

## Does the weather influence where tourists want to stay in Norway?

Leiv Opstad, NTNU Business School, Trondheim, Norway

Robin Valenta, NTNU Business School, Trondheim, Norway

Gaute Hvidsten, NTNU Business School, Trondheim, Norway

Johannes Idso, Western Norway University of Applied Sciences, Sogndal, Norway

### Abstract

The purpose of this article is to determine if the weather affects the length of tourist stays at Norwegian campsites across different Norwegian regions. We use monthly data on visitors divided by counties and regions for the summer months over a five-year period to accompany the data on weather. We provide insight on the weather through figures, while the article's research question is answered with linear regression models. The conclusion is that there is a significant correlation between temperature and the length of time guests spend in a particular geographical area. But the impact is greatest for those who spend the night in tents and caravans. This analysis failed to prove any correlation between temperature and length of stay. The paper does not investigate other factors that may affect the duration of tourists' stay at a campsite.

### Introduction

Camping visitors participate in many outdoor activities, making the quality of their stay weather-sensitive. The optimal weather for summer-time tourism in Norway's landscape is warm and sunny, although the many rainy days introduce risk to the choice of staying in Norway. Around 20% of the tourist stays in Norway is at camping sites (Idsci & Opstad, 2021), which includes everything from low-cost tents to camping huts to luxurious campers. As Mikulie et al. (2017) state, camping tourism is an important part of the tourist sector, due to the public's high demand for this low-cost tourism alternative. The quality of, and thus the demand for, tourism is highly dependent upon the possibility of sleeping under the standards of the chosen tent, cabin, or wagon, so the visit to Norwegian campsites is very seasonal (see Figure I),

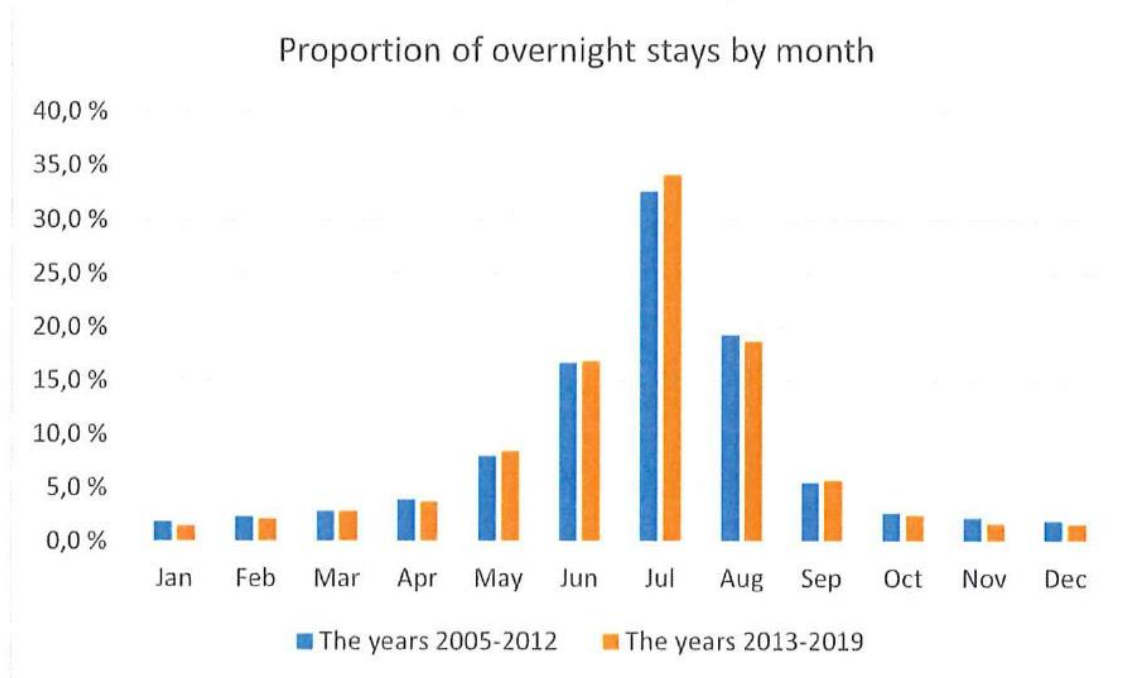


Figure 1. Seasonal stay at campsites (Source: Statistics Norway)

Throughout the year, most campsites only see demand during the summer months, the lengths of which are significantly different depending on the region where the campsite is located. The choice of region for campers is also dependent on the weather (Gosling et al., 2012) and their satisfaction (Becken & Wilson, 2013; Ruddy & Scott, 2014) after the trip. Climate change can modify this picture and make Scandinavia more attractive to visit if the expected negative effect of rainfall does not outweigh the expected positive temperature effect.

In the Western European context, Norway is in a unique position when it comes to different weather zones. The high mountains split east and west, which, combined with Norway's length, creates for distinct weather areas in Norway. In this paper, we exploit these differences and research whether differences in weather and precipitation affect customers' geographical choice of campsites. The choices of whether to camp and where to camp may be affected by the weather, and both short- and close-distance travellers can adjust their travelling plans depending on the weather. The weather projections are only estimates, however, meaning that potential campers can only partly choose the best location to camp as it pertains to weather. We want to research if the dependence of customer demand on weather is reflected in the customer's choice in region of travel. This study looks at the effects of how different weather affects the choice of destination in Norway. However, we will not analyse other factors that may affect the scope and distribution of travellers between different locations in Norway.

#### Literature review

There are not many empirical studies on the importance of climate on campsite visitors' choice of destination (Hamilton & Lau, 2006). However, there is growing interest in the issue (Becken & Wilson, 2013), and it looks like the climate is an important factor to explain the preferred place. Gosling et al. (2012) reported that more than 50% of visitors to Zanzibar rated the climate as a key factor for their decision to go to Zanzibar. The study by Hamilton and

Lau (2006) pointed out that climate ranks at the top of Germans' destination attributes. Other important factors are cultural/historical attractions and nature/landscape, although this study does not include factors besides weather, which includes temperature and rainfall.

Kim et al. (2017) report that weather has a substantial impact on tourist satisfaction. However, they found physical attributes and services to be more important factors than the weather. Tourists enjoy weather deemed normal but dislike weather that is too hot, too cold, too windy, or too rainy. Unforeseen bad weather conditions will have a negative effect on tourists' well-being and activities (Scott et al., 2008). Some researchers report the air temperature as the most important factor for tourist comfort (Bigano et al., 2006). For German tourists, the main reason for visiting the Mediterranean Sea during the summer is the climate (Kozak, 2002).

By using data for the peak summer season from 1960 to 2012, Falk (2013) reported that sunshine duration and temperature have a strong impact on the number of overnight stays (both domestic and foreign). The influence for foreign visitors was only significant with a one-year lag, indicating that weather reports travel by word of mouth from year to year within foreign communities. For domestic visitors, there was a strong relation between stay and sunshine days for the same months, indicating that these tourists can choose whether to go to a given location or to stay or leave another day, depending on the weather. For these tourists, no time lag was recorded.

Another aspect is how visitors will respond to changes in the weather conditions during their stay. Will it affect how long they stay at a particular place? Becken and Wilson (2013) report that bad weather caused visitors in New Zealand to leave a destination earlier than planned, while pleasant weather caused them to stay longer. Other respondents stayed, waiting for the weather to improve based on the weather forecast. Another group continued driving, searching

for better weather. Even though the effect was significant (39%), most of the visitors did not change their timing (61%). Many visitors chose to engage in more indoor activities if the weather was unpleasant (51%).

Tourists who want warm weather and beaches are likely to choose destinations other than Scandinavia. There are probably other factors that are more appreciated and motivational, such as seeing landscapes, mountain hikes, boat trips, cultural attractions, midnight sun, fishing, and other outdoor activities. Even so, the weather conditions can be cruel to the tourism experience. For instance, unpleasant weather can prevent tourists from going fishing or hiking. However, for smaller tourist segments, strong winds and high waves can be perceived as an attraction. According to Denstadli et al. (2011), tourists find the weather good based on what they expect in Northern Norway, and the weather conditions have minor influence on their behaviour. The authors point out that weather forecasts can have a major impact on the choice of tourist destination but that they are not familiar with many studies that have investigated this phenomenon.

According to Hewer et al. (2018), the ideal daytime temperature for summer camping in Canada (Ontario Parks) is 27.4 °C. For the night, the preferred temperature is 19.7 °C. The visitors will find it too hot if the temperature is past 34.8 °C during the day and 28.7 °C during the night, and they find it uncomfortable if the temperature is below 21.3 °C during the day and 10.7 °C during the night. The ideal daytime temperature interval is between 24 and 31 °C. Females prefer slightly higher temperature than males, and older people (aged 55 and up) have a slightly lower ideal temperature than younger people (about 1 °C). Younger visitors are more weather-tolerant than older ones. The results are in line with the finding of Hewer et al. (2015). Using American data, Ma et al. (2020) suggested minimum temperatures for camping to be 11 °C and 4 °C for cabin camping. The temperature impacts depend on occupancy type, with cabin campers being less sensitive than tent campers. The camping occupancy is closely linked to the climate and especially the number of sunshine hours. A considerable part of the stay is weekend-based, with the weather conditions being important for the last-minute decision to go camping. However, Ma et al. (2020) did not capture how shifting weather conditions might influence camping destination and behaviour.

## Research hypotheses

Based on the previous research, we postulate two research hypotheses:

1. There is a positive relationship between overnight stay at campsites in a region and temperature (H1).
2. There is a negative relationship between overnight stay at campsites in a region and rainfall (H2).

While common understanding says that the quality of overnight stays at campsites per region is the highest when the temperature is comfortable and when there is little to no rainfall, it is unclear whether the quality of a trip influences the choice of location and duration of the trip. Becken and Wilson (2013) suggest that about 40% of visitors might change the length of stay at a specific destination due to changes in the weather. In this paper, we investigate if the preference for pleasant weather is reflected in the data of overnight stays, thus seeing if changes in weather can have regional impacts on tourist flow in Norway.

## Sample and methodology

The sample is based on administrative data publicly available in official statistics of Statistics Norway about monthly overnight stay (domestic and foreign) at campsites for the three summer months from 2015 to 2019 (five years). A monthly overview of temperatures and precipitation is publicly available from the Norwegian Department of Meteorology. We divided Norway into five regions (South, West, East, Middle, and North). Within each region, there

are minor differences in temperature and precipitation. In all, there are 75 observations in the three summer months for five years for each of the five regions.

Table 1: Descriptive Statistics

Descriptive statistics						
By Region	Norway	East	Middle	North	South	West
Temperature	12.81 °C (2.21)	13.68 °C (1.71)	12.75 °C (1.72)	10.27 °C (2.14)	14.39 °C (1.62)	12.97 °C (1.48)
Rainfall	98.17 mm (48.02)	74.50 mm (24.74)	94.89 mm (36.06)	71.29 mm (26.30)	99.03 mm (35.12)	151.13 mm (62.92)
Overnight stays	335198 (214597)	371544 (128888)	229058 (62649)	179909 (53619)	617889 (288981)	277592 (89403)
Share of tents/wagons	.239 (.056)	.205 (.049)	.234 (.064)	.251 (.051)	.227 (.050)	.277 (.047)
Number observations	of 75	15	15	15	15	15

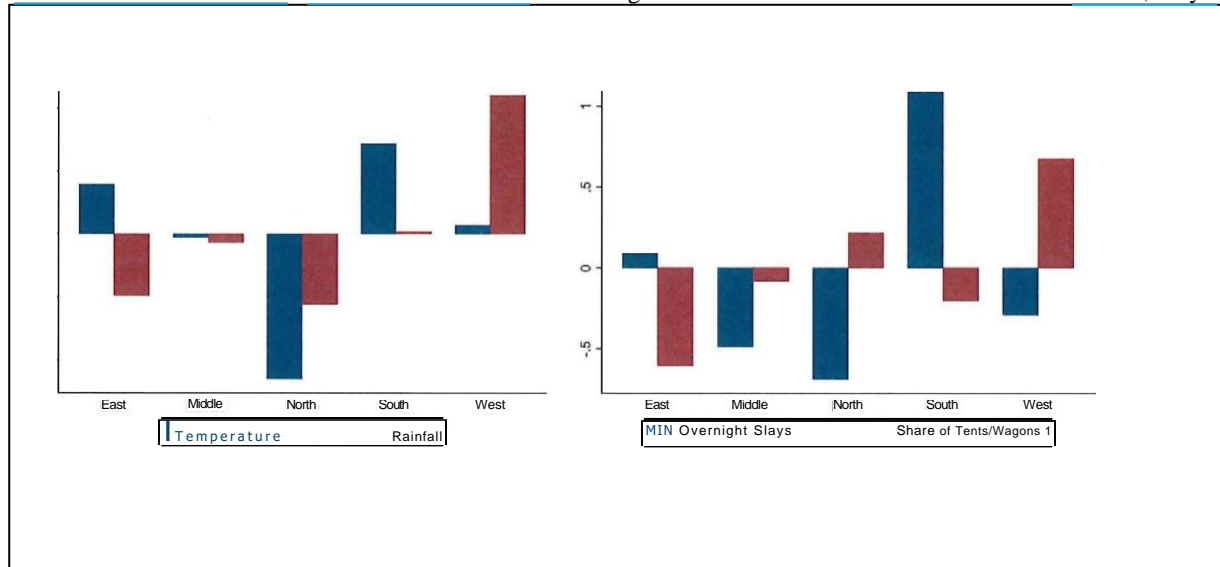
From Table 1, we see that the average temperature in Norway is 12.8 °C during the three summer months, and during these months the average rainfall is 98 millilitres per month. The standard deviation of temperature is 2.2 °C, and it encompasses all regions except the northern part of Norway, which is colder. The western part of Norway distinguishes itself from the rest of Norway in terms of rainfall. It rains over 50% more in the West than in Norway generally. In Figure 2a, we graphed temperature (blue) and rainfall (red) in their standardised values, where we can see that the eastern and middle parts of Norway are at the middle of both measures, the north being colder and the south warmer, while the west has heavy rainfalls.

In the second half of Table 1, we provide the means of overnight stays per region and the share of the campers who camp in tents or wagons. As noted, the latter type of camper is believed to be more sensitive to weather effects, due to the lack of isolation and thus protection from the weather. While the East and West are different from the mean with regards to the makeup of their campers, they are not more than four percentage points away from the Norwegian mean of 24% tent and wagon campers.

The camping sector of the tourism industry is concentrated in the southern region, drawing domestic campers with its warmer climate. Interestingly, the region with the highest share of campers visiting in tents and wagons is also the one with most rainfall: the West. It seems that the West's famous fjords draw this kind of tourism despite the heavy rainfall.

Figure 2a: Temperature and Rainfall

Figure 2b: Overnights Stays



The Appendix presents a more detailed overview of overnight stays, temperatures, and rainfall.

To investigate how, or if, the weather affects how and where tourists choose to camp in Norway, we formulate four regression models. Models 1 and 3 use overnight stays as the dependent variable, while models 2 and 4 use the share of overnight stays in tents and caravans of the total overnight stays as the dependent variable (Y). All models attempt to answer the same question and thus have the same variables of interest: temperature and rainfall. They are described by four explanatory variables: average temperature (X1), average rainfall (X2), the deviation from normal temperature (X3), and the deviation from normal rainfall (X4). The deviations from normal temperature are a ranking between the regions, where the region with the coldest temperature has the value 1, and the region with the temperature has the value 5. The same goes for rainfall, with the rainiest region taking the value 5. Models 1 and 2 use regional observations for the three summer months over five years, resulting in 75 observations. Since the observations are limited, we only include dummy variables controlling for inherent differences in overnight stays between regions. In models 3 and 4, we use observations of counties in Norway for the same five summer periods. There are 16 counties in Norway, meaning that we have 240 observations. In these models, we include dummies to control for yearly and monthly differences, in addition to differences between counties.

## Findings

Table 2 confirms there are substantial regional differences in the choice of destination. There is no significant connection between rainfall and share of stay for either all overnight or overnights for tent and caravan. The same result occurs for model 2; therefore, Hypothesis 2 is rejected. However, there is a weak significant link (10% level) between the average temperature and market share and all overnights and for tent and caravan. The impact is slightly stronger for tent and caravan, with a standardised beta of 0.190 compared to 0.107 for all overnight stays. However, there is no association between temperature ranking and market share using regional data. With county-wise observations, the results are different. For all overnight stays, the connection between temperature and stay is not significant. The same conclusion is made for the average temperature. The variance inflation factor (VIF) values are for both temperature and rainfall in the county-wise regression, suggesting multi-collinearity across counties. Counties close to each other have similar weather. By ranking the temperature, we observe a significant effect of temperature on the share of stays in tents and caravans. The effect is not too strong, and the coefficient value is rather small (beta = 0.082). Hypothesis 1 is confirmed, as the temperature seems to affect where and for how long camping tourists stay in Norwegian regions. The evidence of rainfall affecting stays is weak. A reason might be that rainfalls are harder to predict, making it harder to plan around for tourists.

Table 2. Result from Regression Models

	Model I	Model 2	Model 3	Model 4
	Share of total overnight stays	Share of stays in tents and caravans	Share of total overnight stays	Share of stays in tents and caravans
Temperature (average)	.107* (1.708) [1.909]	.190* (1.755) [1.909]	-.050 (-.750) [6.819]	-.057 (-.687) [6.819]
Temperature (ranking)	.008 (.161) [1.206]	.087 (1.012) [1.206]	.052 (1.568) [1.514]	.082* (2.091) [1.514]
Rainfall (average)	.055 (.826) [2.129]	.100 (.880) [2.129]	.023 (.386) [4.833]	-.057 (-.813) [4.833]
Rainfall (ranking)	-.048 (-.891) [1.411]	-.086 (-.926) [1.411]	.002 (.062) [2.011]	-.036 (-.793) [2.011]
Controlling variables	Regional	Regional	County Year Month	County Year Month
Adjusted R-squared	.848	.547	.825	.757
Observations	75	75	240	240

Standardised coefficients in parentheses , T-test , VIP in brackets

## Discussion

Although researchers report that changes in the weather affect how long tourists stay in a place (Becken & Wilson, 2013), few studies have systematically estimated the extent of this effect. By registering monthly data for the peak summer season over a five-year period, we tried to quantify this impact within Norway. By looking at regional differences in temperature, we proved that this has a significant impact on the proportion holidaying in the different

parts of the country. This is consistent with the findings of Falk (2013). When focusing on regions and market shares, the level of temperature had a positive impact on the share of overnight stays, but the ranking itself based on deviations from normal weather did not result in a significant correlation. As expected, the effect was greatest for those who stayed overnight in tents and caravans. This type of holiday is more sensitive to adverse weather than for those who stay in cabins or campers. Applying disaggregated data and focusing on the number of overnight stays divided by counties give some different results. The most important difference is that we do not have a significant impact between weather and overall overnight stays. This is somewhat surprising, since there are far more observations, and they capture changes within a region. On the other hand, there are still significant effects for the connection between overnight stays in tents and campsites and temperature, based on the ranking of the normal situation. One possible reason why the temperature level did not show any effect is the high VIF value. This is due to multi-collinearity and gives uncertain values on the estimated coefficients.

There may be several factors that explain why the impact of this analysis is not greater. We record the number of millilitres of precipitation in a month, but not how the precipitation is distributed over the period. For a tourist, the experience can be very different from a lot of concentrated precipitation within a few days or hours compared to rain spread out with a little rain over many days. The latter can be perceived as grey and sad. Therefore, it would have been desirable to have registered the division between sunny and grey weather days. Although there is a positive correlation between temperature and sunny days, the average temperature will capture how tourists experience the weather to the same extent. Falk (2013) reports that there is a much stronger link between the number of sunny days and visiting tourists than between average temperature and tourist inflow. If we transfer this result to Norwegian conditions, the impact would have been significantly more marked if data were available on the number of sunny days. Secondly, most people plan their vacation well in advance. According to Denstadli et al. (2011), tourists do not holiday in Norway if they are primarily looking for sun and a warm climate. For both domestic and foreign tourists, there are other factors that motivate (nature experiences, culture, amusement parks, boat trips, etc.). This is related to specific areas. Denstadli et al. (2011) report that if the weather is close to normal, tourists will not focus on this factor. Perhaps it is only when there is a marked deviation from what the visitors expect that they will react. Otherwise, they are not very sensitive to the weather. Results from surveys in New Zealand therefore may not be transferred to Norwegian conditions.

### **Limitation and conclusion**

Using public data over a five-year period, this analysis documents that the temperature affects how long camping tourists stay in a particular place during the peak season. Regions with a high temperature attract a higher proportion of tourists. As expected, this effect is strongest for tent and caravan visitors. The impacts are rather small but are statistically significant. The use of more disaggregated figures by counties resulted in deviations from normal temperature having an effect only on those sleeping in tents or caravans. The analysis could prove some correlation between precipitation and length of stay at the campsites.

Access to data limits this analysis. It would have been desirable to have information that records the number of sunny days and the number of rainy days. Since the weather changes frequently, weekly or daily figures could capture to a greater extent the tourists' change in behaviour due to the weather. It is likely that factors other than the weather motivate camping tourists to holiday in Norway. Therefore, it would be informative to investigate how customers react to changes in weather and the forecasts and also to identify whether there is a difference between domestic and foreign tourists. These may be ideas for future projects.

### **References**

- Becken, S., & Wilson, J. (2013). The impacts of weather on tourist travel. *Tourism Geographies*, 15(4), 620-639. [doi.org/10.1080/14616688.2012.762541](https://doi.org/10.1080/14616688.2012.762541)



- Bigano, A., Hamilton, J. M., & Tol, R. S. J. (2006). The impact of climate on destination choice. *Climatic Change*, 76(3-4), 389-406.
- Denstadli, J. M., Jacobsen, J. K. S., & Lohmann, M. (2011). Tourist perceptions of summer weather in Scandinavia. *Annals of Tourism Research*, 38(3), 920-940. doi: 10.1016/j.annals.2011.01.005
- Falk, M. (2013). Impact of long-term weather on domestic and foreign winter tourism demand. *International Journal of Tourism Research*, 15(1), 1-17. doi: 10.1002/jtr.865
- Gossling, S., Bredberg, M., Randow, A., Sandstrom, E., & Svensson, P. (2006). Tourist perceptions of climate change: a study of international tourists in Zanzibar. *Current Issues in Tourism*, 9(4-5), 419-435. doi.org/10.2167/cit265.0
- Gossling, S., Scott, D., Hall, C. M., Ceron, J. P., & Dubois, G. (2012). Consumer behaviour and demand response of tourists to climate change. *Annals of Tourism Research*, 39(1), 36-58.
- Hamilton, J. M., & Lau, M. A. (2006). The role of climate information in tourist destination choice decision making. *Tourism and Global Environmental Change*, 234-264. Routledge.
- Hewer, M., Scott, D., & Gough, W. A. (2015). Tourism climatology for camping: a case study of two Ontario parks (Canada). *Theor Appl Climatol*, 121, 401-411. <https://doi.org/10.1007/s00704-014-1228-6>
- Hewer, M. J., Scott, D. J., & Gough, W. A. (2018). Differential temperature preferences and thresholds among summer campers in Ontario's southern provincial parks: a Canadian case study in tourism climatology. *Theoretical and Applied Climatology*, 133(3), 1163-1173. doi.10.1007/s00704-017-2248-9
- Idso, J., & Opstad, L. (2021). Use of campsites in Norway. What impact does change in exchange rate and income have? *Global Conference on Business and Finance Proceedings*, Costa Rica, 16, 109-119.
- Kim, S., Park, J. H., Lee, D. K., Son, Y. H., Yoon, H., Kim, S., & Yun, H. J. (2017). The impacts of weather on tourist satisfaction and revisit intention: a study of South Korean domestic tourism. *Asia Pacific Journal of Tourism Research*, 22(9), 895-908. doi.org/10.1080/10941665.2017.1357640
- Kozak, M. (2002). Comparative analysis of tourist motivations by nationality and destinations. *Tourism Management*, 23(3), 221-232. doi.org/10.1016/S0261 5177(01)00090-5
- Ma, S., Craig, C. A., & Feng, S. (2020). The Camping Climate Index (CCI): The development, validation, and application of a camping-sector tourism climate index. *Tourism Management*, 80, 104105. doi.org/10.1016/j.tourman.2020.104105
- Mikulid, J., Prebeac, D., Seric, M., & KregiO, D. (2017). Campsite choice and the camping tourism experience: Investigating decisive campsite attributes using relevance-determinance analysis. *Tourism Management*, 59, 226-233. <https://doi.org/10.1016/j.tourman.2016.07.020>
- Rutty, M., & Scott, D. (2014). Thermal range of coastal tourism resort micro climates. *Tourism Geographies*, 16(3), 346-363.
- Scott, D., Gossling, S., & de Freitas, C. R. (2008). Preferred climates for tourism: Case studies from Canada, New Zealand and Sweden. *Climate Research*, 38(1), 61-73.

## APPENDIX

Overnight stay. Temperature and rainfall by regions and counties.

Region	All overnight stay. mean	Std. dev.	Tent & caravan mean	Std. dev.	Average temperature	Dev .	Average rainfall	Percent of normal
Eastern								
I	104380	32634	12970	9769	16.2	1.0	78.3	101.8
II	78892	29400	17149	10092	13.8	0.7	73.4	101.6
III	188270	70598	50451	27249	11.0	0.9	71.7	112.3
Sum	349437	246670	85863	68841	12.8	1.3	98.2	113.1
Southern								
I	108737	39008	31041	15738	14.2	1.0	83.2	113.0
II	186140	82901	23041	14004	16.0	0.7	88.2	109.0
III	127105	68843	41210	32078	12.8	0.7	97.0	112.4
IV	121519	62370	33196	23173	14.3	0.8	103.6	116.2

V	74386	38999	21351	16835	14.7	0.8	123.3	119.6
Sum	617889	288981	149841	97049	14.4	0.8	99.0	114.0
Western								
I	67384	21168	17923	9654	14.2	1.0	154.3	122.0
II	92178	31048	28067	11083	12.0	0.8	173.7	127.6
III	119028	38556	33797	16688	12.7	0.9	125.4	115.7
SUM	277591	89403	79789	37019	13.0	1.2	151.1	121.8
Middle								
I	106640	33758	25206	13408	12.6	0.9	97.3	104.1
II	122416	31417	30775	15869	12.9	0.9	92.5	116.4
Sum	229057	62648	55982	28810	12.7	0.9	94.9	110.2
Northern								
I	106569	34311	30248	16820	11.2	0.5	82.5	110.0
II	41665	11135	10166	3953	9.5	0.3	67.4	110.1
III	31673	9282	6672	2910	10.0	0.4	63.9	122.0
Sum	179908	53619	47086	22733	10.3	0.4	71.3	114.0