

CLIMATE CHANGE, TOURISM, AND DESTINATION RESILIENCE ON MOUNT DESERT ISLAND

Findings from a 2017-2020 social science study

Key Findings:

- High visitor intention to engage in spatial, temporal, and activity substitution
- Visitors' top perceived threats: increased ticks and mosquitoes, extreme weather events
- Suppliers' top perceived threats: changes to marine economy, shifting species, and overcrowding
- Suppliers and visitors concerned with extreme weather events and increased ticks
- A notable divergence between supplier and visitor concerns was overcrowding

Study Background

- Climate change will create challenges and opportunities for nature-based tourism destinations with shifts in visitation, how tourism products are developed and advertised, and how natural and cultural resources are managed.
- By studying perceptions of and responses to climate change within tourism destinations, we can begin to understand what factors shape destination resilience—the ability of destinations to anticipate and respond to changes and uncertainties¹.
- Successful tourism development is a function of how well suppliers meets demand, and matching supply and demand is an continuous, dynamic process².
- Predicting shifts in visitation patterns and changing demands as a result of climate change can help tourism suppliers proactively respond to changing visitor expectations and behaviors, helping them provide high quality tourism experiences that also generate economic development in rural areas³.
- Misalignments between visitor demand and supplier products and services can result in negative visitor interactions, a decline in visitation over time, and negative impacts to tourism suppliers' livelihoods⁴.

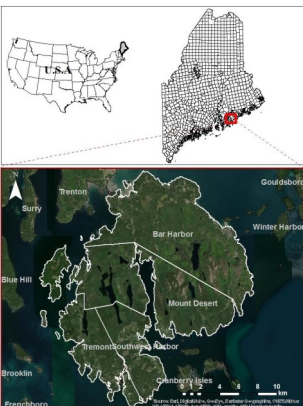
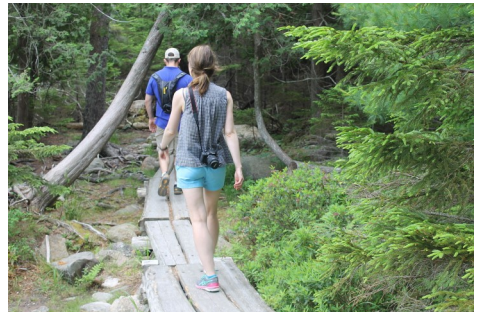


Figure 1. Study site towns include Bar Harbor, Mount Desert, Southwest Harbor, Tremont, and Winter Harbor.



Study Purpose

The goal of this study was to understand destination resilience to climate change by studying tourism suppliers' and consumers' risk perceptions and behavioral responses.

To address this goal, our study was guided by three research sub-questions:

- 1) What are the various climate change risk perceptions of visitors and tourism suppliers on Mount Desert Island?
- 2) How, if at all, are visitors and tourism suppliers responding or intending to respond to perceived threats and/or opportunities resulting from climate change?
- 3) Do inconsistencies exist in demand and supply risk perceptions and behavioral responses?

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Methods Overview



Table 1. Summary of data collection and analysis for supplier interviews and visitor surveys.

Visitor Surveys	Supplier Interviews
Intercepted 1,317 visitor groups to Acadia National Park in summer of 2018 ⁵	Interviews with 24 nature-based tourism stakeholders working from 2017–2020
480 of those intercepted took the online follow-up survey, giving us a response rate of 36.45%	Stakeholders included business owners, researchers, municipal officials, and non-profits whose mission supports tourism
Survey questions about socio-demographics, knowledge, experience with climate impacts, and values to assess climate change risk perceptions among tourists and intended substitution behaviors ^{6,7}	Questions on climate change beliefs, experiences, and behavioral responses (adaptation and mitigation)
Descriptive statistics reported here	Data analyzed using multiple rounds of coding, concept maps, quotations, and analytic memoing ⁸



Figure 2. Visitor intercept survey at Halls Cove Visitor Center.

Survey Results

Visitor Profile:

- 1,317 visitor groups intercepted; 480 took online follow-up survey (response rate: 36.45%)
- Top visitor activities: (1) walking, (2) sightseeing/driving for pleasure, (3) hiking/backpacking, and (4) eating lobster.
- 59% women; mean age of 51.98; highly educated and politically liberal sample.

Table 2. Descriptive statistics from visitor survey reporting top perceived threats to tourism (Reported as percentages; numbers may not total to 100 due to rounding).

Please rate the following climate change factors based on your perception of this as a potential threat to tourism in Acadia National Park:	High Threat	Threat	Not a Threat	Unsure	Sample Size
Increased presence of ticks	31	52	11	6	433
Increased presence of mosquitoes	26	51	13	10	431
Extreme weather events	21	55	15	9	432
Heat waves	24	47	20	9	427
Higher temperatures	24	47	23	7	429
Increased rain	14	49	22	15	428
Species extinction	14	48	27	12	428
Disease outbreaks	17	44	19	20	432

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Visitor Survey Results

Table 3. Descriptive statistics from visitor survey reporting top factors likely to change recreation patterns (Reported as percentages; numbers may not total to 100 due to rounding).

How likely are the following factors to influence your decision to recreate outdoors in Acadia National Park?	Increase recreation	No change	Decrease recreation	I don't know	Sample Size
Disease outbreaks	0	26	61	12	423
Increased presence of mosquitoes	1	44	50	5	427
Increased rain	1	46	48	5	424
Increased presence of ticks	1	46	48	5	424
Extreme weather events	1	44	47	8	427
Heat waves	2	45	46	6	424
Higher temperatures	3	55	34	8	425
Species extinction	1	76	13	10	427

Survey Results

- 83% of visitors said increased presence of ticks was a top threat, followed by increased mosquitos (77%). Given that 34% of visitors indicated hiking/backpacking as their primary activity, it is perhaps not surprising that nuisances like ticks and mosquitoes were ranked as the highest threats to outdoor recreation.
- Disease outbreaks, increased mosquitoes, and increased rain were most likely to decrease outdoor recreation. It is important to note that this survey concluded before the COVID19 pandemic.
- Visitors are likely to engage in substitution behaviors, including visiting other destinations in the US, visiting Mount Desert Island at another time of year, and changing the activities in which they participate.

Table 4. Descriptive statistics from visitor intention to substitute (Reported as percentages; numbers may not total to 100 due to rounding).

If climate conditions were no longer appropriate for your recreational pursuits in Acadia National Park, how likely would you be to do the following?	Very likely	Likely	Not sure	Unlikely	Very unlikely	Sample Size
Visit another place in the US	43	41	12	3	1	425
Visit another time of year	25	48	17	8	5	425
Pursue other tourism/recreation activities	21	49	16	11	2	423
Visit another place in the Northeast	25	42	22	10	2	423
Visit another place outside the US	24	31	22	17	6	422
Visit another place in Maine	22	30	28	17	4	427

Implications

- Intention to substitute activities could provide an opportunity for suppliers to develop new tourism products and diversify product offerings, which may offer increased stability in the face of climate change.

Figure 3. Student survey team at Hulls Cove Visitor Center.



- Spatial substitution intentions may create advantages for suppliers as visitors may spread out to the “quieter” side of MDI (western “half”), increasing business opportunities for traditionally less trafficked towns.

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Supplier Interview Results

- 24 interviews with business owners (7), staff from non-profits whose mission/work includes tourism (8), local municipal workers (4), and National Park Service employees (5).
- Experience with climate change impacts was an important factor in tourism suppliers' perceptions. Extreme weather events (e.g., intense precipitation events, storm surges), higher average temperatures, shifting wildlife, and changes in seasons (e.g., longer fall tourism season) were experienced by interviewees. These extreme events were connected to concerns about infrastructure, which was described as aged, in need of updating, and being vulnerable due to its location close to the coastline.

“We’re already saying, talking about ‘Do we really want to replace it?’ [Thunder Hole platform] But if we take out all that infrastructure and just add a viewing platform on top, it's not going to stop people from going down and peering into the hole. So are we gonna have more people falling in the water?” — (Marcus, NPS)



- Suppliers were concerned about impacts to the marine economy, the potential loss of iconic species like lobsters, the arrival of new species (especially ticks and invasive plants), and the impacts to wildlife viewing tourism operators.
- With visitor numbers rising in Acadia National Park and the expected increase in visitation as the climate warms⁹, interview participants discussed the observed increase in visitation and concerns about overcrowding, especially in relation to cruise tourism.

“I think it’s an unaddressed epidemic on MDI and other communities that’s really serious, and especially here because we have a tourist economy and people won’t even know that they’re being infected [with Lyme disease].”

— (Lucas, Municipal Official)



“I think the discussion around [economic development] is changing into I think a little more sustainable economic development. People are beginning to wonder how much is too much in terms of tourism. Probably in association with the higher and higher numbers of people coming to the park. And also the cruise industry.” — (Heather, Tourism non-profit)

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Supplier Interview Results Cont.

- The most frequently discussed behavioral responses to climate change involved hardening up infrastructure, changing approaches to ecosystem management, and considering local renewable energy projects to mitigate emissions.
- Non-profits and business owners appeared to be shifting the timing of some of their activities, such as seasonal businesses staying open longer into the fall.



Photo credit: USGS, 2016

“They are events that are happening much, much more frequently. So, some of our work around erosion and managing for that, and managing for connectivity in streams, for example, is to understand hydrologic change and to engineer systems, infrastructure that can accommodate those high-higher flows and more frequent flows.” — (Alyssa, NPS)

Comparing Supplier & Visitor Perceptions and Behavioral Responses

Table 5. Similarities and differences between tourism stakeholders’ experiences, perceptions of threats, and behavioral responses

	Tourism Suppliers	Visitors
Experiences		
	<ul style="list-style-type: none"> • Ticks • Extreme weather events • Changing seasons and resulting shift in visitation • Wildlife shifts (changes to range, timing of migrations) • Invasive species moving into the area 	<ul style="list-style-type: none"> • Ticks • Extreme precipitation • Hurricanes and intense storm events • Flooding • Changes in temperatures
Top threats		
	<ul style="list-style-type: none"> • Changes to the natural resource base and resulting impacts to economic activities • Extreme weather events and impact to infrastructure (roads, homes, docks, island access) • Overcrowding due to increased visitation to Acadia National Park 	<ul style="list-style-type: none"> • Ticks and mosquitoes • Extreme weather events • Sea level rise • Road damage • Power outages • Heat waves • Increased temperatures
Behavioral responses		
	<ul style="list-style-type: none"> • Improving infrastructure (e.g., culvert replacement, erosion control) • Adopting ecosystem management approaches to improve general resilience • Solar energy projects • Changing business operations (e.g., timing of events, program offerings) • Acadia National Park planning (e.g., scenario planning, vulnerability assessment) 	<ul style="list-style-type: none"> • Intention to engage in spatial, temporal, and activity substitution

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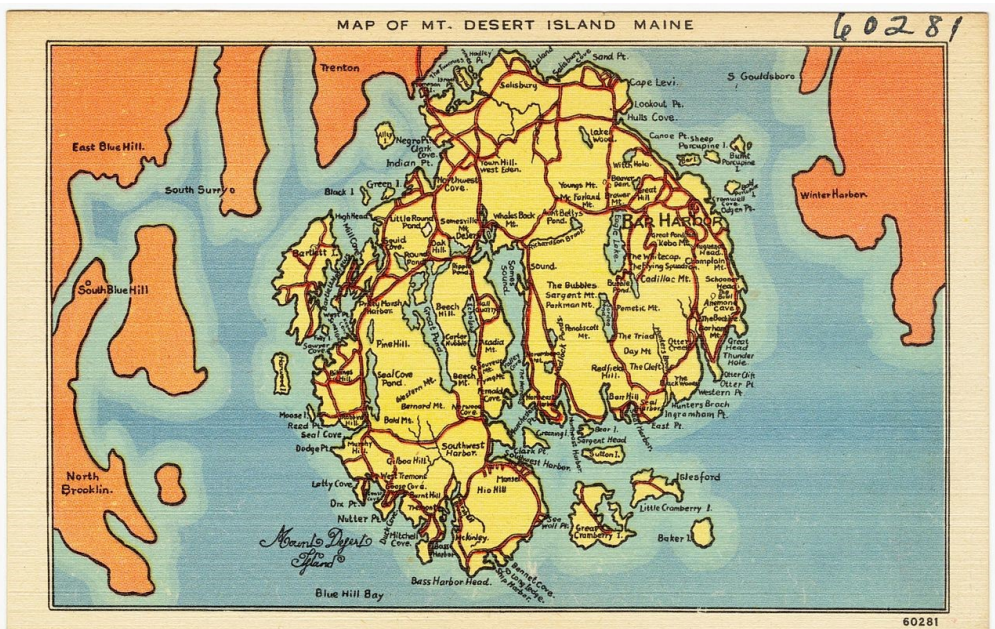
Implications

- Tourism suppliers and visitors perceived extreme weather and increased tick populations as top threats to tourism on MDI.
- Though visitors were not asked about perceptions of crowding, suppliers' perceived overcrowding as a top threat to tourism on the island.
- Perceptions of negative impacts from visitation (e.g., overcrowding, ecological degradation) can cause polarized feelings toward tourism, with some residents rejecting tourism, while those who perceive positive impacts (e.g., financial, positive host-visitor exchanges, pride in local hosts) continue to support tourism¹⁰.
- The combination of changing climate, increased visitation, potential crowding at popular sites, and high substitution intention in our visitor sample will likely influence visitor experiences and visitation management on MDI.



Photo credit: Revision Energy

- A Climate to Thrive's "Solarize MDI" initiative was viewed as the largest mitigation project on the island, though these actions were community-oriented rather than being specific to the tourism industry.
- To ensure long-term destination success, it is important to understand how tourism suppliers' and visitors' climate change perceptions and behaviors overlap and diverge to match supply and demand.



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Acknowledgements

This project was supervised by Drs. Sandra De Urioste-Stone¹ (advisor), Bridie McGreavy¹, Parinaz Rahimzadeh-Bajgiran¹, Laura Rickard¹, and Erin Seekamp².

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This work was supported by the National Oceanic and Atmospheric Administration (grant NA17OAR4310249); the National Science Foundation (grant 1828466); the USDA National Institute of Food and Agriculture (McIntire-Stennis project number ME0-42017). The author would like to thank MacKenzie Conant, Nick Ferrauolo, Nathaniel Burke, and Asha DiMatteo-LePape for transcription services. Thank you to Acadia National Park for giving us on site survey permission. Finally, this work would not have been possible without interview and survey participants who were gracious in sharing their perspectives and time.



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