008; Rutty and Scott 2010). It is therefore essential to examine each tourism segment individually, in order to effectively determine its relative weather sensitivity and specific climatic preferences and thresholds (de Freitas et al. 2008).

The goal of this study is to identify weather preferences and weather-related thresholds for decision-making while camping in two Ontario parks. In order to realise the goal of this study, three objectives guided this research: (1) to determine the relative importance of different weather elements on camper satisfaction and determine if the importance of weather varies between the parks, (2) to identify temperature preferences and thresholds for camping and assess whether these preferences and thresholds vary between the parks, and (3) to assess decision-making thresholds for camping in relation to different weather scenarios and determine if weather-related decision-making thresholds vary between the parks.

2 Background literature

Weather and climate are integral to nature-based tourism and therefore are expected to influence camper satisfaction and trends in park visitation. Buckley and Foushee (2012) analysed historical monthly mean temperatures and past park visitation from 1979 to 2008 among US national parks and found that in parks which had experienced a warming trend, peak attendance occurred an average of 4 days earlier by 2008 than that which was recorded in 1979. They also concluded that humans are therefore among those organisms that adapted their behavioural responses to observed climate change. Furthermore, they emphasised the importance of climate change assessments examining the impact of warming on park seasonality and visitation. Existing impact assessments within the tourism and climate change literature suggest that projected warming due to climate change will increase park visitation and lengthen park operating seasons across Canada (Jones and Scott 2006a, b; Scott et al. 2007) and within the northern regions of the USA (Richardson and Loomis 2004; Loomis and Richardson 2006).

Early studies of tourism climatology were based on expert opinions, were reliant on subjective criteria, and were not validated against actual tourist perceptions (Scott et al. 2008). As a result, the need for additional field studies and further examination of observational data was identified by de Freitas (2003) as an important area of future research, in order to more accurately determine the actual perceptions and responses of tourists to weather and climate. Apart from the early expert-based opinion studies, there are two main approaches to the study of climate preferences for tourism: revealed climate preferences and stated climate preferences (Loomis and Richardson 2006; Scott et al. 2008, 2012).

Revealed climate preference studies determine statistical relationships between measures of tourism demand and historical weather data in an effort to infer tourism climate preferences (Scott et al. 2008). The main strength of this approach is its objectivity as the influence of weather on tourists is determined using measures of aggregate tourist behaviour such as visitation numbers or occupancy rates (Scott et al. 2012). Certain revealed climate preference approaches (Maddison 2001; Lise and Tol 2002; Hamilton et al. 2005; Bigano et al. 2006; Jones and Scott 2006a, b) have been limited by the crude temporal scale of available data for input into the models, such as monthly rather than daily weather and visitation data. However, more recent studies have overcome this limitation by using daily (Scott and Jones 2006, 2007) and even hourly (Yu et al. 2009a, b) data to derive climatic preferences for specific tourism activities.

Stated climate preference studies have used direct on-site observations (de Freitas 1990), including the use of webcams (Moreno and Amelung 2009). They have employed a survey-based approach (Morgan et al. 2000; Mansfeld et al. 2004; Gomez-Martin 2006; Scott et al. 2008; Rutty and Scott 2010; Moreno 2010; Rutty and Scott 2013). Additionally, they have used a combination of such methods to solicit from tourists their specific climate preferences (de Freitas 1990). One of the strengths of this approach is that it overcomes the temporal resolution limitation of the revealed approach and is therefore an effective validation tool for complex predictive models (de Freitas et al. 2008). However, stated climate preference studies based on direct observation of on-site atmospheric conditions are associated with intensive time and resource constraints (Scott et al. 2008). In addition, stated climate preference studies based on hypothetical weather and climate scenarios can be subject to misinterpretation by survey respondents as understanding of meteorological terms, and weather indicators may be limited among the general public (Gössling et al. 2012). Stated climate preference studies have been conducted both in situ (field-based) an ex situ (controlled environment), and each method has its own limitations. In situ stated climate preference studies are limited in the number of atmospheric conditions available for observation and are subject to bias associated with the prevailing weather conditions and the type of respondents who will be present during such conditions (de Freitas 1990; Morgan et al. 2000; Mansfeld et al. 2004; Gomez-Martin 2006; Rutty and Scott 2013). On the other hand, ex situ studies have been associated with sampling constraints often drawing responses from convenient samples of university students (Scott et al. 2008; Rutty and Scott 2010), although strategies to overcome this potential bias have been employed (Moreno 2010; Wirth 2010; Rutty and Scott 2010).

3 Methods

3.1 Study area

The two study parks are located in the Canadian province of Ontario, situated on the North American continent (Fig. 1a). The two Ontario parks selected as case studies were Pinery Provincial Park and Grundy Lake Provincial Park (Fig. 1b), located in southern Ontario. Southern Ontario is located in the Mixedwood Plains ecozone of Ontario and in a humid, continental climate (Dfb) (Gough et al. 2002; Tam and Gough 2012). This climate is characterised by warm to hot summers, snowy cold winters, no well-identified dry seasons and a wide range in annual temperatures. Based on the climate normal for the period 1971–2000 from the closest high-quality meteorological station for each park, during the peak visitation summer season, average daily maximum temperature at Grundy Lake was 23.8 and 24.7 °C at Pinery. The average daily minimum temperatures between the two parks were 11.4 °C for Grundy Lake and 13.8 °C for Pinery. The average daily rainfall total between each park was the same (2.7 mm); however, out of the 2,760 summer days from 1971 to 2000, there was a 34.0 % chance of experiencing a total daily rainfall of 0.5 mm or greater at Grundy Lake, compared to a 30.7 % chance at Pinery. Southern Ontario is often located within the polar front zone where polar and tropical air masses meet, thus generating midlatitude cyclones and causing considerable weather variability (Gough et al. 2002; Gough 2008; Tam and Gough 2012). The passage of fronts has been found to cause noticeable rapid changes in wind direction and speed, temperature, humidity and cloud cover (Tam and Gough 2012) which will have a direct impact on park tourism. Finally, southern Ontario is embedded within the Laurentian Great Lakes of North America and the Lakes have an impact on the local climate, mitigating temperature extremes and modifying precipitation patterns (Gough and Rozanov 2001; Mohsin and Gough 2012).

The two parks were selected based on differing physical and environmental features. Pinery is a coastal beach park

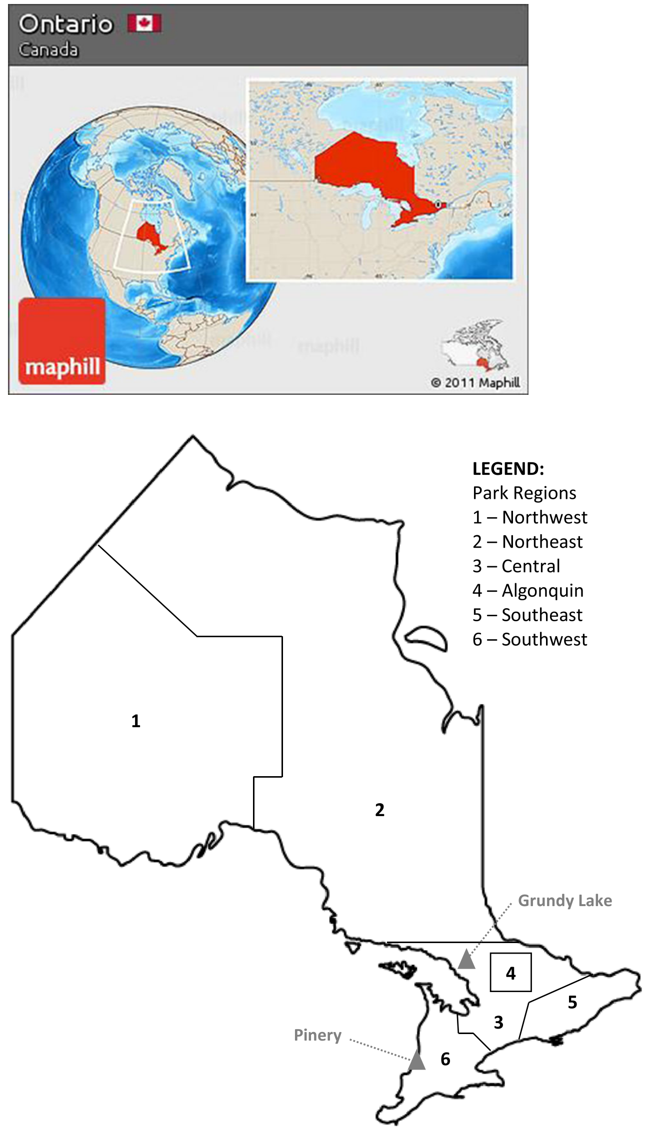

Fig. 1 **a** Shaded relief location map of Ontario, Canada. **b** Map of Ontario—park regions and study parks

located on Lake Huron while Grundy Lake is located on the Canadian Shield and is an in-land, forested lake park, although water is still present in the form of a number of small lakes (Fig. 1a). It was expected that visitation to these two different types of natural environment parks will be associated with different climatic requirements and subsequent weather sensitivity.

3.2 Surveys

A survey-based approach was deemed the most appropriate method to achieve the three research objectives of this study. The stated climate preference survey instrument used in this study builds on the work of Scott et al. (2008) and Rutty and Scott (2010) and was adapted for specific application in the park tourism context. A version of this same survey originally designed by Scott et al. (2008) and improved by Rutty and Scott (2010) has also been used by Moreno (2010) and Wirth (2010) to conduct ex situ tourism climate preference studies. Furthermore, Rutty and Scott (2013) adapted the original survey instrument of Rutty and Scott (2010) to conduct an in situ stated climate preferences study for the Caribbean beach tourism market, similar to what was done here for the park tourism camper market. This study utilised the existing approach of Rutty and Scott (2010) to determine the importance of weather and to identify temperature preferences and thresholds. However, this study also identified night temperature preferences and thresholds as thermal comfort during the night is important for campers. The survey instrument added a new component that effectively identified the relative importance of different weather variables such as heavy rain and strong winds on camper decision-making. This component determined within a given weather scenario a critical behavioural threshold was passed (for both duration and intensity) at which point campers indicated their desire to leave the park early in response. This was done in response to de Freitas (2003) who suggested that physical elements of climate have an over-riding impact on tourist satisfaction and decision-making and that temperature as a weather variable alone is not adequate to access the climate resource for tourism.

The survey instrument was administered within the two study parks, during late August and early September of 2010. Participants were approached while on campsites and were asked to complete the surveys during their current visit to the park and then return them by attaching them to the campsite registration post for pick-up by the researcher. Campers who thought they would be unable to complete and return the survey during their current visit to the park were supplied with a mail back option. This however constituted only a small portion of the total sample (N=18, 2.5 %). Out of the 844 campers asked to participate in the study, 801 agreed to do so (95 %). Of these 801 campers, 721 successfully returned a completed survey, resulting in a 90 % return rate. Four hundred two surveys were collected from Pinery, 311 from Grundy Lake and 8 were returned by mail that did not specify a collection site. The eight surveys without a specified collection site were used in the overall analysis but not for comparisons between parks.

4 Results and discussion

4.1 Importance of weather

When assessing the importance of different weather variables in relation to overall park visit satisfaction, respondents were asked to identify the level of importance they assigned to each weather variable on a five-point Likert scale ranging from “not important” to “very important”. Table 1 shows the importance assigned to each of the six different weather variables. The mean values for each weather variable indicate its rank of importance.

The presence of sunshine was the most important weather variable in relation to camper satisfaction, followed by comfortable temperatures (combining the importance of both day and night temperatures), and then the absence of rain. A number of studies have set out to identify the importance that tourists assigned to different weather variables for beach, urban, mountain and park tourism activities (Table 2). The presence of sunshine was identified as the most important weather variable for camping, which was also the case for beach tourism (Scott et al. 2008; Rutty and Scott 2010). Air temperature was the second most important weather variable for camping, which again mirrored that of beach tourism (Scott et al. 2008; Moreno 2010) and was also similar to mountain tourism (Rutty and Scott 2010). Surprisingly, the absence of rain was found to be only the third most important weather variable for camping, a finding that was only echoed by one other study concerning beach tourism (Scott et al. 2008). The absence of strong winds was recorded as being the least important weather variable for all tourism contexts considered. These results suggest that campers rank the importance of these four weather variables in an order similar to that of beach tourists.

The results of this study add further credence to the suggestion that temperature may not be the most important climate variable in the study of preferred climates and weather sensitivity for tourism or at least that temperature alone in not a sufficient proxy for tourism climatology. This, in turn, gives further support to the conclusions of de Freitas et al. (2008) and Scott et al. (2008), who stated that both the physical (wind and rain) as well as the aesthetic (hours of sunshine and sky condition) components of weather variability need to be considered in order to accurately assess climate preferences for tourism.

Statistically significant differences between the two parks were found when considering the importance of specific weather variables in relation to camper satisfaction (Table 3). Differences were found between the two parks for the absence of rain (P<0.001), comfortable day temperatures (P=0.027) and comfortable night temperatures (P<0.001). Campers at the coastal beach park placed greater importance on all three of these weather variables, when compared to campers at the forested lake park. The other three weather variables considered in this study (the importance of sunshine, the importance of comfortable water temperatures and the importance of no strong winds) did not demonstrate statistically significant differences between the two parks. These results are not surprising since campers at the coastal beach park are likely to spend more time swimming and engaging in beach activities which are associated with greater weather sensitivities, such as the absence of rain and comfortable day temperatures.

Table 1 Importance of weather variables in relation to camper satisfaction

Weather variable	Percentage of respondents					Mean value
	Not important	A little important	Moderately important	Important	Very important	
Sunshine	2.1	6.5	22.0	33.7	35.7	3.94
Comfortable day temperature	2.7	7.0	23.2	39.7	27.4	3.82
Absence of rain	4.9	12.7	28.4	28.0	26.0	3.57
Comfortable night temperature	6.9	11.1	28.9	31.5	21.6	3.49
Comfortable water temperature	6.2	15.1	32.4	29.8	16.5	3.36
Absence of strong winds	10.9	19.9	33.3	24.7	11.3	3.06

4.2 Weather preferences and thresholds

A number of studies have endeavoured to identify an optimal temperature or ideal temperature range for different tourism contexts as reported in Table 4. Some studies represented the ideal temperature for tourism as a single temperature value, while others reported a range of ideal temperatures. It had been argued that tourists are more likely to perceive a range of temperatures as being ideal rather than identifying only one specific temperature degree (de Freitas et al. 2008). Following this, our work produced a range of ideal temperatures for camping in the two Ontario parks. However, we were also able to determine the mean temperature value within this range for the purpose of direct comparison with other studies that identified a specific temperature as being the ideal temperature for a specific tourism context. Respondents were presented with a spectrum of potential temperatures and were asked to circle the range that they perceived to be ideal, for both day and night. The averages of these specified ranges therefore represent the mean ideal day and night temperatures.

This study examined three facets of temperature preferences for summer camping in Ontario parks: an ideal temperature range, as well as unacceptably cool and unacceptably hot temperature thresholds for both during the day (Fig. 2) and at night (Fig. 3). The average unacceptably hot daytime temperature threshold was 34.8 °C, while the average unacceptably cool daytime temperature threshold was 15.6 °C. The average ideal daytime temperature was 27.4 °C. The average range of ideal temperatures for the day was 24–31 °C. The average ideal night temperature was 19.7 °C, with the ideal range of night temperatures being between 17 and 23 °C. The average unacceptably cool night temperature threshold was 8.7 °C, while the average unacceptably hot night temperature threshold was 28.7 °C. Ideal night temperatures for summer camping are comparable to what Heurtier (1968) identified as being optimal temperatures for a lightly dressed, seated person (20–27 °C).

The range of ideal daytime temperatures for camping in Ontario parks (24–31 °C), was similar to the range of ideal temperatures for beach tourism (27–30 and 27–32 °C), as identified by both Morgan et al. (2000) and Rutty and Scott (2010), respectively. The mean ideal daytime temperature for park camping (27.4 °C) again is similar to that which was identified by Scott et al. (2008) and Moreno (2010) for beach

Table 2 The importance of weather variables for different tourism contexts

Source	Rank of importance for weather variable			
	Air temperature	Presence of sunshine	Absence of rain	Absence of strong winds
Beach tourism				
Moreno and Amelung (2009)	2	3	1	4
Rutty and Scott (2010)	3	1	2	4
Scott et al. (2008)	2	1	3	4
Urban tourism:				
Rutty and Scott (2010)	1	3	2	4
Scott et al. (2008)	1	3	2	4
Mountain tourism				
Scott et al. (2008)	2	3	1	4
Park tourism (camping)				
Current study	2	1	3	4

Table 3 Differences in importance of weather variables between parks

Weather variable	Percentage of respondents						
	Not important	Little important	Moderately important	Important	Very important	Mean rank[a]	P value[a]
Absence of rain							
Coastal beach park	4.0	10.3	25.1	30.3	30.3	382.97	<0.001
Forested lake park	6.1	15.7	32.7	25.0	20.5	321.51	
Comfortable day temperatures							
Coastal beach park	2.2	5.5	22.2	40.4	29.7	370.81	0.027
Forested lake park	3.2	9.0	24.4	38.9	24.4	338.05	
Comfortable night temperatures							
Coastal beach park	4.5	8.8	27.6	33.8	25.3	383.42	<0.001
Forested lake park	10.0	14.2	30.6	28.4	16.8	318.43	

[a] Mean rank and significance of difference (P) generated through the use of the Mann-Whitney U Test, where higher mean ranks reflect a higher level of importance assigned to a particular weather aspect

tourism (26.8 and 28.3 °C, respectively). Based on a review of the existing literature, ideal daytime temperatures for camping are most similar to that for beach tourism. There were no statistically significant differences between the coastal beach park and the forested lake park in relation to ideal temperature preferences. However, since the coastal beach park, which is essentially a beach tourism destination where people go to camp, did make up 56 % of the total sample size, it is possible that the inclusion of this park may have contributed to this finding. Nonetheless, these findings still do make intuitive sense as it is reasonable to suggest that park camping shares similar weather sensitivities with beach tourism rather than with less weather sensitive tourism such as general or urban tourism (i.e. sight-seeing, shopping and dining).

The identification of unacceptable temperature thresholds has received less attention within the literature on climate and tourism. A comparison of the results from this study and that of Rutty and Scott (2010) show that unacceptably hot daytime temperature thresholds for camping in Ontario, Canada (>35 °C), are most similar to those for beach tourism in regions of the Mediterranean (>37 °C). When considering the unacceptably cool temperature threshold for camping in Ontario parks (<16 °C), the results were most similar to that of urban tourism in the Mediterranean (<17 °C). This is

Table 4 Comparison of ideal temperatures across different tourism contexts

Tourism context Source	Study region	Ideal temperature(s) (°C)	
		Mean	Range
General			
Besancenot et al. (1978)	France		25–33
Mieczkowski (1985)	Global		20–27
Maddison (2001)	UK	30.7	
Beach			
Morgan et al. (2000)	UK and Mediterranean		27–30
Gomez-Martin (2004)	Spain		22–28
Scott et al. (2008)	Canada, New Zealand and Sweden	26.8	
Moreno (2010)	Mediterranean	28.3	
Rutty and Scott (2010)	Mediterranean		27–32
Urban			
Scott et al. (2008)	Canada, New Zealand and Sweden	22.5	20–26
Rutty and Scott (2010)	Mediterranean		
Mountain			
Scott et al. (2008)	Canada, New Zealand and Sweden	20.5	
Park (day camping)			
Current study	Canada	27.4	24–31

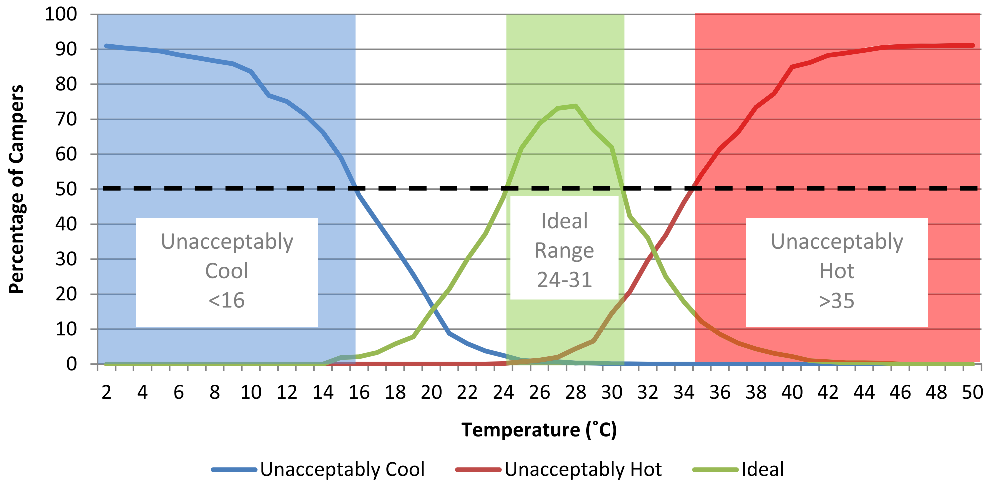

Fig. 2 Preferred daytime temperatures for summer camping in Ontario parks

interesting to note as it suggests that campers are willing to endure temperatures as hot as beach tourists and as cool as urban tourists making them a more climatically robust tourist market and in comparison to these other tourism segments, less sensitive to temperature extremes.

Although there were no statistically significant differences found between the parks with respect to the actual unacceptably hot thresholds or ideal temperatures, during the day or at night, there were significant differences between the two parks in relation to the presence of an unacceptably hot temperature threshold. At the forested lake park, 11.9 % of campers felt that no temperatures were unacceptably hot, while only 6.0 % of the campers at the coastal beach park made this same indication (x^2=7.854, P=0.005). At the coastal beach park, only 5.7 % of respondents indicated that no night temperatures felt too hot, while 11.9 % of campers at the forested lake park denied the presence of an unacceptably hot temperature threshold (x^2=8.657, P=0.003). The only other statistically significant difference found between the two parks in regard to temperature preferences were related to unacceptably cool day and night temperature thresholds. The average temperature that campers from the coastal beach park perceived to be unacceptably cool during the day was 16.4 °C, while campers from the forested lake park indicated unacceptably cool temperature threshold of 14.7 °C (t=4.725, P<0.001). During the night, the average unacceptably cool temperature threshold recorded among respondents at the coastal beach park was 9.8 °C, while campers at the forested lake park recorded an unacceptably cool temperature threshold of 7.3 °C (t=5.505, P<0.001).

4.3 Weather-related decision-making

Respondents were presented with a series of hypothetical weather scenarios where they were asked how they would respond to different weather conditions if they persisted over increasing durations of time. The six weather conditions that were presented were as follows: unacceptably cool and hot

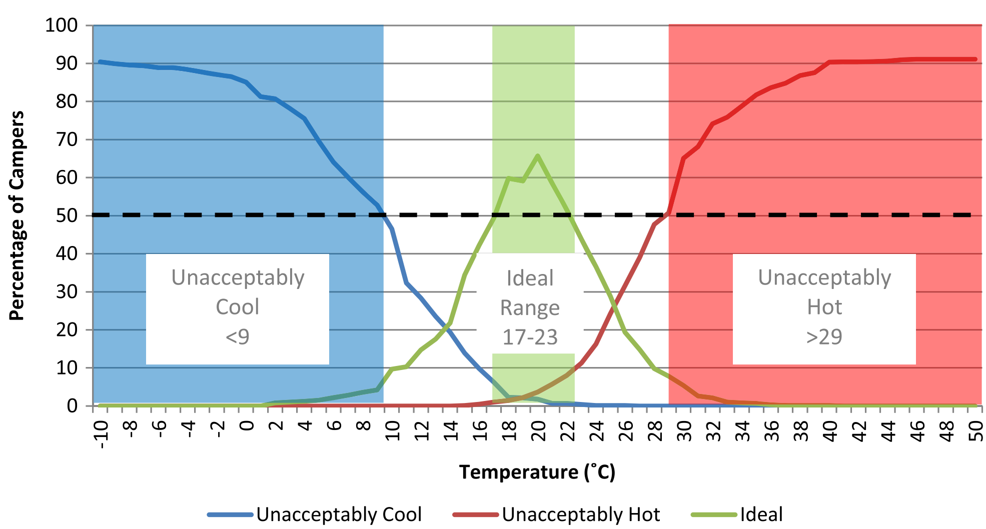

Fig. 3 Preferred night temperatures for summer camping in two Ontario parks

temperatures (as defined by the respondent), light rain (less than 1 mm/h), heavy rain (more than 16 mm/h), light winds (10–40 km/h) and strong winds (41–90 km/h). The increasing durations of time presented in the scenarios were as follows: 1 to 12, 13 to 24, 25 to 48 and more than 48 h. The three weather scenarios with the greatest influence over campers' decision-making (early departure) were heavy rain (68.3 %), followed closely by strong winds (60.8 %) and then unacceptably cool temperatures (49.4 %). Heavy rain and strong winds are indicative of severe weather which can be dangerous for campers, hinder or prevent most recreational activities, or may cause considerable discomfort and therefore negatively influence camper satisfaction (de Freitas 2003). Furthermore, the last finding of unacceptably cool temperatures coincides with the notion of natural seasonality for park tourism in the study region, as suitable temperatures are the biggest determent of park visitation in Ontario (Jones and Scott 2006a) and for most parks across Canada (Jones and Scott 2006b).

The respondents from the two study parks displayed statistically significant differences in intended responses to five out of the six different weather scenarios (Table 5). Only in the case of intended responses to light winds were no significant differences found between the two parks (x^2=1.972, P=0.160). A significantly higher percentage of campers from the coastal beach park indicated their intentions to leave the park early for all five weather scenarios considered. The most pronounced difference found between campers from these two parks was observed in the intended responses to heavy rain conditions (x^2=32.256, P<0.001).

Respondents who indicated their intentions to leave the park early in response to weather (N=521) also identified the duration of time they were willing to endure for each specific weather condition before leaving. Table 6 displays the temporal weather thresholds for each weather condition. In four of the six weather conditions considered (unacceptably cool and hot temperatures, light rain and light winds), the greatest percentage of campers were willing to withstand more than 48 h of each respective weather condition, before indicating their intentions to leave the park early. It was only in the case of heavy rain and strong winds that the greatest percentage of campers indicated their intentions to leave the park after 25 to 48 h. Once again, these results support the claims that wind and rain have an "over-riding effect" on the suitability of weather for tourism and on weather-based decision-making among tourists (de Freitas 1990, 2003). The suggestion that wind and rain have an over-riding effect on the suitability of weather for tourism has been applied to beach tourism (Scott et al. 2008) as well as golf participation (Scott and Jones 2006, 2007). The results of this study suggest that the weather-related behavioural thresholds of campers are similar to that of beach users and golf participants.

When considering the differences between parks for temporal weather thresholds, only one weather scenario generated statistically significant differences related to the time before leaving the park early. Based on a Mann-Whitney U test (P=0.003), campers at the forested lake park were willing to endure heavy rain conditions for a significantly longer duration of time (mean rank=240.14), when compared to campers at the coastal beach park (mean rank=204.54). A greater percentage of campers from the coastal beach park indicated their intentions to leave the park early after 1 to 12 h (12.0 %) as well as after 13 to 24 h (26.4 %), compared to what was

Table 5 Differences in intended responses to weather scenarios between parks

Weather scenario	Percentage of respondents		x^2	P value
	Adjust activities	Leave park early		
Unacceptably cool temperatures (day <16 °C; night <9 °C)	**(50.6)** [a]	**(49.4)**	18.272	<0.001
Coastal beach park	43.1	56.9		
Forested lake park	60.5	39.5		
Unacceptably hot temperatures (day >35 °C; night >29 °C):	**(68.8)**	**(31.2)**	23.547	<0.001
Coastal beach park	60.5	39.5		
Forested lake park	79.0	21.0		
Light rain (less than 1 mm/h)	**(66.4)**	**(33.6)**	14.604	<0.001
Coastal beach park	60.0	40.0		
Forested lake park	74.5	25.5		
Heavy rain (more than 16 mm/h)	**(31.5)**	**(68.5)**	32.256	<0.001
Coastal beach park	22.3	77.7		
Forested lake park	43.4	56.6		
Strong wind (41–90 km/h)	**(39.2)**	**(60.8)**	13.889	<0.001
Coastal beach park	32.6	67.4		
Forested lake park	48.0	52.0		

[a] Percentages within brackets, placed in bold, are representative of the percentage of responses within the total sample for each intended response; this is indicative of the expected value from the individual parks within each intended response for the various weather conditions

Table 6 Time before leaving park due to weather scenarios

Weather scenario	Percentage of respondents				Mean time (1–4)
	1–12 h	13–24 h	25–48 h	>48 h	
Heavy rain (more than 16 mm/h)	12.3	31.1	38.2	18.5	2.63
Strong wind (41–90 km/h)	10.6	21.6	44.3	23.6	2.81
Unacceptably cool temperatures (day <16 °C; night <9 °C)	5.2	12.4	37.1	45.3	3.23
Light rain (less than 1 mm/h)	1.4	17.4	36.6	44.6	3.24
Unacceptably hot temperatures (day >35 °C; night >29 °C)	2.6	11.1	37.0	49.2	3.33
Light wind (10–40 km/h)	8.1	17.7	35.5	38.7	NA

observed among campers from the forested lake park (7.6 and 12.7 %, respectively). Inversely, a greater percentage of campers from the forested lake park were willing to endure between 25 to 48 h (53.2 %) as well as more than 48 h (26.6 %) of heavy rain conditions, compared to what was reported among campers from the coastal beach park (39.5 and 22.1 %, respectively). Campers at the forested lake park had a higher temporal weather threshold for heavy rain conditions and are therefore less sensitive to extreme rain events. However, it is important to recognise that the on-site weather conditions while sampling at the forested lake park were predominantly wet and rainy, in comparison to the hot and dry conditions experienced at the coastal beach park. These on-site weather conditions may present a possible bias within the results and more specifically, when comparing these two parks, especially in relation to weather-based decision-making surrounding light and heavy rain conditions. The reason for such bias lies in the potential that campers from the forested lake park who would have left the park due to rain may have done so already and therefore were not able to participate in the study and contribute to the results.

5 Conclusions

The results of this study demonstrated that sunshine, followed by comfortable temperatures and then the absence of rain were the three most important weather variables in relation to camper satisfaction. During the day, temperatures below 16 °C were considered too cold, temperatures above 35 °C were considered too hot and temperatures between 24 and 31 °C were considered ideal for summer camping in two Ontario parks. At night, temperatures below 9 °C were considered too cold, temperatures above 29 °C were considered too hot and temperatures between 17 and 23 °C were considered ideal. Furthermore, the results of this study demonstrated that heavy rain, followed by strong winds and then unacceptably cool temperatures were the three most influential weather variables in relation to camper decision-making. Additionally, it was determined that campers were willing to endure the least amount of time under strong wind conditions, before indicating their intentions to leave the park early, followed by heavy rain conditions and then unacceptably cool temperatures.

A comparison between two different natural environment parks within the study region generated statistically significant differences for unacceptably cool temperature thresholds and weather-related decision-making. Campers from the coastal beach park placed greater importance on the absence of rain and comfortable temperatures. Campers from the forested lake park were willing to endure temperatures of an average of 2 °C cooler, both during the day and at night. Campers from the coastal beach park were more likely to indicate their intentions to leave the park early in response to five of the six different weather scenarios (heavy and light rain, strong winds, unacceptably hot and cool temperatures), all but light wind conditions for which there were no statistically significant differences. Finally, campers from the forested lake park were willing to endure longer durations of heavy rain conditions before indicating their intentions to leave the park early. There were no significant differences between the two parks in relation to the temporal weather thresholds associated with the other five weather scenarios.

Based on the nature of this study and subsequent data analysis, it can only be concluded that the differences in weather preferences and weather-related decision-making between the two parks are related to the different physical and environmental features associated with them. However, it is very likely that other market-oriented characteristics may exert a controlling relationship over the weather preferences and weather-related decision-making of campers at these two parks. There is a noted gap in the tourism climatology literature due to a lack of empirical studies that compare climatic preferences for major tourism market segments such as sociodemographic and cultural groups, as well as tourists from different places of origin (Scott et al. 2008; Rutty and Scott 2010; Gössling et al. 2012). Nonetheless, Rutty and Scott (2013) found that there were significant differences in weather preferences and thresholds among Caribbean beach tourists based on both place of origin and tourist age. Other factors that are likely relevant control variables for park tourism in particular may include the following: distance travelled, length of stay, activity preferences and type of accommodation. There is a need for further research to explore the interconnected relationship between market-oriented camper characteristics, as well as the physical and environmental features associated with each park in relation to weather preferences and weather-related decision-making (Hewer and Gough, forthcoming).

The identification of what temperatures campers perceived to be ideal and unacceptable for camping in Ontario parks allows for new approaches to assess the impact of rising temperatures projected under climate change on this nature-based tourism activity. Jones and Scott (2006a) projected considerable increases to park visitation in Ontario over the course of the twenty-first century as a result of warming. However, they were unable to identify a critical temperature at which visitation may begin to decline during the peak summer months because only monthly park visitation data was available. This study suggests that when temperatures rise above 35 °C during the day or above 29 °C at night, conditions become unsuitable for camping and may result in a decline in park visitation. The identification of temperature preferences and thresholds during the spring and fall months of the park shoulder seasons for this study region would also provide important empirical evidence for use in future climate change impact assessments on park visitation in Ontario.

The results of this study suggest that climate preferences and thresholds differ between parks with different physical and environmental characteristics, even within the same tourism region and climate zone. It is therefore likely that the weather sensitivity of these parks will also vary considerably. These findings are in agreement with Jones and Scott (2006a, b), who in their climate change impact assessment on park seasonality and visitation in Ontario and across Canada, showed that weather sensitivities vary among parks and therefore projected disparate climate change impacts across different parks.

The finding that heavy rain and strong winds had the greatest influence over camper decision-making compared to any other weather variables considered, supports the contention of de Freitas (2003) concerning the over-riding effect of wind and rain on tourist decision-making. There is a need for future research looking at the effect of severe weather on park visitation, as well as other tourism activities in general. This knowledge gap could be addressed, as one example, by employing a temporal analogue (Steiger 2011), examining the effect of past severe weather events on park visitation.

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