

**TOURISTS IN A FRAGILE ECOSYSTEM: IDENTIFYING INTENTION TO  
PRACTICE GUIDELINES AND BEHAVIORAL COMPLIANCE**

by

John Basil Read IV  
A Thesis  
Submitted to the  
Graduate Faculty  
of  
George Mason University  
in Partial Fulfillment of  
The Requirements for the Degree  
of  
Master of Science  
Sport and Recreation Studies

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Tourists in a Fragile Ecosystem: Identifying Intention to Practice Guidelines and  
Behavioral Compliance

A Thesis submitted in partial fulfillment of the requirements for the degree of Master of  
Science at George Mason University

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## **DEDICATION**

This research is dedicated to all the individuals who have worked to preserve the Antarctic as well as those who continue this monumental endeavor to protect one of the last bastions of untarnished landscape.

## **ACKNOWLEDGEMENTS**

I would like to express my extreme gratitude to Dr. Slocum and my committee members Dr. Wiggins and Dr. Daniels. I would not have been able to accomplish this thesis without your support and encouragement. I would additionally like to thank Dr. Liggett, Dr. Ferrada, and Dr. Roura for meeting with me in Davos, CH and for your continued support. I owe Dr. Read III, Dr. Fields, and Ms. Catania a huge debt for all their assistance in the review and editing of this thesis. I am profoundly grateful to the management, staff, and crew of the IAATO vessel that worked with me to be able to conduct this research in Antarctica. To my fellow M.S. students Brett Thomas, Jeremy Steinel, Griffin Gissendanner, and Mihir Mulay, thank you for the reminders in class that it could have always been worse.

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## LIST OF ABBREVIATIONS

Antarctic and Southern Ocean Coalition .....	ASOC
Analysis of Variance .....	ANOVA
Antarctic Treaty .....	AT
Antarctic Treaty Consultative Meeting .....	ATCM
Antarctic Treaty Consultative Party .....	ATCP
Antarctic Treaty System .....	ATS
Attitude .....	AT
Australian Antarctic Division .....	AAD
Behavioral Intention .....	BI
British Antarctic Survey .....	BAS
Central Intelligence Agency .....	CIA
Common Pool Resources .....	CPR
Cultural Heritage Site .....	CHS
Environmental Impact Assessment .....	EIA
General Guidelines for Visitors to the Antarctic .....	GGVA
International Association of Antarctic Tour Operators .....	IAATO
International Geophysical Year .....	IGY
Leave-No-Trace .....	LNT
Natural Environment Research Council .....	NERC
Non-Governmental Organization .....	NGO
Observation Journal .....	Obj
Organization of Economic Co-operation and Development .....	OECD
Perceived Behavioral Control .....	PBC
Perceived Control .....	PC
Perceived Difficulty .....	PD
Predicted Behavior .....	B
Self-Reported Behavioral Intention .....	srBI
Subjective Norm .....	SN
Theory of Planned Behavior .....	TPB
United Nations Framework Convention on Climate Change .....	UNFCCC

## **ABSTRACT**

### **TOURISTS IN A FRAGILE ECOSYSTEM: IDENTIFYING INTENTION TO PRACTICE GUIDELINES AND BEHAVIORAL COMPLIANCE**

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George Mason University, 2019

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Antarctica, considered to be one of the last pristine environments on the planet, has seen tourism increase by 32% over the last ten years. The adoption of the General Guideline for Visitors to the Antarctic (GGVA) by the Antarctic Treaty System in 2011 outlined the best-practices to mitigate impacts to the Antarctic environment. With over 43,000 tourists visiting the continent during the 2017-2018 season and visitation numbers expected to continue to rise, it is imperative that visitors are motivated to practice the GGVA to keep the Antarctic pristine. After a thorough literature analysis, this study identified that compliance with the GGVA in Antarctica has seen, to date, little research investigating the intersection of tourists' intention to practice guidelines and the GGVA. To isolate this intersection, tourists' attitudes (AT), subjective norms (SN), perceived behavioral controls (PBC), and Level of Knowledge of the GGVA must be understood. The ability of the Theory of Planned Behavior to elicit intention from these variables makes it the ideal framework to examine tourists' motivations to practice the GGVA. Using mixed methods, this research assessed tourists' intention to practice the GGVA and the performed behaviors of tourists in the Antarctic through the use of a questionnaire and participant observation. Presented as a case study, the researcher found that SN is the most significant

mediator of tourists' intentions to practice the guidelines followed by AT and PBC. The research additionally found that while non-compliance rates appear low, instances of non-compliance could range as high as 111.64 per hour. While Level of Knowledge of the GGVA was found to have no significant effect on intention to practice the GGVA, the results of this study found that a significant effect does exist between Level of Knowledge and the predicted actual behaviors of tourists' practicing the GGVA. This research concluded that the TPB is an effective framework for assessing tourist compliance in the Antarctic, and that the questionnaire could have the potential to be a good predictor of how attitudes correspond to the most frequently occurring non-compliant behaviors. If expanded, future research using the TPB may help inform the decisions of stakeholders on the development of best-practices that reduce human impacts in the Antarctic.

## **CHAPTER ONE: INTRODUCTION**

When one thinks of the Antarctic continent, images of desolate frozen tundra and small numbers of specially adapted wildlife come to mind, but this was not always the case. Originally, Antarctica was a portion of the Gondwana and Pangea supercontinents, locations which held rich biodiversity and a temperate to tropical climate (Pappas, 2013). When the supercontinent Pangea divided 180 million years ago, the continental drift occurred and Gondwana began to shift further south. From 170 million to 45 million years ago, Gondwana continued to break-up finally splitting Antarctica from Australia, which drifted to where it is located today (Nance, Worsley, & Moody, 1988). The Antarctic's desolate landscape lays claim to the titles of "the coldest, windiest, highest (on average), and driest continent" (CIA, 2018, para. 3; Woods Hole, 2006, para. 1).

The existence of Antarctica has been postulated on since the sixth century B.C. by philosophers such as Aristotle and Parmenides (Hooton, 2017). The Antarctic was originally termed *Terra Australis Incognita* or 'Unknown Land of the South' and this hidden continent was first depicted on maps by the Greek cartographer Ptolemy (Dempsey, 2015). Ptolemy's maps were lost after his death, but once these maps were rediscovered in the 14<sup>th</sup> century, Antarctica was inscribed on many prominent maps during the 15<sup>th</sup> through the 18<sup>th</sup> centuries A.D. The Antarctic, with a total land area of 14 million square kilometers, approximately half the size of the African continent (Delaney,

2010), remained unseen with all evidence of this frozen continent escaping discovery until the end of the 18th century.

### **Discovery**

The second expedition of James Cook (1772 to 1775), during which he observed icebergs as he sailed south of what we know presently to be the Antarctic Circle or 67° South (Woods Hole, 2006), was the first documented proof of the existence of Terra Australis Incognita. The first physical sighting of the continent occurred during the austral summer of 1820 by Russian Admiral Fabian Gottlieb von Bellingshausen. The following year, 1821, was when the first landing on the continent was accomplished by American sealing Captain John Davis.

The majority of voyages to the Antarctic were conducted primarily as commercial ventures that focused on sealing and whaling. It was during the beginning of the twentieth century that exploration and discovery emerged as the primary themes for Antarctic expeditions. The Heroic Age of Antarctic exploration, from the turn of the century to the end of World War I, saw many grand discoveries, including, but not limited to, cartographic, geologic, and meteorological. However, the accomplishment of Roald Amundsen in 1911, the first to reach the geographic South Pole and return alive, was the apex of this era (Solomon, 2013; Woods Hole, 2006).

Since the discovery of the continent, seven nations have staked claims to portions of the Antarctic and three of those nations assert ownership of the seas surrounding it. While these claims are not formally recognized by the Antarctic Treaty System (ATS), 27

nations have constructed 60 bases for scientific research, both on the perimeter and far into the interior of the continent (CIA, 2018; Woods Hole, 2006).

### **Wildlife**

The Antarctic continent has a limited variety of wildlife that can survive its year-round harsh climate and seasons of total darkness and total daylight. Lacking any reptiles, amphibians or higher insects, terrestrial organisms in the Antarctic are mainly limited to arthropods and nematodes. Terrestrial food webs can be very simple and many, like that of the nematodes (worms), have as few as three species. Convey and Stevens (2007) explain that small organisms of the terrestrial biota are not species poor as suspected from previous research; while Tin et al. (2009) identify that “many higher taxonomic groups” are species poor (p. 10). The plant life found in the Antarctic consists of approximately 500 species that fall within mosses, liverworts, and lichens, with approximately 20 additional species of macro-fungi represented. Larger terrestrial wildlife can be found on the southern continent, although these animals spend a large portion of their lives in the ocean. Avian life in the Antarctic consists of six species of penguins, which Ron Naveen the CEO of Oceanites’ states “are the canaries of global warming” (Bathurst, 2015, para. 7), five species of albatross, five species of petrels, the South Polar Skua, the South Georgia Pipit and gulls, tern, cormorants, sheathbills, as well as some vagrants that rarely occur in this region (NERC BAS, 2015). Terrestrial mammals of the Antarctic are limited to six species of seal with four being found in the pack-ice covered regions of the continent and two species found further north outside of the pack-ice. The most population dense area in the Antarctic is the peninsular region, where the majority of

these larger species are found. Antarctica is additionally known for its marine life, including twelve species of whale and dolphins, that are frequently found in these waters (ASOC, 2008) as well as over 272 species of discovered fish (Gon & Heemstra, 1990), squid, octopi, and krill (NERC BAS, 2015).

## **Governance**

As the Antarctic lacks any indigenous people and exploration of the continent only began in the late 19th and early 20th century, this has resulted in a distinct lack of governance on this vast terrain of land and ice (CIA, 2018). Post-World War II, this lack of governance posed dramatic geopolitical implications especially as it pertained to the arms race that was occurring during the Cold War (State, 2012). To prevent the arms race from reaching Antarctica, on December 1<sup>st</sup>, 1959 the Antarctic Treaty (AT) was signed by 12 nations at the Conference of the Antarctic held in Washington, D.C., serving as the first post-World War II arms limitation and nuclear agreement between superpowers (Conference on Antarctica, 1959; Nuclear Threat Initiative, 2018; State, 2012). During the Cold War, activities remained peaceful in the Antarctic, but with an increasing potential for economic gain, in addition to the general fear of the Antarctic becoming a staging area for nuclear weapons, there was fear relating to how long the peace would last.

To encourage peaceful activities, collaboration was encouraged during the 1957-1958 International Geophysical Year (IGY) among twelve national scientific programs. The IGY encouraged scientists from different countries to work together as well as to conduct scientific personnel exchanges during the Antarctic winter season. The



successful cooperation of countries during the IGY showcased the ability of these nations to cooperate peacefully during the Cold War (State, 2012). At the completion of the IGY in 1958, the United States proposed a conference of the participating countries to discuss “that the legal status quo of the Antarctic Continent remain unchanged; that scientific cooperation continue; [and] that the continent be used for peaceful purposes only” (State, 2012, para. 6). It was this conference that led to the signing of the Antarctic Treaty (AT) by all twelve nations in 1959 with the treaty “entering into force on June 23, 1961” (State, 2012, para. 7).

The AT contains 14 resolutions that regulate activities in the Antarctic with an overall goal of maintaining the continent for peaceful and scientific purposes (Nuclear Threat Initiative, 2018; State, 2012). Consisting of two levels of treaty membership, the AT includes both ‘Consultative Parties’ and ‘Non-Consultative Parties.’ ‘Consultative Parties’ are countries whose membership is “dependent on demonstration of ‘interest in Antarctica by conducting substantial scientific research activities, such as the establishment of a scientific station or the dispatch of a scientific expedition’ (Article IX) (Meadows, Mills, & King, 1994, p. xv). The second level of membership termed ‘Non-Consultative Parties’ affords any nation that is a member of the United Nations to be a participating party, but these nations do not have voting or ‘consultative’ rights on the passage of regulations (Secretariat of the Antarctic Treaty, 2011b). Other parties are allowed to participate at the Antarctic Treaty Consultative Meeting (ATCM), including observer organizations and expert organizations that provide research and information to the decision making consultative parties (CIA, 2018).

With the signing of the treaty on June 23rd, 1961 (State, 2012) the implementation of bi-annual Antarctic Treaty Consultative Meeting (ATCM) began and continued until 1994 when the ATCM began to organize annually (Secretariat, 2011b). The annual ATCM is where the 29 ‘consultative’ nations vote on the adoption of recommendations that regulate how the Antarctic is managed (Meadows et al., 1994). Meadows et al. (1994, p. xv) clarify that “[t]he complex of documents, agreements, recommendations, and meetings used to manage the region are collectively known as the Antarctic Treaty System or ATS.” Any document, agreement, or recommendation that is submitted at an ATCM requires that the consultative nations must come to a unanimous vote for its inclusion within the Antarctic Treaty System (Nuclear Threat Initiative, 2018).

In the 1980s, there was a greater environmental focus centered on Antarctica where potentially abundant resource reserves were being discovered. The environmental focus brought the ATS under fire from lobbyists of environmental protection groups, especially during the 1988 minerals convention. The efforts of environmental groups came to fruition in 1991, when the ATS adopted the ‘Protocol on Environmental Protection’ which designated the Antarctic as a ‘natural reserve’ (Meadows et al., 1994). The ‘Protocol on Environmental Protection’ brought about strict requirements for scientific research, including the need for an Environmental Impact Assessment (EIA) to be completed before any activities were conducted. While the ATS created significant environmental requirements, Meadows et al. (1994, p. xvi) point out that “...the seeds of

the Protocol lie in Article IX of the Antarctic Treaty itself, which, along with scientific research, promotes the ‘preservation and conservation of living resources in Antarctica’”.

With the ATS being the only form of governance for the southern continent, verifying the compliance of member nations is done through the use of observers that have the ability to inspect any area of Antarctica where human activities occur. Inspections can take place at “all stations, installations, and equipment within those areas, and all ships and aircraft at points of discharging or embarking cargos or personnel in Antarctica” (Nuclear Threat Initiative, 2018, para. 24). The adjudication of justice upon member states that are found to be non-compliant falls within three categories. Member nations may use “negotiation, arbitration, or, if all the parties to the dispute agree, adjudication by the International Court of Justice” (Nuclear Threat Initiative, 2018, para. 18). The process may take a long time to reach resolution, and in many cases the enforcement of the ATS falls onto individual member states using nation specific laws that regulate activities within the Antarctic upon their citizens (CIA, 2018). Ferrada (2018) identifies potential issues that result from the implementation of ATS resolutions into nation specific laws due to “the diversity of legal systems involved, as well as the large number of provisions, leads to a complex approval process and a sometimes-ineffective practical application” (p. 90).

### **Tourism in Antarctic**

Tourism to Antarctica can be identified by individuals that participate in pursuits that are non-expedition or non-science based. Antarctic tourists are currently afforded three modes of transportation to visit the continent including air-based, land-based, and

ship-based experiences. Air-based tourism primarily originates out of New Zealand and Australia and offers tourists the opportunity to fly over the ‘Southern Continent’ and view Antarctica from the comfort of an aircraft. Land-based tourism accounts for the smallest percentage of the tourist population that ventures to the Antarctic, with tourists participating in mountain climbing, long duration skiing or trekking expeditions, and truck-based expeditions, to name a few. The majority of tourism operators in the Antarctic belong to the International Association of Antarctic Tour Operators (IAATO) and operate ship-based tourism. IAATO ship-based tourism sees approximately 65 vessels carrying between six and 500 passengers per voyage while making multiple trips between their port of departure and the Antarctic during the austral summer (IAATO, 2018h). The austral or Antarctic summer is a six month period from late October to March (IAATO, 2018e) which provides “milder temperatures, less ice and more visible wildlife” (AAD, 2006) making it the ideal season for tourism.

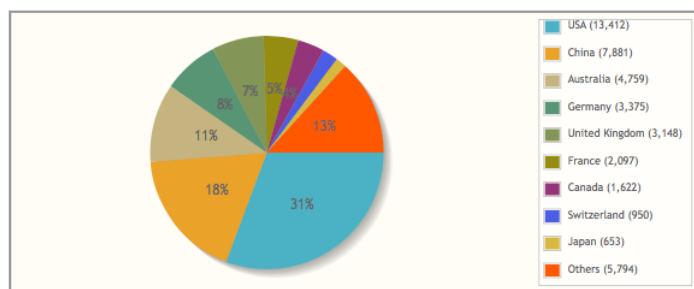


Figure 1  
2017-2018 Tourists By Nationality Landed  
Note. Reprinted from 2017-2018 Tourists By Nationality Landed. IAATO, 2018c. Copyright 2019 by IAATO.

During the 2017-2018 season, all three categories of non-expedition tourism saw over 58 thousand tourists visit the Antarctic, with Americans accounting for 33 % of this population (IAATO, 2018d). Of the 58 thousand tourists during the 2017-2018 season, over 43 thousand tourists stepped foot in the Antarctic, with Americans accounting for 31 % of this population (see Figure 1) (IAATO, 2018c). Of the over 43 thousand tourists to step foot in the Antarctic, only 580 individuals participated in non-ship-based tourism, which accounted for less than two % of the annual landed tourist population (IAATO, 2018b). The IAATO has documented an approximate 32 % increase in the number of tourists landing in Antarctica between the 2007-2008 season and the 2017-2018 season (IAATO, 2018g).

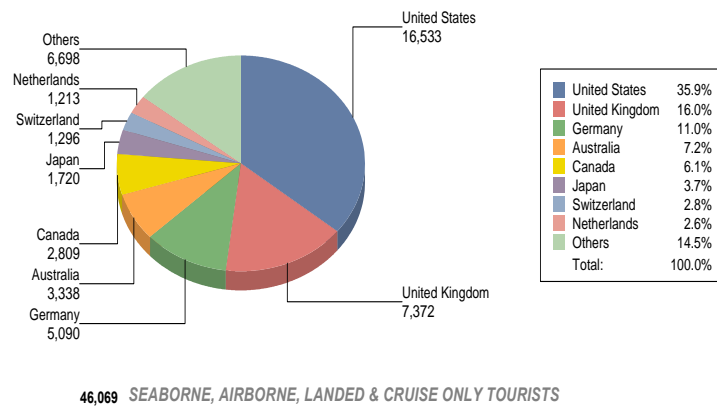


Figure 2  
 2007-2008 Tourists By Nationality Total  
 Note. Reprinted from 2007-2008 Tourists By Nationality Total, IAATO, 2008.  
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Participation in vessel-based trips with landings on the southern continent provide tourists the opportunity to visit “a wide range of areas of interest, including wildlife sites, historic sites, active research stations, and sites of exceptional wilderness and aesthetic value” (IAATO, 2018f). In the Antarctic, the majority of tourist vessels hold less than 500 passengers, which permits these vessels to meet treaty requirements allowing them to make landfall by the use of zodiac boats. Zodiacs, which shuttle groups of tourists from the ship and to landing-sites multiple times in a 24 hour period, provide tourists opportunities to access landing sites for participation in activities such as “mountain climbing, camping, kayaking and scuba diving” (IAATO, 2018f).

Tourists that visit the Antarctic primarily travel to the peninsular region by ship via the Drake Passage on vessels that originate from Ushuaia, Argentina (AAD, 2006). Using an IAATO system, tour operators obtain designated landing sites for each of their voyages to the Antarctic. The top ten most frequently visited landing sites by tour operators in the peninsular region during the 2017-2018 summer each saw between 11 and 25 thousand tourists making landings (IAATO, 2018a). The most popular tourists landing sites see some fluctuation, but many factors including the fauna, flora, and landscapes that are encountered influence the rate of visitation. The itineraries of the IAATO members often provide tourists with only the general route that their vessels will travel while remaining vague on the exact locations, using phrasing such as “depending on the ice conditions” (Antarpply, 2018, para. 13).

Increases in Antarctic tourism in the early 1990s paired with the fragile state of the continent spurred the need for guidelines regulating the behaviors of Antarctic tourists. It was during the 34th Antarctic Treaty Consultative Meeting in Buenos Aires in 2011 that this need for concrete guidelines was addressed. In an effort to ensure continued efforts towards environmental protection, the consultative parties adopted the most updated guidelines on Antarctic tourism including six categories of required behaviors (Table 1). These behaviors include: protect Antarctic wildlife, respect protected areas, respect scientific research, keep Antarctica pristine, be safe, and landing and transport requirements (IAATO, 2018i). These guidelines replaced the 1994 and 2004 guidelines by providing overarching requirements for the actions of tourists and tourism operators in the Antarctic. Additionally, there are approximately 39 supplemental specific site guidelines for areas with the highest visitation and greatest likelihood of impact. The supplemental guidelines provide a detailed description of the site along with more strict requirements for the tourist and tourism operators. These guidelines also include known and potential impacts of tourism and restrictions that limit the potential for further impacts to occur (Secretariat of the Antarctic Treaty, 2011c).

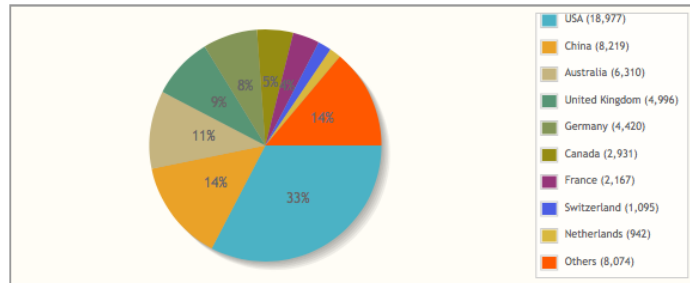


Figure 3  
 2017-2018 Tourists By Nationality Total  
 Note. Reprinted from 2017-2018 Tourists By Nationality Total, IAATO, 2018d. Copyright 2019 by IAATO

## Conclusion

Increases in tourism make the recommendations by the Antarctic and Southern Ocean Coalition (ASOC) (2009) during the Antarctic Treaty Consultative Meeting in Baltimore increasingly salient. The fragile Antarctic environment is a place for activities that have “no more than a minor or transitory impact on the environment” (ASOC, 2009, p. 3). ASOC (2009) additionally identifies that “a precautionary approach should be used to manage tourism in the absence of conclusive scientific evidence about tourism impacts” (p. 3). Since ASOC made these recommendation, landed tourist numbers to the Antarctic continent have increased from 27 thousand in 2008-2009 to over 43 thousand in 2017-2018 (IAATO, 2018c). The drastic increase of tourists to the continent in less than ten years, especially on specific sites that only accommodate vessel-based tourism, has the potential for significant environmental harm. Locations such as Culverville Island have seen increases to over 14 thousand tourism-related individuals landing per season



(IAATO, 2018c) in an area less than 200 square meters (Secretariat of the Antarctic Treaty, 2011a). These increases hold a high potential for impacts on wildlife and the environment that may be impossible to restore. As the primary means of Antarctic tourism has continued to be vessel-based with travel costs becoming more economical ("Responsible Travel", 2018), it is important to understand the intersection of tourism and environmental protection. With the introduction of the General Guidelines for Visitors to the Antarctic (GGVA) (Appendix I) in 2011 and the noted rapid increases in tourism occurring, it is important to learn how effective these recommendations are ensuring behaviors have minimum impacts to the environment.

This study used a non-experimental method, including a questionnaire, to identify the attitudes, subjective norms, perceived behavioral controls, and level of knowledge of tourists towards the GGVA, as well as observations of tourists' behavior while in the Antarctic. After obtaining this information, statistical methods were employed to determine the intentions of tourists to practice the GGVA and the ways in which tourists actually practice the guidelines. Statistical analysis allowed for a greater understanding of the effectiveness of the GGVA and highlighted areas where tourists' intentions do not match the expectations of the GGVA.

Table 1

*General Guidelines for Visitors to the Antarctic*

*Note.* Reprinted from General Guidelines for Visitors to the Antarctic, Secretariat of the Antarctic Treaty, 2011c. Copyright 2011 by ATS.

PROTECT ANTARCTIC WILDLIFE	
<b>The taking of, or harmful interference with, Antarctic wildlife is prohibited except in accordance with a permit.</b>	
<b>WILDLIFE</b>	<ul style="list-style-type: none"> <li>When in the vicinity of wildlife, walk slowly and carefully and keep noise to a minimum.</li> <li>Maintain an appropriate distance from wildlife. While in many cases a greater distance may be appropriate, in general don't approach closer than 5m. Abide by any guidance on distances in site specific guidelines.</li> <li>Observe wildlife behaviour. If wildlife changes its behaviour stop moving, or slowly increase your distance.</li> <li>Animals are particularly sensitive to disturbance when they are breeding (including nesting) or moulting. Stay outside the margins of a colony and observe from a distance.</li> <li>Every situation is different. Consider the topography and the individual circumstances of the site, as these may have an impact on the vulnerability of wildlife to disturbance.</li> <li>Always give animals the right of way and do not block their access routes to the sea.</li> <li>Do not feed wildlife or leave food or scraps lying around.</li> <li>Do not use guns or explosives.</li> </ul>
<b>VEGETATION</b>	<ul style="list-style-type: none"> <li>Vegetation, including mosses and lichens, is fragile and very slow growing. Do not damage the vegetation by walking, driving or landing on any moss beds or lichen covered rocks.</li> <li>When travelling on foot, stay on established tracks whenever possible to minimise disturbance or damage to the soil and vegetated surfaces. Where a track does not exist, take the most direct route and avoid vegetation, fragile terrain, scree slopes, and wildlife.</li> </ul>
<b>INTRODUCTION OF NON-NATIVE SPECIES</b>	<ul style="list-style-type: none"> <li>Do not introduce any plants or animals into the Antarctic.</li> <li>In order to prevent the introduction of non-native species and disease, carefully wash boots and clean all equipment including clothes, bags, tripods, tents and walking sticks before bringing them to Antarctica. Pay particular attention to boot treads, velcro fastenings and pockets which could contain soil or seeds. Vehicles and aircraft should also be cleaned.</li> <li>The transfer of species and disease between locations in Antarctica is also a concern. Ensure all clothing and equipment is cleaned before moving between sites.</li> </ul>
RESPECT PROTECTED AREAS	
<b>Activities in Antarctic Specially Protected Areas (ASPAs) or Antarctic Specially Managed Areas (ASMAs) must comply with the provisions of the relevant Management Plan.</b>	
<b>Many historic sites and monuments (HSMs) have been formally designated and protected.</b>	
<b>SPECIALY MANAGED AND SPECIALLY PROTECTED AREAS</b>	<ul style="list-style-type: none"> <li>A permit from a relevant national authority is required for entry into any ASPA. Carry the permit and obey any permit conditions at all times while visiting an ASPA.</li> <li>Check the locations and boundaries of ASPAs and ASMAs in advance. Refer to the provisions of the Management Plan and abide by any restrictions regarding the conduct of activities in or near these areas.</li> </ul>
<b>HISTORIC SITES AND MONUMENTS AND OTHER STRUCTURES</b>	<ul style="list-style-type: none"> <li>Historic huts and structures can in some cases be used for tourist, recreational and educational visits. Visitors should not use them for other purposes except in emergency circumstances.</li> <li>Do not interfere with, deface or vandalise any historic site, monument, or artefact, or other building or emergency refuge (whether occupied or unoccupied).</li> <li>If you come across an item that may be of historic value that authorities may not be aware of, do not disturb it. Notify your expedition leader or national authorities.</li> <li>Before entering any historic structure, clean your boots of snow and grit and remove snow and water from clothes, as these can cause damage to structures or artefacts.</li> <li>Take care not to tread on any artefacts which may be obscured by snow when moving around historic sites.</li> </ul>
RESPECT SCIENTIFIC RESEARCH	
<b>Do not interfere with scientific research, facilities or equipment.</b>	
<ul style="list-style-type: none"> <li>Obtain permission before visiting Antarctic stations.</li> <li>Reconfirm scheduled visits no less than 24-72 hours before arriving.</li> <li>Comply with any site specific rules when visiting Antarctic stations.</li> <li>Do not interfere with or remove scientific equipment or markers, and do not disturb experimental study sites, field camps or stored supplies.</li> </ul>	
KEEP ANTARCTICA PRISTINE	
<b>Antarctica remains relatively pristine. It is the largest wilderness area on earth. Please leave no trace of your visit.</b>	
<b>WASTE</b>	<ul style="list-style-type: none"> <li>Do not deposit any litter or garbage on land nor discard it into the sea.</li> <li>At stations or camps smoke only at designated areas, to avoid litter and risk of fire to structures. Collect ash and litter for disposal outside Antarctica.</li> <li>Ensure that wastes are managed in accordance with Annexes III and IV of the Protocol on Environmental Protection to the Antarctic Treaty.</li> <li>Ensure that all equipment and rubbish is secured at all times in such a way as to prevent dispersal into the environment</li> </ul>

**WILDERNESS VALUES**

- Do not disturb or pollute lakes, streams, rivers or other water bodies (e.g. by walking, washing yourself or your equipment, throwing stones, etc.)
- Do not paint or engrave names or other graffiti on any man-made or natural surface in Antarctica.
- Do not take souvenirs, whether man-made, biological or geological items, including feathers, bones, eggs, vegetation, soil, rocks, meteorites or fossils.
- Place tents and equipment on snow or at previously used campsites where possible.

**BE SAFE**

**Be prepared for severe and changeable weather. Ensure that your equipment and clothing meet Antarctic standards. Remember that the Antarctic environment is inhospitable, unpredictable and potentially dangerous.**

**SAFETY**

- Know your capabilities, the dangers posed by the Antarctic environment, and act accordingly. Plan activities with safety in mind at all times.

**PRECAUTIONS/ PREPARATIONS**

- Keep a safe distance from dangerous wildlife like fur seals, both on land and at sea. Keep at least 15m away, where practicable.
- If you are travelling in a group, act on the advice and instructions of your leaders. Do not stray from your group.
- Do not walk onto glaciers or large snow fields without proper equipment and experience. There is a real danger of falling into hidden crevasses.
- Do not expect a rescue service. Self-sufficiency is increased and risks reduced by sound planning, quality equipment, and trained personnel.
- Do not enter emergency refuges (except in emergencies). If you use equipment or food from a refuge, inform the nearest research station or national authority once the emergency is over.
- Respect any smoking restrictions. Use of combustion style lanterns and naked flames in or around historic structures should be avoided. Take great care to safeguard against the danger of fire. This is a real hazard in the dry environment of Antarctica.

**LANDING AND TRANSPORT REQUIREMENTS**

**Act in Antarctica in such a way so as to minimise potential impacts on the environment, wildlife and associated ecosystems, or the conduct of scientific research.**

**TRANSPORT**

- Do not use aircraft, vessels, small boats, hovercraft or other means of transport in ways that disturb wildlife, either at sea or on land.
- Avoid overflying concentrations of birds and mammals. Follow the advice in Resolution 2 (2004) *Guidelines for the operation of aircraft near concentrations of birds in Antarctica*, available from [www.ats.aq/devAS/info\\_measures\\_list.aspx?lang=e](http://www.ats.aq/devAS/info_measures_list.aspx?lang=e).
- Refilling of fuel tanks for small boats should take place in a way that ensures any spills can be contained, for example onboard a vessel.
- Small boats must be free of any soil, plants, or animals and must be checked for the presence of any soil, plants, or animals prior to the commencement of any ship-to-shore operations.
- Small boats must at all times regulate their course and speed so as to minimise disturbance to wildlife and to avoid any collisions with wildlife.

**SHIPS\***

- Only one ship may visit a site at any one time.
- Vessels with more than 500 passengers shall not make landings in Antarctica.

**LANDING OF PASSENGERS**

- A maximum of 100 passengers may be ashore from a vessel at any one time, unless site specific advice requires fewer passengers.
- During landings from vessels, maintain a 1:20 guide to passenger ratio at all sites, unless site specific advice requires more guides.

\* A ship is defined as a vessel which carries more than 12 passengers

## **CHAPTER TWO: LITERATURE REVIEW**

In a fast paced and increasingly connected world, opportunities for travel have been afforded to a larger percentage of the global population. Increases in tourism are clearly evident, especially between the years 2006 and 2016 when worldwide tourism increased by an astonishing 45 % (The World Bank, 2018). This growth in tourism will have impacts as a “reliance of tourism upon the natural and cultural resources of the environment means invariably that its development induces change which can either be positive or negative” (Holden, 2008, p. 65). These changes, when coupled with a study by VISA, predict an increase in tourism of an additional 35 % by 2025 (Lonely Planet, 2016). While Sharpley and Jepson (2011), identify that the global population of tourists “are seeking meaning, truth or authenticity” (p. 63), Talty (2017) call[s] this “the climate change effect,” as in the year 2018 the top travel trend is to locations considered to be ‘last-chance tourism’ destinations. Last-chance tourism is especially prevalent among millennial travelers who feel a need to see many destinations that may disappear (Talty, 2017) such as the Galapagos, Antarctica, and Madagascar.

### **Tourism and its Environmental Impacts**

The impacts of tourism on the environment were first investigated globally when the creation of the Organization of Economic Co-operation and Development (OECD) occurred in 1977. Holden (2008) identifies that the OECD encompassed a body of

experts who were investigating the relationships that exist between tourism impacts on the environment globally. In many cases, negative impacts were already being noticed from tourism, including impacts to “culture, environment, and biodiversity” (Schelhass, 2007, p. 141). Holden (2008) held that the negative aspects of tourism can be classified into three groups including natural resource usage, behavioral considerations, and pollution.

Natural resource usage within tourism is primarily focused on the use of ‘common pool resources’ (CPRs) and the way in which, when discovered, these resources are either excluded or exploited. Holden (2008) clarifies that when natural resources are excluded, prevented from use by others, or exploited, there is a “rush to harvest and secure the benefits of the resource before someone else does” (p. 75). The impacts of tourism on CPRs becomes compounded: as visitation increases so do the impacts. Physical impacts can include changes in the flora and fauna, pollution, erosion, and the depletion, change, and/or over-exploitation of natural resources (Tribe, Font, Griffiths, Vickery, & Yale, 2000). Physical impacts, when unregulated, can additionally result in a shift of tourism activities to a new location where the original CPRs that are desired still exist. Location shifts can be prevented when biodiversity and natural resources are prioritized as key elements of the tourism industry along with investigations into best practices to limit impacts (Holden, 2015).

Tourism impacts not just the environment but additionally the people who reside where these activities occur. The behavioral choices of both groups have the potential for either positive or negative impacts on the resources that are used. Holden (2008) provides

the example of national parks on the Kenyan/Tanzanian border where both tourists and the local operators make choices that are seen to have a negative impact on the environment. In his example, tourists have a desire for close-up encounters with the wildlife found in these parks, and through a culture of tipping, have created an environment where operators will crowd around the big cats resulting in reduced hunting and copulating behavior of the wildlife. In other parts of the world, similar impacts are observed as a result of human behavior, such as corals being broken and sold for profit or damaged by tourists touching and walking on them. In the Cayman Islands, dietary provisioning is occurring in wildlife as tourism activities promote the hand feeding of stingrays. This human-wildlife interaction has resulted in sub-optimal health, overcrowding, and injury to stingrays that reside near tourism areas on the Cayman Islands (Semeniuk, Haider, Cooper, & Rothley, 2010). In Brazilian national parks, recreational use by tourists has been observed to result in impacts to terrestrial wildlife, such as improperly disposed garbage being consumed by wildlife which afflict dietary issues and disease (Almeida Cunha, 2010). In a similar vein, Finnessey (2012) found that littering in the United States' (US) national parks plays a major factor in both environmental aesthetic values and ecosystem change. Finnessey (2012) further identified that a sample of college student visitors to US national parks assessed littering as one of the most significant threats to these locations. While these are only a limited number of examples where direct human behaviors associated with tourism impacts on the destination environment, there are many more impacts that can occur.

The direct impacts of tourism may be more obvious and easy to see, however there are additionally non-direct impacts occurring that can be harder to observe. Abell and Wining (1997) identify that multiple types of pollution can be associated with the tourism industry, including water, air, and noise pollution, which also negatively impact the aesthetic value of a location. Instances of the pollution impacts of tourism are evidenced throughout the world especially in aquatic environments. Water pollution was found to affect the livelihood and health of farmers in Bali according to Cole and Browne (2015), and their findings may also be representative of other communities as less than 30 % of sewage outflow from tourism hotspots is treated (Holden, 2008). In Bali, tourism accounts for 65% of the country's water use, according to Cole (2012), resulting in farmers being left with polluted water for agriculture creating water inequity between locals and tourism development. In many cases, there is no way for locals to provide feedback to the tourism industry or government that communicates the impacts that tourism creates on their water supplies (Cole, 2012).

Climate change and greenhouse gas emissions are raising global concerns of the carbon footprint of humanity, as evidenced by the Paris Agreement (UNFCCC, 2016). Encompassing 8% of carbon dioxide output, which is heavily influenced by air travel as Holden (2017) identifies, tourism is an industry that plays a major role in contributing to overall global emissions and impacts to the climate (Lenzen et al., 2018). In more remote destinations like Antarctica, the tourism industry produces the majority of carbon dioxide emissions from cruise vessels operations as compared to other vectors of carbon dioxide production that occur in and around the continent (Farreny et al., 2011).

The effects of tourism are known to create noise pollution through increased levels of anthropogenic sounds that are disseminated into the environments that surround areas that are utilized for tourism. Not only occurring in developed destinations, noise pollution also occurs in areas that are more remote, like national parks, deserts, and even the polar regions. Anthropogenic sounds can reduce an individual's experience or negatively affect wildlife in areas where natural soundscapes are the traditional norm (Harris, 2005; Hughes, Waluda, Stone, Ridout, & Shears, 2008; Pilcher, Newman, & Manning, 2009). Of the classifications of tourism impacts mentioned previously, aesthetic pollution in many cases is the easiest to observe from both the tourist and local populace's perspective. One example of aesthetic pollution can be observed in the construction of skyscrapers that reduce the original unobstructed viewsheds that attracted tourists to a location. A reduction in the attractiveness of a location can result in a destination being used up and new pristine locations sought out where the process of negative impacts will potentially begin anew (Dawson, Stewart, & Lemelin, 2012; Johnston, Viken, & Dawson, 2012) creating a cycle of impact and overuse.

With tourism having noticeable impacts upon the environment of a destination, new tourism trends can raise cause for concern of increases in destination impact. One prominent new trend in tourism is the emergence of 'last-chance tourism' an idea that "provides [tourists] the opportunity to witness the demise of ecosystems, to behold the extinction of an entire species from its natural habitat" (Lemelin, Stewart, & Dawson, 2012, p. 3). Lemelin et al. (2012) go on to say "tourism of this nature is for all intents and purposes a chance to observe ecocide first-hand" (p. 3). The idea that last-chance tourism

allows individuals to observe a destination, ecosystem, or other attraction before it disappears should ring alarm bells for the managers, stakeholders, and communities that are invested in these tourism destinations. Holden (2017) states:

a tragedy of the commons caused by an unsustainable use of natural resources that leads to its demise or a range of negative externalities, as in the case of climate change, raises issues of how tourism stakeholders, including governments, the private sector and tourists, respond to these environmental challenges (p. 79).

If there is a potential for the loss of a destination, ecosystem, or other attraction, invested parties should raise questions surrounding what can be done and who is responsible for ensuring that a ‘tragedy of the commons’ does not occur through unsustainable actions due to tourism.

### **Mitigating the Environmental Impacts of Tourism**

Historically, as the awareness of the impacts of tourism became more mainstream, non-governmental organization (NGOs) like Tourism Concern, the Ecotourism Society, and the Goa Foundation began to form in the 1980s with goals of encouraging ethical tourism ideals that focused on limiting the impacts to local populations and the natural environment (Holden, 2008). Tourism stakeholders in the 1990s, began to develop additional ideas to increase profits, especially as calls for tourism operation to institute ‘green’ practices began to grow in the public sphere as an effort to reduce tourism impacts. Tourism operators began to incorporate terminology like ‘ecotourism’ and ‘sustainable tourism,’ as an adaptation to the changing thought processes that were occurring in the way that people connect with the natural world around them, especially



when they act as a tourist (Holden, 2008). As society transitioned into the 21<sup>st</sup> century, the appearance of the word ‘sustainability’ began to crop up across government vernacular pertaining to policy and strategy development. Recent global policies developed by the UNFCCC (2016), like the Paris Agreement, demonstrate an increasingly forward thinking global stance to reduce the carbon output and its impact on the environment through climate change.

When analyzing tourism, many lenses focus primarily on the negative effects that result from these activities. A common principle identified from the research of Foxlee (2007) was that ethical tourism and the positive outcomes that accompany it are often an additional focus. Conner (2007) states that tourism destinations in protected areas can create significant economic benefits for the communities that surround them through the increased resulting visitation. Increases in economic benefit can occur when the tourism industry invests in the local community. Efforts to provide outreach, education, employment, and foundations for the surrounding areas has resulted in opportunities around Sabi Sabi game reserve in South Africa that increase community welfare (Loon, Harper, & Shorten, 2007). Scherl and Edwards (2007) note that outreach works, but in areas that have existing protections, restrictions can occur on many communities which limit their opportunities to increase public welfare or profit generation for local communities. Indigenous peoples may have the opportunity to create sources of income from tourism providing themselves a higher standard of living; however, income sources may not always be sustainable if the resource is exploited and the destination no longer holds value.

Climate change is a primarily anthropogenic effect that is progressing at an accelerated pace but can be corrected as Lemelin et al. (2012) believe that there “is an opportunity to learn and possibly reverse these changes before it is too late. It is a chance to enlighten the dark” (p. 4). Holden (2008) advocates that there can be an element of conservation where tourism revenues can be used to protect the environment from forms of development that are human influenced like climate change. Even with the consequences that can result from higher levels of visitation and the resulting impact to ‘last-chance tourism’ destinations, Dawson et al. (2012) posit that tourism revenues “in some instances [can be] an influx of conservation funds and a ‘call for action’” (p. 223). Frew (2012), Lamers et al. (2012), and Lemieux and Eagles (2012) identify that the potential of this ‘call for action’ from tourists could become apparent as an ethic of ambassadorship for preservation and conservation for the tourism destinations that they visit.

Currently, many last-chance tourism destinations, such as Antarctica, Greenland, Mount Kilimanjaro, the Great Barrier Reef, and numerous national parks, as well as wildlife, such as mountain gorillas and polar bears, are being targeted as attractions that should be viewed before they are gone (Lemelin et al., 2012). Weaver (2017) suggests that under the correct planning and management, tourists can be positioned to take strides towards sustainable practices that may limit anthropogenic impacts. A limiting of impacts, as well as the efforts of governments to produce adequate planning that prioritizes environmental protection and conservation, has the potential to limit the resulting impacts of tourism development (Holden, 2008). The tourism industry and the

environments where tourism occurs, are tied to both political and economic drivers, which will continue to shape future mitigation strategies that limit tourism's impacts. For tourism to continue into the future, it must follow a principle of minimal environmental impact, requiring both tourism operators and governments to work together. This collaboration, would ensure that "a balanced approach to how natural resources are used, based upon recognition that the natural environment holds a variety of other values alongside the purely monetary" (Holden, 2008, p. 247), are cornerstones of effective tourism management.

### **Antarctic Tourism**

Before tourism to the Antarctic began, there was a collision of the Antarctic environment and humankind in the 18<sup>th</sup> century when explorers and hunters first began to 'invade' the southern polar latitudes (Tin et al., 2009). The arrival of hunters "led to local extinctions as well as the overall near-extinction of a number of species" (Tin et al., 2009, p. 3), similarly to other human caused extinctions (i.e., the Dodo (*Raphus Cucullatus*)). According to Bargagli (2005), the last two centuries have seen a significant change in populations of aquatic species in the Antarctic. However, it was not until the 20<sup>th</sup> century that the concept of tourism to the pristine Antarctic environment began to take hold.

### ***History of Antarctic Tourism***

Up until 1957, land-based tourism was unheard of in the Antarctic, but this began to change that very year when Pan American Airlines completed the first known landed tourist venture to the runway on McMurdo Station. The following year, in 1958, the *Ara Les Eclaireurs* made two departures from Argentina with a combined passenger count of

200, making it the first vessel to conduct ship-based tourist landings to Antarctica (Snyder, 2007). Inconsistencies in the history of *Ara Les Eclaireurs* should be explored as Day (2013) documents the vessel-making single ventures south during both the 1957 and 1958 Antarctic summer seasons with 100 tourists aboard each trip. In either circumstance, the vessel *Ara Les Eclaireurs*, an Argentinian naval transport ship, was the first documented vessel to transport individuals to Antarctica for purely touristic purposes. It was less than 10 years later, in 1966, that a tourism outfitter based out of New York City, US by the name of Lars-Eric Lindblad revolutionized Antarctic tourism according to Day (2013) and Erceg (2017) by commissioning the first private tourism venture to Antarctica. Hiring an Argentine naval vessel, the *Lapataia*, travelled with 58 American tourists to the Antarctic where they made landfall at multiple locations. Lindblad is quoted as saying the tourists’ “[had] ‘a wonderful time’... ‘picking up penguins, photographing them and had tobogganing parties on the snow-covered hills” (Day, 2013, p. 508). For his tourism operation to the Antarctic, “Lindblad was proposed for membership to the New York Explorers’ Club and it was suggested that the future of the Club could be tied to scientific tourism” (Day, 2013, p. 508).

The Antarctic Treaty (AT), when it was developed, did not account for tourism being a factor that would have an effect on the Antarctic. Failing to account for tourism in the AT was a potential oversight by the creators, and it is evidenced by none of the resolutions of the AT addressing the actions of tourist activities (see Appendix II). The only original resolution that influenced tourism from the AT was that no actions should occur that would have an effect on the “preservation and conservation of living resources

in Antarctica” (Conference on Antarctica, 1959, p. 8). It was not until 1994 at the XVIII Antarctic Treaty Consultative Meeting (ATCM) held in Kyoto, Japan that the first regulations to discuss tourism in Antarctica were included (Secretariat of the Antarctic Treaty, 2016). The recommended tourism guidelines from 1994, however, were not officially ratified by all consultative nations until 2016. The Secretariat of the Antarctic Treaty (2011b) notes that the ATCM added two additional documents concerning tourism in the Antarctic including Annex 1 in 2004, setting requirements for “contingency planning, insurance, and other matters,” as well as in 2011 with an update to the tourism guidelines established at the 1994 meeting, identified as the General Guidelines for Visitors to the Antarctic (GGVA). As the 2011 update to the Antarctic Treaty (AT) supersedes the 1994 guidance, only the most current literature pertaining to general tourism guidelines within the Antarctic will be reviewed.

Using published research on the identified impacts of tourism to the Antarctic, the International Association of Antarctic Tour Operators (IAATO) and the Antarctic Treaty System (ATS) collaborated along with other organizations to develop “Site Guidance to Visitors” to mitigate further damage while proposing strategies which could minimize impact from continued use of these sites (Tin et al., 2009). The 2011 update of the GGVA consists of six sections detailing the guidelines for any visit to a site in the Antarctic by tourists and tour operators. The GGVA lists recommendations that mitigate harm to the environment, wildlife, and individuals, as well as preserve scientific research while providing for the best experiences possible. The AT has further guidelines in addition to the GGVA for certain sites within the Antarctic that provide greater detail and

additional recommendations based upon the environmental or scientific sensitivity of the site. Some sites that have additional recommendations include locations with large penguin populations and specially protected/managed areas being identified as the rationale for stricter guidelines.. Developing the site-specific guidelines is an accomplishment in part due to an organization called Oceanites that “in 2006 was tasked by the UK Foreign and Commonwealth Office to draft the initial set of ten site specific visitor guidelines” (Oceanities, 2017). The ten site-specific guidelines eventually turned into 37 and, over time, were adopted individually as part of the Antarctic Treaty System (ATS) (Oceanites, 2017).

Using a map developed by the British Antarctic Survey in 2004, Tin et al. (2009) identify that “[o]nly about 0.34% of the Antarctic continental area is ice-free...mostly in the Peninsula and remote mountain regions” (p. 6). The findings of Tin et al. (2009) increase the Convey and Stevens (2007) results slightly as their primary findings were an area that was 0.30% ice-free. A personal communication in 2008 with D. Smith of the Australian Antarctic Data Center provides further insight to the ice-free areas as referenced by Tin et al. (2009), “The total surface area of rocky outcrops within 5 km of the coast has been estimated to be around 5970 km<sup>2</sup>” (p. 6) or 2305 mi<sup>2</sup>.” Ice-free areas in the Antarctic are where the majority of habitat for terrestrial species exists and is also where 53 active research stations (as of 2009) and a plethora of vacant stations and infrastructure are located; making these areas the prime locations for tourism to occur (Tin et al., 2009).

### ***Impacts of Antarctic Tourism***

Tin et al. (2009) believe that “human activities inevitably compete with terrestrial ecosystems, as well as seals and seabirds, for the small areas of ice free ground available, intensifying the pressure on individual sites at a local scale” (p. 11). Competition for space in terrestrial ecosystems has resulted in negative impact on vegetation and soil composition located in proximity to human activities. Studies identifying that one week’s worth of trampling on vegetation by groups as small as 50 individuals resulted in damage that could not be recovered within the same growing season (Tin et al., 2009). Building on the research of Tejedó et al. (2009) which found that trampling was impacting Antarctic soils, Perterra, Lara, Tejedó, Quesada, and Benayas (2013) found that no areas of vegetation surveyed after 200 pedestrian transits were able to maintain 50 % of their pre-survey vegetation. Their findings also showed that even low level trampling had an impact on surveyed vegetation, leading to the conclusion that “with the current trend of increasing human presence in Antarctica, we predict that the cumulative impacts of trampling over future decades will adversely affect all types of moss and lichen communities” (Perterra et al., 2013, p. 318). In areas of Antarctica with soils containing a higher level of sensitivity to trampling, it was found that as few as 20 foot passes would result in distinctly formed tracks (Campbell, Claridge, & Balks, 1998). Perterra et al. (2013), Campbell et al. (1998), and Tejedó et al. (2009) support the findings of Scott and Kirkpatrick (1994) who concluded that increased tourism foot transits would result in substantial damage to the soils of the Antarctic.

According to Tin et al. (2009), direct and indirect impacts of human activities to Antarctic avifauna may result in stress responses. These stress responses can result in psychological and behavioral responses that impact reproduction and survival of avifauna (Tin et al., 2009). Building upon these findings, during the 31st ATCM, a working paper was presented drawing the conclusion that “the effects of human disturbance on wildlife in the Antarctic are highly variable. Wildlife responses are affected by numerous extrinsic and intrinsic factors many of which are incompletely understood” (SCAR, 2008, p. 5). The SCAR (2008) report also found that

no ‘one size fits all’ solution can be applied to managing human disturbance effects on wildlife. For example, the setting of a minimum approach distance for pedestrian approaches that applies to all species at all sites is likely to be inappropriate for at least some species and some sites (p. 5).

Recent research by Coetzee and Chown (2016) illustrated similar conclusions showing inconclusiveness within the same species at different sites where human interaction has little perceived impact, while at other sites human interaction has resulted in population decline. Coetzee and Chown (2016) found that while the current standards on visitor approach distances to limit impacts on wildlife are centered on the behaviors of the animal, a review is needed as the current research does not address the physiological changes that may be occurring for the endemic species.

The levels of human interaction with Antarctic avifauna were recently explored in the research of Pertierra et al. (2017) who utilized methods involving an ArcGIS model.



Their model assessed the footprint that human activities generate at Important Bird Areas (IBA) within the Antarctic and identified that the IBA's with the highest levels of impact were found concentrated along the northern edges of the Antarctic Peninsula. High levels of impact along the Antarctic Peninsula is evidenced by the nine IBA's with the highest levels of human impact (Pertierra et al., 2017). The potential for impact within the IBA is important to note as four of these locations are tourism destinations and 75% of these sites do not require a permit process for access. This lack of permitting during the 2017-2018 season enabled 47,736 individuals participating in tourism activities to go ashore at these three IBA's Pertierra et al. (2017). While non-permitted locations may have site specific guidelines that Pertierra et al. (2017) identify as non-mandatory, vague, and of voluntary compliance. The lack of an enforcement structure does not define the penalties for non-compliance, similarly to the issues resulting from a lack of enforcement as it pertains to the General Guidelines for Visitors to the Antarctic (GGVA).

In summary, Antarctic tourism has changed over the years, from having few if any environmentally friendly practices, to adopting the GGVA. When followed, the GGVA mitigates the level of anthropogenic impact on the continent. While demonstrating steps in the right direction, the research also shows that the impacts of tourism on the natural environment can be quite significant. From the research of Pertierra et al. (2013), Campbell et al. (2009), Tejedo et al. (2009), and Scott and Kirkpatrick (1994), it is seen that even walking on the continent can have dramatic impacts that can take years to recover. Pertierra et al. (2017) locate the IBA's that see the highest human footprint and Tin et al. (2009) identify that impacts occur when there is a

convergence of human-wildlife interactions. As the majority of tourism occurs on the Antarctic Peninsula, which has high biodiversity, this area has become a hotspot for potential impacts to occur. Liggett, Frame, Gilbert, and Morgan (2017) identify that for the future of Antarctica, tourism will play a role in shaping potential outcomes. Their study detailed four scenarios ranging from optimal with sustainable growth of the tourism industry that eventually peaks, to the worst-case scenario where infrastructure is built on the continent specifically for tourism and self-regulation within the Antarctic tourism industry ceases to exist. Whichever scenario or mix of scenarios comes to fruition, Coetzee and Chown (2016) identify that there are currently still gaps in the literature, and impacts from tourism are occurring even if the extent is not fully known. To this end, it is imperative that research efforts strive to identify impacts and the rationale for why they are occurring, to encourage a more positive outcome based on the scenarios of Liggett et al. (2017).

### ***Examples of Negative Tourist Actions in Antarctica***

Documentation exists containing observations of tourism's negative impacts in the Antarctic, especially before the adoption of the GGVA. One of these documented observations was made by a researcher in the early 1990s who noted:

Some transgressions of tourism guidelines witnessed by the author during field work in the Antarctic during the 1991-92 season included: 1. a boat driver smoking while transporting passengers ashore; 2. a passenger attempting to feed a penguin; 3. a passenger touching a penguin; 4. a passenger tossing small stones at

the foot of a penguin to improve a photographic opportunity; 5. a crew member throwing a lit cigarette within 10 m of nesting penguins; 6. shore guides having no previous Antarctic experience; 7. groups of more than 100 ashore at any given time; 8. passengers ashore in numbers exceeding the recommended 25:1 tourist to guide ratio; 9. plastic bags, matches and cigarettes left ashore by passengers; and 10. untreated food waste inadvertently discharged in an enclosed bay (Enzenbacher, 1992, p. 264).

While these observations by Enzenbacher (1992) occurred in the same year as the founding of IAATO, non-compliant and risky behaviors of tourists have continued to persist. When the researcher reviewed recent documentation of non-compliance, major violations of the GGVA have continually been reported by IAATO during the ATCMs. Some examples of these reports of non-compliance include, on December 14th, 2011, two tourists were successful in dispersing a non-native species of barley seed at Telefon Bay while on a hike (IAATO, 2012). A few months later on February 11th, 2012, a camera tripod fell and severely injured a Gentoo penguin chick, resulting in an inability of the chick to walk and the chick being euthanized by field staff (IAATO, 2012). The 2014-2015 season saw the theft of a compass from the Port Lockroy museum (an ATS protected heritage site) on November 21<sup>st</sup>. The museum had been visited by two cruise ships on the day of the compasses disappearance, but the vessel operators were unable to locate the compass (IAATO, 2015). That same 2014-2015 season saw the failure of a ski expedition to comply with their Waste Management Permit forcing another group to collect the waste left behind. These incidents of significant non-compliance with the

GGVA were reported by IAATO to the ATS during the annual ATCMs. The research of Roura (2012) conversely showed frequent instances of tourist non-compliance with the GGVA, insinuating an assumed dearth of reports on the part of operators as it pertains to non-compliant behavior that could be viewed as ‘minor’. Frequent non-compliance with the GGVA, as suggested by Roura (2012), is a potential problem that should not be overlooked in the Antarctic, however, there are limited outside compliance inspections occurring as to the specific actions of tourists and tour operators.

### ***Antarctic Tourism Research***

The research of Roura (2012) focuses on the behavior of tourists in the Antarctic utilizing a review of tourists’ internet blog posts, pertaining specifically to behaviors and activities that occurred on Deception Island over four austral summer seasons. His research contained a sample size that included 50 blog posts, which detailed the corresponding behaviors of 90 individuals whose actions were documented in the blogs. Roura (2012) reviewed the written aspects of the blog entries as well as the included photographs to evaluate whether the behaviors of the individuals listed in the blog posts complied with the regulations set forth from the ATS in the GGVA. Roura (2012) found that there were many instances of tourists ignoring the requirement of a minimum five-meter (fifteen-foot) separation distance between visitors and wildlife, or finding claims that the wildlife approached the tourist in the blog posts. His study found that “as a whole, blogs showed many more instances of compliance than of noncompliance, although it is interesting that both types of behavior were picked up in a small sample” (Roura, 2012, p. 20). The conclusion seems to be correct that “the scale of tourism

activity...at many sites...becomes apparent, as is the potential for conflict between humans and wildlife...” (Roura, 2012, p. 20). The Antarctic and Southern Ocean Coalition (ASOC) (2013) presented a paper at the 36th ATCM addressing the needs to manage tourist behavior based in part on Roura’s (2012) review of tourist blogs and the implications of behavior that were identified from Lamers and Gelter's (2012) study on the expansion of Antarctic tourism to include scuba diving. With consultative parties of the ATS raising concerns over the activities related to tourists making landings and the implications of their actions, it is vital that a better understanding of the attitudes and behaviors of tourists be developed. Roura (2012) states that “further research on human behavior would be needed to better understand tourism and its consequences to the natural and cultural (historic) environment of Antarctica” (pp. 20-21).

As mentioned previously, tourism has increased in Antarctica by approximately 32 % between 2007-2008 and 2017-2018 and significant research has been conducted to identify the impact of human activity on wildlife in the Antarctic. Social science research however, has been limited with almost no research looking at the attitudes and behaviors of tourists and the ways that these can be shaped to limit environmental impacts. Powell, Kellert, and Ham (2008) conducted surveys of tourists between 2002 and 2004 using five tour operators as their platform for distribution. Their surveys took place during ten expeditions and explored tourists’ “knowledge of Antarctica’s natural and human history” as well as how knowledge increased across five thematic areas: “natural history, marine biology, oceanography, environmental conservation, and general awareness of the natural environment” (Powell et al., 2008, p. 235). Additionally, their study assessed

attitudes toward Antarctic resource management and included five questions that were “used to investigate tourists’ attitudes toward the ATS and IAATO visitor guidelines designed to protect the Antarctic environment” (p.235). The results of Powell et al.’s (2008) study found that knowledge across the five thematic areas increased significantly over the short term and was retained when further investigated after a three-month period. Their findings were not the same relating to tourists’ intention to conduct environmentally conscious behaviors over the two data periods. In the short-term their study found a significant increase in tourists’ intention to modify environmentally conscious behavior in a positive way, but conversely found that after a three-month period that intention to perform environmentally conscious behavior occurred at minimal levels (Powell et al., 2008). Their results additionally showed that “62% of the respondents felt that fellow tourists often approached the wildlife too closely” and “91% of the post visitation respondents disagreed or strongly disagreed that they should ignore another photographers that repeatedly approached nesting penguins too closely indicating that a predominance of tourist would intervene” (Powell, 2005, p. 237). The assertion by Powell et al. (2008) as to the likelihood of tourists actually behaving in an intervening manner seems to be a major assumption on the part of the researchers, as the bystander effect could result in differences between intention and action. The bystander effect occurs when an individual identifies that they would behave in a specific manner, but when confronted with the situation, they expect another individual in their group to intervene (Latane & Darley, 1969). Powell et al. (2008, p. 239) state that, “additional outreach and research is needed that focuses on integrating theoretically based

interpretation and the operational factors that improve the adoption of stewardship behaviors”. Following the suggestion of Powell et al. (2008) and Roura (2012), the incorporation of a theoretical framework (for this study the Theory of Planned Behavior) to explore the behaviors of tourists will provide foundational research developing a deeper understanding of the mindset and actions of Antarctic tourists.

### **Theory of Planned Behavior**

The Theory of Planned Behavior (TPB) identifies that the behavior of an individual is directly related to their intentions to perform the behavior (Ajzen, 1991). To determine the behavioral intention of an individual, the three following aspects must be assessed:

- (1) An individual’s attitude as to how desirable is the performance of a behavior, or as Kleiber, Walker, & Mannell (2011) state: “the persons’ attitudes towards the behavior, both affective ‘is it enjoyable or unenjoyable?’ and instrumental ‘is it wise or unwise?’” (p. 177).
- (2) The subjective norm or an individual’s perception of how their community perceives the performance of a behavior, or as Kleiber et al. (2011) state: “the subjective norms that he or she believes significant others have concerning the behavior, both injunctive ‘Do they approve or disapprove?’ and descriptive ‘do they actually do it or not?’” (p. 177).

(3) The ease or difficulty an individual would face to conduct a behavior is their perceived behavioral control or, as Kleiber et al. (2011) state: “his or her perception of whether the behavior can be performed i.e., perceived behavioral control, both in terms of self-efficacy ‘is it easy or difficult?’ and controllability ‘do I have a little control or a lot?’” (p. 177).

Ajzen and Madden (1986) indicate that an addition to the theory of reasoned action through the inclusion of “perception of control, like attitude toward the behavior and subjective norm, can have an important impact on a person’s behavioral motivation” (p. 472). Ajzen (1991) also states, “as a general rule, the more favorable the attitude and subjective norm with respect to a behavior, and the greater the perceived behavioral control, the stronger should be an individual’s intention to perform the behavior under consideration” (p. 188). An individual’s behavior is linked to how they perceive the outcomes of said behavior, while perceived outcomes of a behavior combined with the individual’s opinions on a behavior, as well as what the individual perceives are the opinions of their peers, will have significance in relation to the actual behavior performed. Antimova, Nawjin, and Peeters (2012) conclude:

It could be argued that dominant social norms allow for environmental action/inaction; individuals copy behavior from others and use them as verification and support of their own behavior. Put differently, if individuals recognize inaction in those around them this could serve as a confirmation tool for their own lack of initiative (p. 13).



### *Adapting the TPB*

The research of Goh, Ritchie, and Wang (2017) is one of the first studies to look at off-trail non-compliance of visitors in Australian national parks as it relates to TPB. Their research added an extension to the TPB by including environmental values as a factor that influences intention (p. 124). While this extension was not found to be an influencing factor on the research subjects' behaviors, it does not exclude environmental factors from influencing intention in other environments. The results of the study did show that the TPB framework can be used to "better identify predictive variables to prevent non-compliance and motivate visitors...by focusing on their attitudes and social norms" (Goh et al., 2017). The research of Ong and Musa (2012) additionally supports the use of TPB to explain the behaviors of Australian scuba-diving tourists. Their research found that the attitudes, subjective norms, and perceived behavioral control all had a significant relationship to the scuba-diving behavior of those individuals that participated in their study. A main discovery of Ong and Musa's (2012) research was that the TPB is useful for investigating responsible behavior of tourists while scuba-diving (p. 791).

TPB has, for instance, been used to explain other aspects related to tourism in general as well as within specific niches of tourism. Duarte Alonso, Sakellarios, and Pritchard (2015) studied the motivations of tourists visiting a Cultural Heritage Site (CHS) in the United Kingdom utilizing a methodology incorporating a modified version of TPB. Their research found that the TPB is an effective model for determining individuals' attitudes towards a behavior as a significant predictor of visiting a CHS, and

that perceived behavioral controls were a predictor of actual intention when behavior was assessed. Sparks's (2007) research into consumer behavioral intention using the TPB provides further reassurance that this theory is appropriate for assessing the behavioral intention of tourists to engage in wine tasting. Sparks (2007) found that there is a direct correlation between an individual's intention to conduct an activity and their perceived behavioral control, additionally finding that an individual's attitude towards an experience is correlated to the individual's intention to conduct the activity in the future. The research of Kim and Han (2010) illustrate that the TPB can be extended or modified based on the principal constructs by incorporating factors that assessed environmental concerns, perceived customer effectiveness, and the environmentally conscious behaviors of tourists choosing a 'green' hotel option. The TPB has also been used in assessing buy-in to environmentally conscious behaviors in the research of Vagias, Powell, Moore, and Wright (2014) who extended a fourth variable to the TPB by incorporating knowledge levels. Their study, located in two US National Parks, effectively investigated backpackers intentions and behaviors relating to Leave-No-Trace guidelines by identifying levels of compliance that corresponded to knowledge level (Vagias et al., 2014). Their findings illustrate the utility of the TPB to be extended from the original form via modification as evidenced in the research of Ong and Musa (2012), Sparks (2007), Duarte Alonso et al. (2015b), and Kim and Han (2010). The findings of multiple researchers demonstrates that when the TPB is modified, research findings will remain both reliable and significant while providing deeper insights into the intention of tourists to perform a behavior.

The TPB is not without its critiques, specifically that while the theory has the ability to explain behaviors that are specific to tangible products, the theory lacks the ability to accommodate the intangible ideas, experiences, and emotions that are often represented in tourism research (Marsh & Woodside, 2005). Marsh and Woodside (2005) further contend that the TPB does not provide a deeper understanding as the “benefits realized from a consumption experience may be more useful to understand than the benefits that consumers say they intend to seek” (p. 128). Sparks’ (2007) acknowledges that while the use of the TPB was productive within the constructs of their study, “it may be useful to look at alternative models in future research given the complexity of tourist destinations” (p. 1191). While these critiques exist, the applicability and success of studies like Vagias et al. (2014) and Ong and Musa (2012) provide a foundation for the effectiveness of this theory in tourism research.

### **Problem and Purpose Statement**

Tourism has been seen to have negative physical impacts upon the environment as a result of the nature of the industry and tourist non-compliance with regulations. The Antarctic, a destination labeled as pristine and part of the realm of last chance tourism, has seen localized impacts due to a small percentage of the Antarctic (<.034% of landmass) being used for the majority of tourism related activities. Tourism in the Antarctic is increasing, and the opportunities for impacts to occur are correspondingly rising. Increases in the potential for impacts to occur are evidenced by the 24 polar-class vessels currently under construction and a 40% surge in visitation anticipated by tour operators (Read, 2018). In 2011, at the Antarctic Treaty Consultative Meeting in Buenos

Aires, the General Guideline for Visitors to the Antarctic (GGVA) were adopted by the Antarctic Treaty System outlining best practices to mitigate impacts to the Antarctic environment. Yet, the literature demonstrates an assessment of compliance with the GGVA in Antarctica has seen, to date, little scientific research.

The overarching purpose of this thesis is to explore the factors that motivate tourists to comply with the GGVA. To accomplish this, the employment of a theoretical framework that has the ability to determine intention is required to explore tourists' motivation to comply with the GGVA. To isolate the intersection of tourists' motivation and their corresponding compliance, tourists' attitudes, subjective norms, perceived behavioral controls, and knowledge of the GGVA must be understood. The Theory of Planned Behavior's (TPB) ability to be extended allows for the identification of the role that Level of Knowledge plays in relation to the other variables when assessing an individual's intention to practice the GGVA. Understanding the variables that influence TPB and identifying the actual behaviors of tourists in relation to the GGVA will answer the following research questions:

(RQ1): how do tourists' attitudes, subjective norms, perceived behavioral controls, and Level of Knowledge mediate their intention to comply?

(RQ2): which guidelines are tourists practicing and not practicing in relation to the GGVA?

The results will be used as a case study to explore the effectiveness of the GGVA to elicit behaviors that mitigate human impacts in the Antarctic. The data collected could enable stakeholders to make informed decisions that reevaluate the current best-practices

for visitor compliance. In providing the ability to make informed decisions, IAATO and the ATS could potentially emphasize effective strategies that address the factors that inhibit the ability of Antarctic tourists' to practice the GGVA.

### **CHAPTER THREE: METHODOLOGY**

This case study utilized the Theory of Planned Behavior (TPB) in a quasi-experimental design format through the implementation of a questionnaire and observational data collection conducted by the researcher. Utilizing a mixed methods approach, this case study was conducted to understand the behavioral intentions of tourists while exploring the frequency of compliant behavior with the GGVA among tourists. Mixed methods research, as described by Creswell and Plano Clark (2007), allows the researcher to gain a deeper and more well-rounded understanding of the research questions by reducing the individual limitations that occur within quantitative and qualitative research. A case study design as described by Labaree (2019) is suitable for research that analyses the effectiveness of a theoretical framework in relation to actual events. Labaree (2019) justifies the effectiveness of case studies in circumstances where little knowledge exists relating to the process or system that is under investigation. With no known research existing that specifically explored the intentions of tourists to comply with the GGVA and little research exploring which specific guidelines tourists' do and do not comply with, a case study fits within Labaree's (2019) constructs. By providing a baseline set of data in the form of a case study, this research will provide a framework for further studies to expand upon.

To accomplish a case study research design, the study incorporated mixed methods through the use of a questionnaire and observational data. The questionnaire was framed around the GGVA using the TPB as the theoretical framework as described by Vagias et al. (2014). Vagias et al.'s (2014) research utilized the TPB to assess compliance with Leave-No-Trace (LNT) practices in US National Parks. As there have been no previous studies assessing compliance with the GGVA in Antarctic, this framework was selected as LNT and the GGVA are both the recommended guidance for environmental protection in their respective environments (ATS, 2011; Leave No Trace, 2012). RQ1 was investigated with a quantitative questionnaire where participating tourists responded to questions within a preset metric that was developed based on the design of Vagias et al.'s (2014) survey. RQ2 was explored utilizing qualitative observational data that was collected by the researcher at five landing sites in the Antarctic where tourists' behaviors that did not align with the GGVA were documented. The observational data collection was conducted in-situ as recommended by Gillham (2008) for structured observations and was centered around the general and site-specific guidelines for each landing site.

### **Rationale**

As previously identified by Labaree (2019), case studies are best suited when little knowledge exists pertaining to a given circumstance and when a theoretical framework is utilized to understand an event. This research aimed to identify the motivations of tourists to comply with the GGVA and the actual behaviors of tourists in the Antarctic. The design of this research provides an introductory understanding of

tourists' behavioral intentions and the actual behaviors of participants as they relate to Antarctic tourists during a single tourism voyage.

### **Threats**

A potential for internal validity to be compromised resulted from the reactive effects of observation. As described by Carlson and Morrison (2009), internal validity could be confounded by a research-produced error in the results. An error in the results could be attributed to the Hawthorne effect as some of the tourists may have noticed that the researcher was observing their actions resulting in the tourists modifying their natural behaviors (Porta & Last, 2018). Risks to internal validity were unavoidable due to the nature of the research and are acknowledged in the discussion of the results. There was one known treatment that occurred during the study that may have affected future observational validity for a specific group of individuals that were advised that they had been out of compliance with the GGVA. While at least one threat to validity resulted in unavoidable risks for this study, it should be noted that all efforts were taken to be as unobtrusive as possible and limit the exposure of researcher derived impacts.

### **Population**

During the 2017-2018 tourist season, vessels capable of carrying between 26 and 500 tourists per voyage made landings in the Antarctic. Based on an average population of 189 individuals per vessel, the researcher sought a confidence level of 95 %, which required 180 responses. The actual response rate of valid questionnaires was  $n=32$  which was a less than a 50% response rate from the vessel population. According to Francis et al. (2004), the expected response rate for Theory of Planned Behavior questionnaires is



“often around 50%” (p. 29), which was not achieved for this study. As such, the response rate did not meet the requirements for study validation and generalization at a 95% confidence level. Therefore, the analysis of the research was exploratory in nature and provided a case study evaluating the intentions of tourists on a single Antarctic tourism vessel.

The targeted group for sampling was tourists that booked passage on a single Antarctic expedition involving a single vessel. While tourists on this expedition that completed questionnaires originated from eleven nations, self-reported non-English speakers questionnaires were removed from the sample to avoid potential response error due to language barriers. Respondents were requested to complete the full questionnaire with two questions used to verify respondent eligibility based on demographics. The two verification of eligibility questions were: ‘Are you fluent in English?’ and ‘What is your age range?’. Respondents identifying as both fluent in English and 18 years of age or older had their questionnaires included in the data analysis. The exclusion of questionnaires that did not meet the eligibility requirements reduced the sample size and corresponding response rate.

### **Sampling Procedure**

The quantitative research in this study involved the use of a questionnaire (see Appendix III) with an attached consent form that was placed in a sealable manila envelope that was provided to respondents after passenger embarkation. To introduce the research study, the researcher worked with the expedition leader to identify a time when they could present an introduction to all the passengers simultaneously and outline the

details of the research while additionally providing verbal directions on how the questionnaire should be completed. In the research introduction, the researcher provided details outlining time requirements for completion, the voluntary nature of the questionnaire, eligibility requirements for participation, and the request that questionnaires be completed before tourists participated in their first shore excursion; this was done using a script and recruitment document (see Appendix IV and V). The research introduction occurred while the vessel was traveling south towards the Antarctic Peninsula from Ushuaia, Argentina (see Figure 4). Tourists that volunteered to participate by completing a questionnaire were requested to return the questionnaire in the sealed manila envelope to a box located in a common area of the vessel. The box was checked in the evenings, the mornings, and shortly before the briefing for the first shore excursion.



Figure 4: Example of cruise route

*Note.* Reprinted from Classic Antarctica | Explore Antarctica on board the Ushuaia, Antarpplly, 2018. Copyright 2018 by Antarpplly Expeditions.

The qualitative research component of this case study involved the creation of an observation journal (Obj) based on the guidelines within the GGVA. The Obj included 12 representative guidelines from the GGVA and had blank spaces to incorporate site-specific guidelines as needed based on the vessel itinerary. The Obj was in paper format and logged in a notebook (see Appendix VI). Observations at the landing sites were conducted in-situ by the researcher using the recommendation of Gillham (2008) for time sampling during structured observations. Time sampling was selected as the ideal observation tactic as Gillham (2008) notes that other observation strategies, especially the use of continuous observations, can result in researcher fatigue. Observations were conducted every ten minutes for a duration of 60 seconds and all instances of non-compliance during the sample period were recorded in the Obj immediately after each observation period ended. To keep track of time periods, a stopwatch was utilized and was set to nine minute and 60 second intervals. As many of the landing sites were spread out, the researcher utilized 10x42 power binoculars to scan the tourists that were at a distance from the observation location.

Researcher bias can be a result of observational research, as Altmann (1974) stated that “without some form of systematic sampling procedure, there appears to be no way to avoid the bias that results when the observer's attention is attracted by certain types of behavior or certain classes of individuals”(p. 237). To create a systematic sampling procedure for this study, the researcher identified one tourist who was excluded from observations that they followed for the length of time spent ashore at each landing site. Following one individual provided the researcher a sampling procedure that

attempted to avoid selection bias, as this method potentially prevented the researcher from walking towards areas where non-compliance was occurring as well as removed the selection of sampling points at landing sites from the researcher's influence.

During time spent onboard the vessel between landing sites, conversations occurred naturally between the researcher and tourists. On occasion, these conversations resulted in comments being made by tourists that appeared to be pertinent to the research of this case study. The comments made during these conversations were recorded anecdotally, after consent was granted by the tourist (see Appendix VII), by the researcher in the Obj. Anecdotal observations and conversations were reviewed and in some circumstances included in the discussion section to provide context to the interpretation of the results. To maintain confidentiality of vessel, operator, and tourists, specific landing sites, total number of landing sites, and the identifiable aspects of anecdotal observations were excluded from the data analysis and results.

### **Validity**

To ensure the validity and reliability of the instrument, the questionnaire utilized the format developed by Ajzen (1991) and extended by Vagias et al. (2014) with the inclusion of knowledge and a two-factor analysis of perceived behavioral control. The inclusion of questions that assess both the difficulty of performing a behavior and the ability to perform a behavior are better able to predict this variable as described by Ajzen in Vagias et al. (2014). While Francis et al. (2004) recommends that the questionnaire be pilot tested with five respondents of the population providing comments on the survey items (p. 27), pilot testing was not possible with the target population due to constraints

relating to accessibility of individuals that participated in Antarctic tourism. Instead, the researcher used the expert analysis of five individuals in related fields to provide validation for the instrument. After completion of the expert analysis, the survey was found to require no more than minor modifications and was established for distribution. Utilizing an extended format similar to that used by Vagias et al. (2014), the survey constructs for the questionnaire are outlined in Table 2, additionally respondents' demographics including country of residence, fluency in English, previous experience in nature trips, gender identity, age range, and education level were also gathered (see Appendix III).

Table 2  
Survey Constructs

### Perceived Knowledge

- How would you describe your current knowledge of the General Guidelines for Visitors to the Antarctic?

### Behavioral Intention to follow General Guidelines for Visitors to the Antarctic

- I intend to follow the General Guidelines for Visitors to the Antarctic during my trip.
- I will make every effort to follow General Guidelines for Visitors to the Antarctic.
- I am determined to follow the General Guidelines for Visitors to the Antarctic.

### Attitudes regarding following General Guidelines for Visitors to the Antarctic

- Approaching wildlife that is 5 meters away
- Walking across ground where moss and lichens are growing
- Accidentally bringing non-native species in your luggage
- Standing between wildlife and the ocean
- Accidentally dropping litter/rubbish on land or in the sea
- Painting or engrave names on man-made or natural surfaces
- Collecting a small stone or other souvenir
- Approaching fur seals
- Joining another guides group while onshore
- Walking onto large snow fields without a guide
- Lighting a cigarette while ashore
- Passengers touching wildlife
- Other passengers taking souvenirs i.e. rock, feather
- Driving a small boat up to a whale for better pictures
- Another passenger breaks a guideline. You decide to break the same guideline.

### Subjective Norms

- Other passengers on my cruise would find it acceptable for me to walk across some lichens and moss in order to get a great photograph
- Other passengers on my cruise would approve of me taking a small pebble as a souvenir.
- Something negative will happen to me if I do not comply with the General Guidelines for Visitors to the Antarctic
- The guides think that I should comply with the General Guidelines for Visitors to the Antarctic

### Perceived Behavioral Control; Perceived Control

- How I act on the cruise vessel while in the Antarctic is:
- My time on the cruise vessel while in the Antarctic is:
- The way I act on shore while in the Antarctic is:
- My experience on the cruise vessel while in the Antarctic is:
- My actions while in Antarctica are:

### Perceived Behavioral Control; Perceived Difficulty

- If I wanted to, inspecting and cleaning all of my belongings to prevent the introduction of non-native species to Antarctica would be:
- Telling another passenger that they are not following the General Guidelines for Visitors to the Antarctic would be:
- I find following the General Guidelines for Visitors to the Antarctic to be:

## **Bias**

Sampling bias can have an influence on the results of a study and three sources of sampling bias have been identified as potential factors. Non-response bias, exclusion bias, and under-coverage bias were identified as having an effect on the study results. Dommeyer, Baum, Hanna, and Chapman (2004) identified that only 43.4 % response rates are achieved from online surveys versus a 75 % response rate for in-person surveys of similar sized populations. Variability in response rate could contribute to non-response bias, therefore this was accounted for by the distribution of the questionnaire in-person. Exclusion bias occurs when qualifying questions exclude a percentage of the population from the survey. As surveys were not translated into multiple languages for this study, individuals that did not meet the language and age requirements for participation were excluded. Exclusion for age and language was deemed to be acceptable to ensure the accuracy of survey completion and to ensure that the reliability and validity of the survey were not affected by language barriers. The third bias was under-coverage bias. As a sample for the entire Antarctic tourist population was impossible for the researcher to obtain due to monetary and time constraints, this study focused on a single voyage as a case study which was deemed to be acceptable as the results were not extrapolated to the entire Antarctic tourist population.

## **Data Analysis**

Using the data software SPSS, the questionnaire was evaluated to identify tourist's initial 'factors of intentions' and calculate their Behavioral Intention (BI) and Predicted Behaviors (B) using the TPB framework. Conducting descriptive statistics, the researcher found the mean and standard deviation scores for attitudes, subjective norms,

perceived behavioral control, and level of knowledge. The researcher additionally created box-plots to identify and note any outliers in the data for individual questions. These outliers were acknowledged in the discussion. Box-plots were additionally created for the overall results of attitudes, subjective norms, perceived behavioral control, level of knowledge, behavioral intention, and predicted behavior. These resulted in one case that was found to have outlying data for 12 of 13 attitudes that were assessed. Additionally, this resulted in one case within behavioral intention that outlies the rest of the data. The outlier case was removed for data analysis while the potential significance of this outlier (Osborne & Overby, 2004) was investigated in the discussion. The researcher then conducted bivariate correlations to identify how attitudes, subjective norms, perceived behavioral controls, and knowledge mediate intention to practice the GGVA.

The last set of tests conducted on the survey data involved breaking the data into groups based on gender identification, country of residence, age, education, and previous nature tour experience. After assessing for normality of the data with a Shapiro-Wilk Test, an ANOVA was conducted for parametric data and an Independent-Samples Kruskal-Wallis Test for non-parametric data. The researcher then analyzed the outputs for each independent variable against survey dependent variables to determine if there was a significant difference based on the dependent variables. This data was used to explain how demographic differences influence the independent variables and affect an individuals' ability to practice the GGVA.

The results of the observational data were transcribed into a spreadsheet and analyzed based on frequencies and descriptive. The data was then loaded into the data



analysis software R where the observational data means and standard deviations were calculated. The data was then run through a bootstrap routine in R for the total amount of time that passengers spent onshore ( $T=470$ ) minutes with a random seed that was set to 112358 for the analysis. The set seed was chosen at random and allows for the results of this bootstrap analysis to be reproduced (Tibshirani, 2016). The mean and standard deviation were then calculated for the bootstrap data and compared with the original observational data in the results section.

## CHAPTER FOUR: RESULTS

### Survey Results

#### *Descriptive Statistics*

The demographics for the questionnaire are detailed in Table 3 representing the frequencies of the questionnaire responses. Of the 36 total respondents, 33 of these individuals identified as fluent in English. As English fluency is a requirement and one case was removed as an outlier, the demographics detailed are only for the 32 eligible participants. Eligible participants were 53.12% Female (n=17) and 46.88% Male (n=15); originating predominantly from North America (n=18, 56.25%), followed by Europe (n=13, 40.63%), and other (n=1, 3.13%). Participants under the age of 50 (n=20) accounted for 60% of respondents with those between the age of 30-39 (n=11) accounting for the majority of this group. Participants aged 50 or older (n=12) accounted for the additional 37.50% of respondents. Advanced Education was reported at 53.13% (n=17) for tourists that held a professional or graduate level degree and 34.38% (n=11) for College Graduates. Participants that did not enter college after High School (n=2) or had participated in Some College (n=2) accounted for a combined 12.50% of the questionnaire responses. The majority of participants (n=23) represented travelers with at least one previous nature-based tourism experience (71.88%), while for the other participants (n=9) this was their first nature-based tourism experience that was over one week in length.

### *Summary Statistics*

The interpretation of the seven-point Likert scale utilized in the survey was accomplished by identifying the cumulative (n=32) mean ( $\bar{x}$ ) and standard deviation (s) of the survey responses. The output of mean and standard deviation of individual results are provided in Table 4. Attitude (AT) 1-13, Subjective Norm (SN) 1, and SN2 were reverse coded for scale alignment or to change questions with negative phrasing to reflect positive phrasing. The Self-Reported Behavioral Intention to Practice GGVA (srBI) averaged  $\bar{x} = 6.86$ ,  $s = 0.29$ . The Attitudes regarding GGVA Practices (AT) averaged  $\bar{x} = 6.53$ ,  $s = 0.49$ . Subjective Norms (SN) 1 and 2 were reverse coded and combined with SN-3 and SN-4 for positive responses which averaged  $\bar{x} = 5.55$ ,  $s = 1.14$ . Perceived Behavioral Control (PBC) was sub-divided into Perceived Control (PC) averaging  $\bar{x} = 5.97$ ,  $s = 0.86$ , and Perceived Difficulty (PD) averaging  $\bar{x} = 5.30$ ,  $s = 1.35$ , with a combined PBC of  $\bar{x} = 5.72$ ,  $s = 0.87$ . The Level of Knowledge that respondents expressed regarding their current understanding of the GGVA averaged  $\bar{x} = 4.06$ ,  $s = 1.46$ . Boxplots were created to identify the distribution of the data for Level of Knowledge (Figure 5), AT

Table 3  
*Frequency Demographics for the Survey*

Gender	<i>f</i>	<i>f/n</i>	English	<i>f</i>	<i>f/n</i>	Residence	<i>f</i>	<i>f/n</i>	Edu	<i>f</i>	<i>f/n</i>	Tours	<i>f</i>	<i>f/n</i>	Age	<i>f</i>	<i>f/n</i>
Male	15	0.45	Yes	33	1	North America	18	0.55	High School	2	0.06	0	9	0.27	<18	0	0.00
Females	17	0.52	No	3	0.09	Europe	13	0.39	Some College	3	0.09	1	2	0.06	18-29	5	0.15
-	-	-	-	-	-	Other	1	0.03	Graduated from College	11	0.33	2	4	0.12	30-39	11	0.33
-	-	-	-	-	-	-	-	-	Professional or Graduate Degree	16	0.48	3	2	0.06	40-49	4	0.12
-	-	-	-	-	-	-	-	-	-	-	-	4+	15	0.45	50-59	2	0.06
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	60-69	5	0.15
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	70+	5	0.15

Table 4  
Summary Statistics for the Survey

Indicators		$\bar{x}$	$s$
<b>Self-Reported Behavioral Intentions to Practice GGVA (F1_BI)</b>			
BI-1	I intend to follow the General Guidelines for Visitors to the Antarctic during I will make every effort to follow the General Guidelines for Visitors to the	6.88	0.42
BI-2	Antarctic	6.91	0.30
BI-3	I am determined to follow the General Guidelines for Visitors to the Antarctic	6.84	0.45
<b>Attitudes Regarding GGVA Practices (AT)</b>			
A-1	Approaching wildlife that is 5 meters away	5.97	1.58
A-2	Walking across ground where moss and lichens are growing	6.31	1.20
A-3	Accidentally transporting non-native species to Antarctica	6.94	0.25
A-4	Standing between wildlife and the ocean	6.13	1.24
A-5	Accidentally dropping litter/rubbish on land or in the sea	6.97	0.18
A-6	Painting or engrave names on man-made or natural surfaces	7.00	0.00
A-7	Collecting a small stone or other souvenir	6.31	1.12
A-8	Approaching fur seals	6.66	0.79
A-9	Lighting a cigarette while ashore	6.53	1.16
A-10	Passengers touching wildlife	6.81	0.64
A-11	Other passengers taking souvenirs i.e. rock, feather	6.34	1.04
A-12	Driving a small boat up to a whale for better pictures	6.06	1.44
A-13	Another passenger breaks a guideline. You decide to break the same guideline.	6.81	0.54
<b>Subjective Norms (SN)</b>			
SN-1	Other passengers on my cruise would find it acceptable for me to walk across Other passengers on my cruise would approve of me taking a small pebble as	6.03	1.51
SN-2	a souvenir	6.13	1.34
SN-3	Something negative will happen to me if I do not comply with the General Guidelines for Visitors to the Antarctic	3.91	2.44
SN-4	The guides think that I should comply with the General Guidelines for Visitors to the Antarctic	6.19	1.89
<b>Perceived Behavioral Control</b>			
<b>Perceived Behavioral Control; Perceived Control (PBC-PC)</b>			
PC-1	How I act on the cruise vessel while in the Antarctic is:	6.38	0.94
PC-2	What I do with my free time on the cruise vessel while in the Antarctic is:	5.94	1.21
PC-3	The way I act on shore while in the Antarctic is:	5.81	1.58
PC-4	My experience on the cruise vessel while in the Antarctic is:	5.19	1.60
PC-5	My actions while in Antarctica are:	6.39	0.99
<b>Perceived Behavioral Control; Perceived Difficulty (PBC-PD)</b>			
PD-1	Inspecting and cleaning all of my belongings to prevent the introduction of non-native species to Antarctica would be:	5.22	1.90
PD-2	Telling another passenger that they are not following the General Guidelines	4.62	1.83
PD-3	I find following the General Guidelines for Visitors to the Antarctic to be:	6.06	1.34
<b>Knowledge of the GGVA</b>			
Know	How would you describe your current knowledge of the General Guidelines	4.06	1.46

(Figure 6), SN (Figure 7), and PBC (Figure 8). In Figure 5, it can be seen that all the responses to Level of Knowledge fall within the minimum and maximum. Figure 5 appears tall demonstrating a wide range of tourists' Level of Knowledge concerning the GGVA.

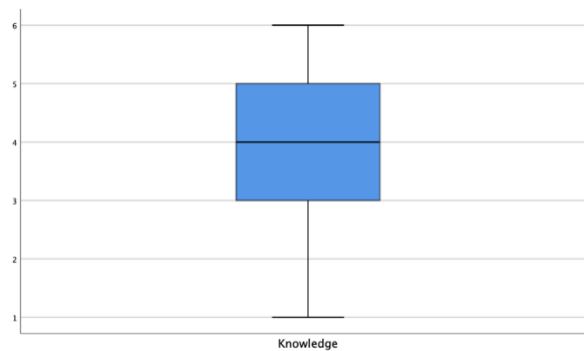


Figure 5  
*Box Plot for Survey Result Knowledge*

In Figure 6, it can be seen that not all the responses to individual AT variables fall within the minimum and maximum for each variable. Within AT, multiple boxplots have outliers. As tests were not conducted on individual responses within AT, these outliers were not removed.

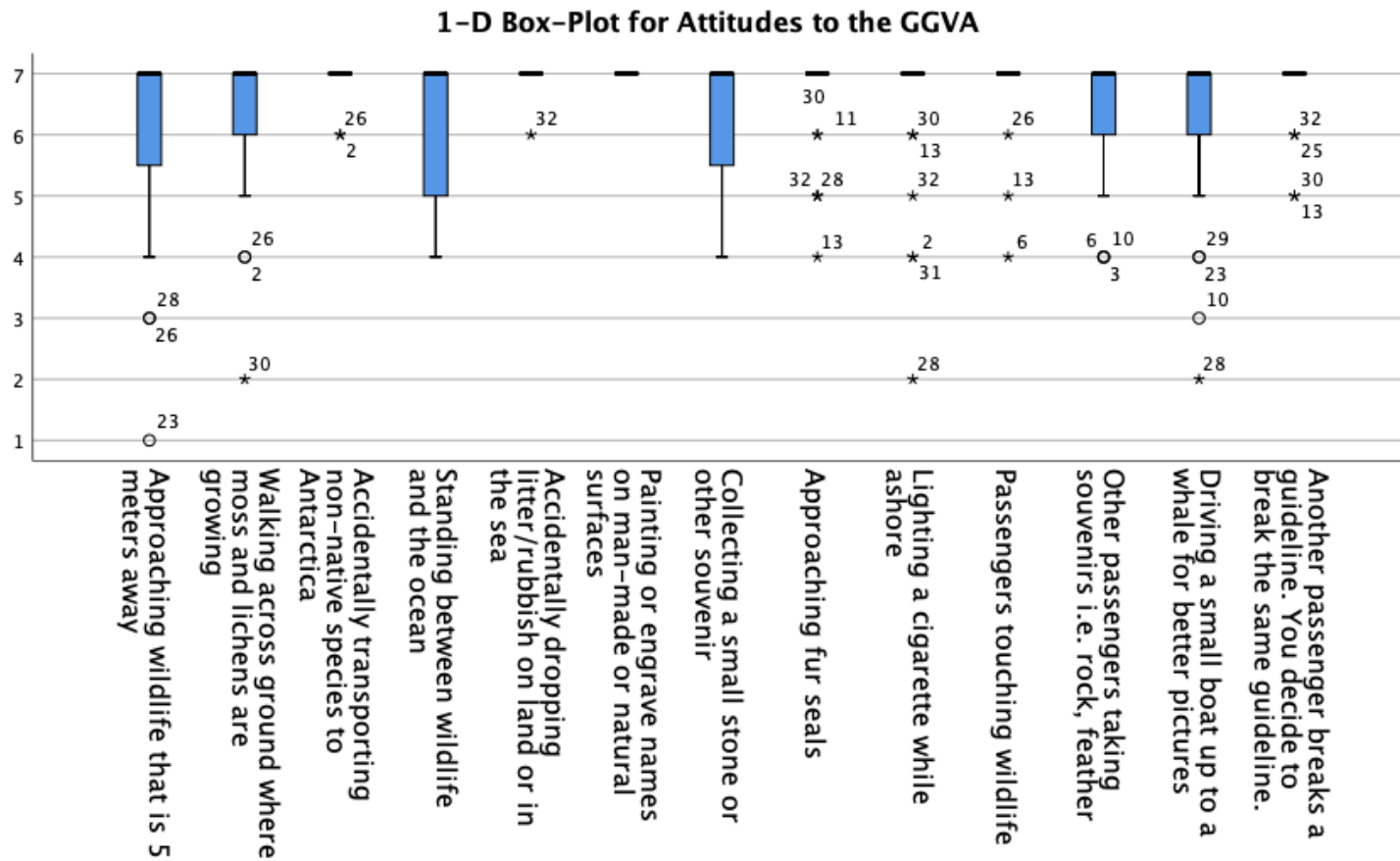


Figure 6  
Box Plot for Survey Results Attitude

In Figure 7, it can be seen that questions one, two, and three assessing SN have responses that fall within the minimum and maximum, demonstrating a wide range of beliefs from respondents. The fourth question in Figure 7 has multiple outlying data points that fall outside of the range of the majority of respondents. As tests were not conducted on individual responses within SN, these outliers were not removed.

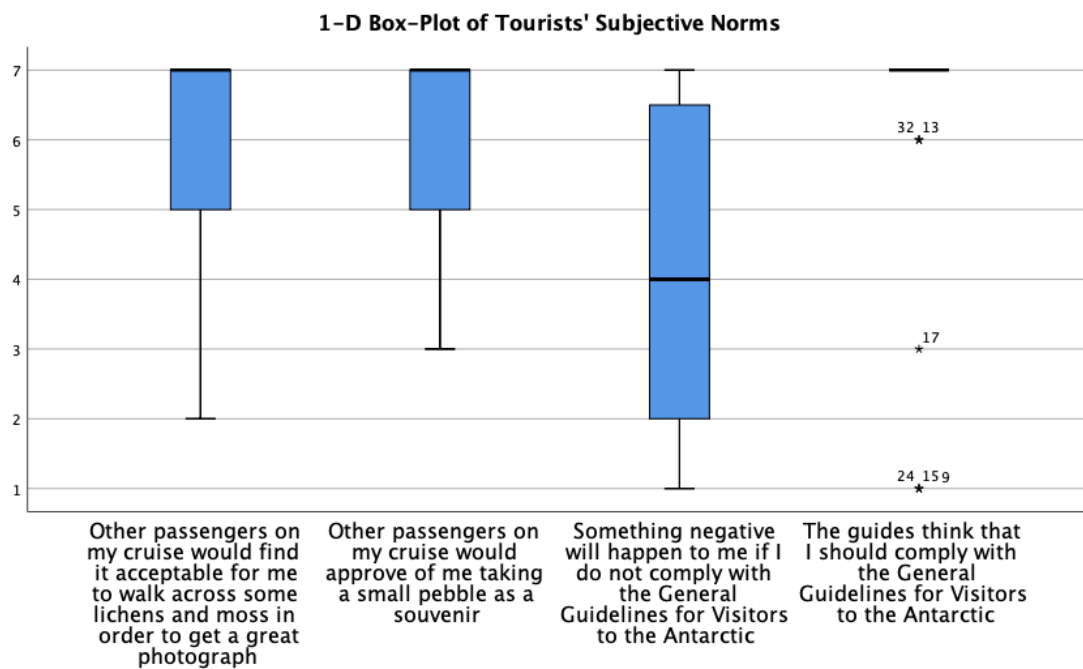


Figure 7  
Box Plot for Survey Result Subjective Norms



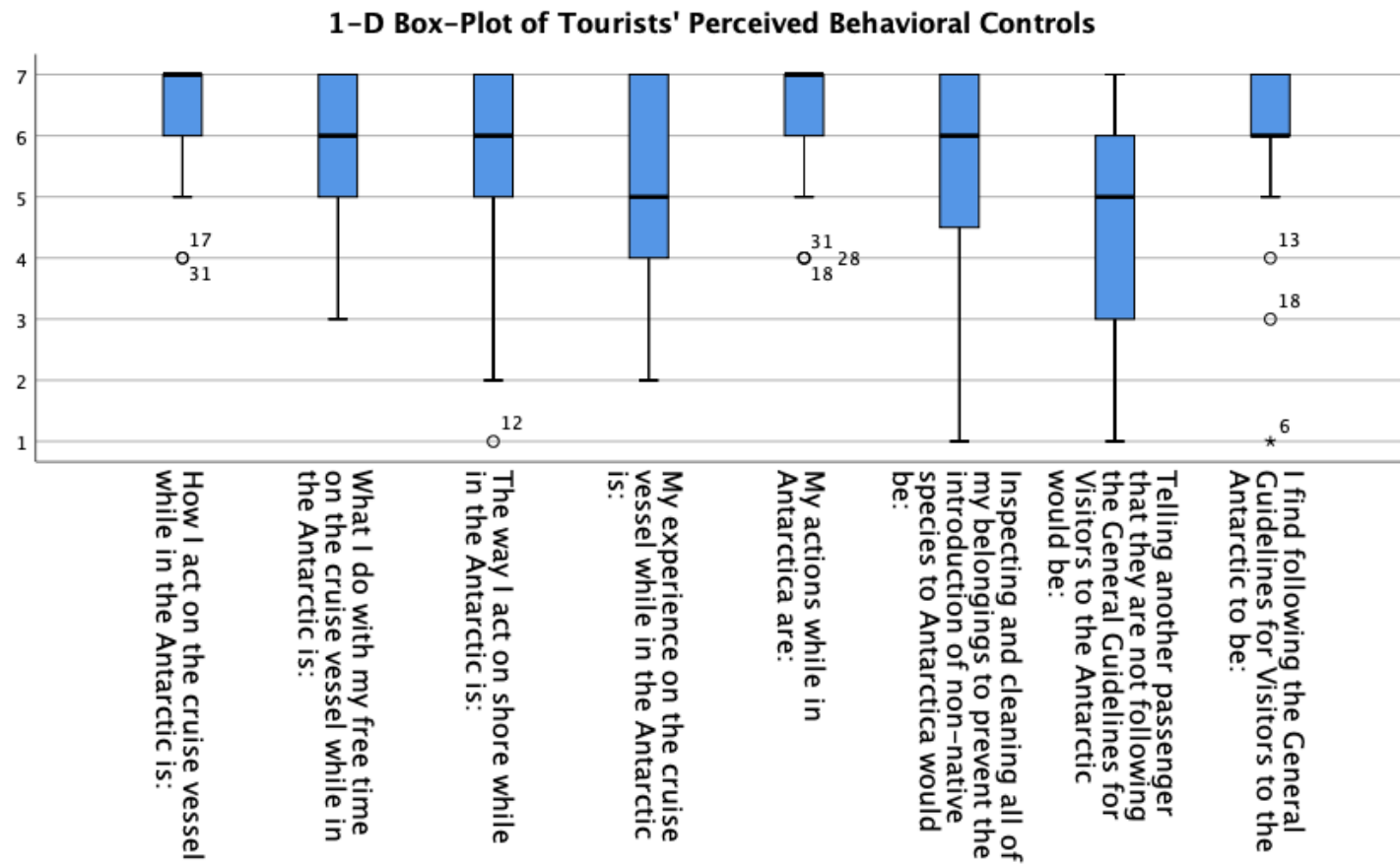


Figure 8  
*Box Plot for Survey Results Perceived Behavioral Control*

In Figure 8, it can be seen that outliers exist for questions one, three, five, and eight. Questions two, four, six and seven have no data points that are outside their respective minimums. Questions six and seven demonstrate a tall range of tourists' PD covering all possible responses. As tests were not conducted on individual responses within PBC, these outliers were not removed.

### ***Summary Statistics for Grouped Variables***

Table 5 was generated in SPSS to identify the means and standard deviations of the variables Level of Knowledge of the GGVA, srBI, AT, SN, and PBC for the groups: Gender, Country of Residence, Age, Education, and Past Nature Tours. Level of Knowledge of the GGVA averaged the highest among Females ( $\bar{x} = 4.29$ ), North Americans ( $\bar{x} = 4.33$ ), 40- to 49-year-olds ( $\bar{x} = 4.75$ ), High School Graduates ( $\bar{x} = 6.00$ ), and individuals that had been on two previous nature tours that were more than 100 miles from their homes for a week's duration ( $\bar{x} = 4.75$ ).

There is a potential skew to the result of Education on Level of Knowledge as High School Graduates only accounted for 6% of the sample size ( $n = 2$ ). The second highest rating of Education on Level of Knowledge is the Professional or Graduate Degree category which scored  $\bar{x} = 4.18$  and accounted for 50% of the sample size ( $n = 16$ ). The responses by group for srBI saw Females ( $\bar{x} = 6.96$ ) with a higher average response rate to Males in the same category. North Americans ( $\bar{x} = 6.91$ ), 50-59 and 60-69 year-olds ( $\bar{x} = 7.00$ ), High School Graduates and those with Some College ( $\bar{x} = 7.00$ ),

Table 5  
Summary Statistics for Grouped Variables

	Females		Males		Europeans		North Americans	
	$\bar{x}$	$s$	$\bar{x}$	$s$	$\bar{x}$	$s$	$\bar{x}$	$s$
Knowledge of the GGVA	4.29	1.53	3.80	1.38	3.77	1.36	4.33	1.53
Self-Reported Intention to Comply with the GGVA	6.90	0.26	6.82	0.33	6.79	0.35	6.91	0.25
Attitudes towards the GGVA	6.73	0.33	6.30	0.55	6.44	0.50	6.56	0.49
Subjective Norms	5.81	1.08	5.27	1.17	5.44	1.13	5.56	1.16
Perceived Behavioral Control	6.06	0.69	5.33	0.92	5.35	0.82	6.05	0.79

	18-29 yrs		30-39 yrs		40-49 yrs		50-59 yrs	
	$\bar{x}$	$s$	$\bar{x}$	$s$	$\bar{x}$	$s$	$\bar{x}$	$s$
Knowledge of the GGVA	4.00	1.58	3.91	1.45	4.75	1.26	2.50	0.71
Self-Reported Intention to Comply with the GGVA	6.87	0.18	6.79	0.37	6.92	0.17	7.00	0.00
Attitudes towards the GGVA	6.34	0.55	6.45	0.35	6.56	0.83	6.46	0.76
Subjective Norms	5.60	1.38	5.20	1.12	4.81	0.83	6.88	0.18
Perceived Behavioral Control	5.13	0.60	5.41	0.88	5.78	0.94	5.94	0.80

	60-69 yrs		70+ yrs		HS Graduate		Some College	
	$\bar{x}$	$s$	$\bar{x}$	$s$	$\bar{x}$	$s$	$\bar{x}$	$s$
Knowledge of the GGVA	4.60	1.34	4.00	1.87	6.00	0.00	3.00	1.41
Self-Reported Intention to Comply with the GGVA	7.00	0.00	6.80	0.45	7.00	0.00	7.00	0.00
Attitudes towards the GGVA	6.82	0.30	6.59	0.56	7.00	0.00	6.38	0.65
Subjective Norms	6.40	0.82	5.50	1.10	5.50	2.12	6.25	0.71
Perceived Behavioral Control	6.25	1.09	6.33	0.23	6.81	0.27	5.94	0.80

	College Grad		Professional or Graduate Degree		No Nature Tours		1 Nature Tour	
	$\bar{x}$	$s$	$\bar{x}$	$s$	$\bar{x}$	$s$	$\bar{x}$	$s$
Knowledge of the GGVA	3.73	1.42	4.18	1.43	4.11	1.36	4.00	0.00
Self-Reported Intention to Comply with the GGVA	6.85	0.31	6.87	0.28	6.85	0.38	6.50	0.71
Attitudes towards the GGVA	6.45	0.46	6.54	0.52	6.55	0.50	6.54	0.33
Subjective Norms	5.59	1.24	5.46	1.08	6.00	0.66	5.75	1.77
Perceived Behavioral Control	5.52	0.70	5.69	0.98	5.85	0.79	6.06	1.33

	2 Nature Tours		3 Nature Tours		4+ Nature Tours		-	-
	$\bar{x}$	$s$	$\bar{x}$	$s$	$\bar{x}$	$s$	-	-
Knowledge of the GGVA	4.75	1.26	3.50	3.54	3.93	1.49	-	-
Self-Reported Intention to Comply with the GGVA	6.92	0.17	7.00	0.00	6.89	0.24	-	-
Attitudes towards the GGVA	6.54	0.82	6.83	0.24	6.47	0.46	-	-
Subjective Norms	5.13	1.20	5.50	2.12	5.38	1.25	-	-
Perceived Behavioral Control	5.88	0.87	6.44	0.27	5.46	0.92	-	-

and those that had participated in three previous nature tours that were more than 100 miles from their homes for a week's duration ( $\bar{x} = 7.00$ ) averaged higher scores in srBI than their comparable groups. The averages for 50-59 year-olds, High School Graduates and those with Some College, as well as those that had participated in three previous nature tours that were more than 100 miles from their homes for a week's duration are all ranked as <10% of the sample size, which may cause the averages for these groups to be skewed.

Tourists' AT towards the GGVA saw Females ( $\bar{x} = 6.73$ ) with a higher average than Males. AT held a higher average among North Americans ( $\bar{x} = 6.56$ ), 60-69 year old's ( $\bar{x} = 6.82$ ), High School Graduates ( $\bar{x} = 7.00$ ), and those that had participated in three previous nature tours that were more than 100 miles from their homes for a week's duration ( $\bar{x} = 6.83$ ) compared to other response groups. The ATs towards the GGVA variable may not be truly representative as High School Graduates, and those that had participated in three previous nature tours that were more than 100 miles from their homes for a week's duration, as they are ranked as <10% of the sample size.

In identifying the sample SN, Females ( $\bar{x} = 5.81$ ) and North Americans ( $\bar{x} = 5.56$ ) averaged higher than Males and Europeans respectively. While 50-59 year olds ( $\bar{x} = 6.88$ ) averaged the highest, their frequency of <10% of the sample size makes this average questionable. The same holds true for the highest average SN ( $\bar{x} = 6.25$ ) resulting from tourists that had attended Some College. Tourists that had participated in no previous nature tours that were more than 100 miles from their homes for a week's duration had the highest average ( $\bar{x} = 6.00$ ) for SN.

The average PBC of tourists in this case study were highest for Females ( $\bar{x} = 6.06$ ), North Americans ( $\bar{x} = 6.05$ ), 70+ year old's ( $\bar{x} = 6.33$ ), High School Graduates ( $\bar{x} = 6.81$ ), and those that had participated in three previous nature tours that were more than 100 miles from their homes for a week's duration. The results of PBC that account for >10% of the sample size are Females, North Americans, and 70+ years of age. While High School Graduates, and those that had participated in three previous nature tours that were more than 100 miles from their homes for a week's duration additionally accounted for less than 10% of the sample size.

### ***Calculating Behavioral Intention and Predicted Behavior***

The TPB formula created by Ajzen (1991) to calculate Behavioral Intention (BI) utilizes the following equation:

$$BI = w_A A + w_{SN} SN + w_{PBC} PBC.$$

Where:

$w_A A$  = The weighted AT

$w_{SN} SN$  = The weighted Subjective Norm

$w_{PBC} PBC$  = The weighted Perceived Behavioral Control

To identify the weight for AT, SN, and PBC, the means of all the responses for AT, SN, and PBC variables were utilized as inputs for an automatic linear regression in SPSS, which identified the level of importance for each of the variables as related to self-reported behavioral intention (srBI). The levels of importance were assigned to each variable as a weight for the calculation of BI with outputs of 0.030, 0.002, 0.968 respectively. The regression analysis identified PBC as holding the greatest amount of

influence (96.8%) on srBI, followed by AT (3.00%) and SN (0.20%). When these weights were assigned to AT, SN, and PBC, the result is BI=5.87, indicating a perceived likelihood of 83.86% of tourists intending to practice the GGVA.

The TPB formula for Predicted Behavior (B) is:

$$(B): B = w_{BI}BI + w_{PBC}PBC$$

Where:

$w_{BI}BI$  = The weighted BI

$w_{PBC}PBC$  = The weighted PBC

Using the automatic linear regression in SPSS, the weighted BI and weighted PBC were regressed against tourists' self-reported behavioral intention (srBI) from the questionnaire, which provided the weights 0.55 for BI and 0.45 for PBC. When the weighted BI and weighted PBC were summed, this resulted in a B=5.80 indicating the predicted likelihood of tourists actually practicing the GGVA was 82.86%. A boxplot was generated for both BI and B to assess for outliers. Based on Figure 9, there were no identified outliers in the data for BI or B. Both variables in Figure 9 show a wide representation of tourists BI and B, though it is noted that behavioral intention appears to have a marginally higher mean than behavior. This appears to indicate that the average tourists' intention to practice the GGVA is slightly higher than the behaviors that tourists may actually perform.

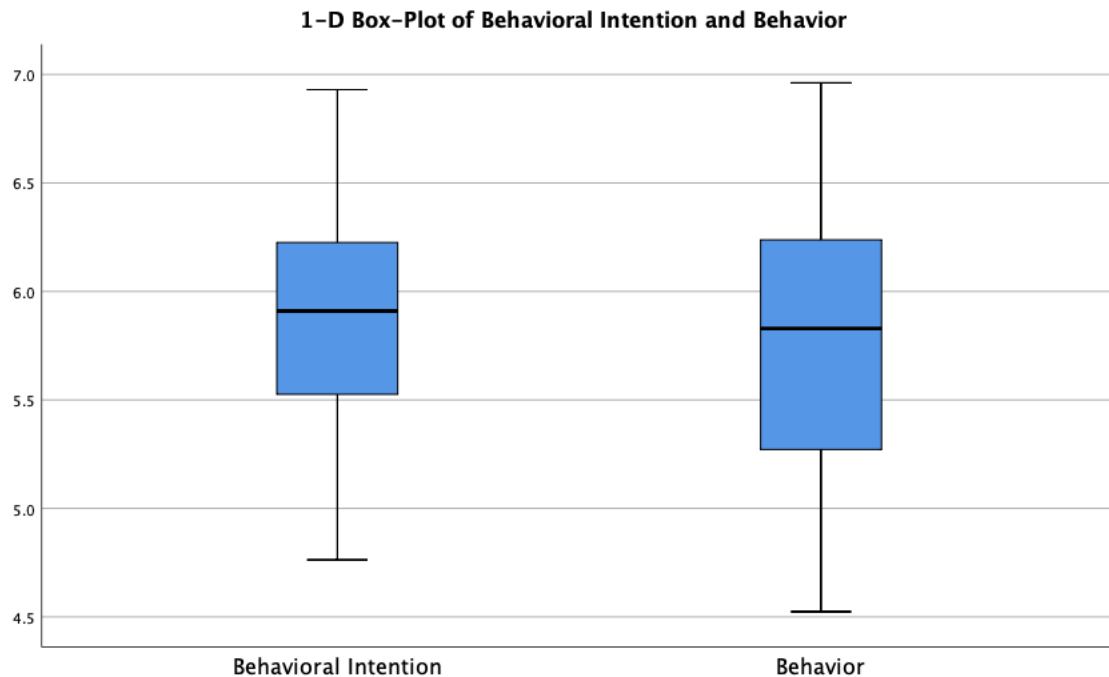


Figure 9  
*Box Plot for Calculated Behavioral Intention and Behavior*

To identify if relationships existed after BI and B were calculated (see Table 6), a bivariate test was run in SPSS between BI, B, AT, SN, PBC, and Level of Knowledge. The bivariate test resulted in strong correlations between BI, B, SN, as well as between B and PBC, which were statistically significant ( $p < 0.01$ ). There was also a moderate correlation between BI, AT, PBC, as well as between AT and B and between PBC and Level of Knowledge that were statistically significant ( $p < 0.01$ ). Finally, there was a weak correlation between B, SN, and Level of Knowledge as well as between AT, PBC, and Level of Knowledge that were statistically significant ( $p < 0.05$ ). There were no

statistically significant correlations found between BI and Level of Knowledge, AT and SN, SN and PBC, or SN and Level of knowledge.

Table 6  
*Correlations between Survey Results and Calculated Behavioral Intention and Predicted Behavior*

Pre-Survey	Behavioral Intention	Behavior	Attitudes	Subjective Norms	Perceived Behavioral Control	Knowledge
Behavioral Intention						
Behavior	0.88**					
Attitudes	.63**	0.53**				
Subjective Norms	0.75**	0.39*	0.24			
Perceived Behavioral Control	0.63**	0.93**	0.36*	0.03		
Knowledge	0.14	.39*	.38*	-0.35	.52**	

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

While Table 5 shows the survey constructs against the demographic variables, an understanding of the relationships between BI and B in regards to the descriptive variables was additionally important; the mean and standard deviation for these relationships are summarized in Table 7. A Shapiro-Wilk test was conducted to assess the normality of the distributions for each demographic variable, and a parametric test or non-parametric test was conducted based on the normality of the data. A parametric test was conducted for Gender as it was the only demographic variable that was found to have a normal distribution based on the Shapiro-Wilk test. A non-parametric test was conducted for Country of Residence, Age, Education, and Previous Nature Tours, as



these demographic variables were found to have groups within them that were not normally distributed.

Table 7  
*Summary Statistics for Behavioral Intention and Predicted Behavior*

	Females		Males		Europeans		North Americans	
	$\bar{x}$	$s$	$\bar{x}$	$s$	$\bar{x}$	$s$	$\bar{x}$	$s$
BI	6.14	0.52	5.58	0.47	5.69	0.50	6.00	0.60
B	6.10	0.60	5.47	0.56	5.53	0.57	6.02	0.63
	18-29 yrs		30-39 yrs		40-49 yrs		50-59 yrs	
	$\bar{x}$	$s$	$\bar{x}$	$s$	$\bar{x}$	$s$	$\bar{x}$	$s$
BI	5.63	0.61	5.63	0.44	5.66	0.63	6.36	0.57
B	5.40	0.48	5.53	0.56	5.71	0.72	6.17	0.67
	60-69 yrs		70+ yrs		High School Graduate		Some College	
	$\bar{x}$	$s$	$\bar{x}$	$s$	$\bar{x}$	$s$	$\bar{x}$	$s$
BI	6.42	0.49	6.08	0.41	6.37	0.79	6.13	0.24
B	6.35	0.71	6.19	0.25	6.57	0.55	6.04	0.49
	Graduated From College		Professional or Graduate Degree		No Nature Tours		1 Nature Tour	
	$\bar{x}$	$s$	$\bar{x}$	$s$	$\bar{x}$	$s$	$\bar{x}$	$s$
BI	5.79	0.63	5.84	0.53	6.07	0.43	6.06	1.13
B	5.67	0.60	5.77	0.66	5.97	0.53	6.06	1.22
	2 Nature Tours		3 Nature Tours		4+ Nature Tours		-	-
	$\bar{x}$	$s$	$\bar{x}$	$s$	$\bar{x}$	$s$	-	-
BI	5.79	0.70	6.19	0.53	5.71	0.56	-	-
B	5.83	0.70	6.30	0.17	5.60	0.64	-	-

Because the data for Gender was parametric, a one-way ANOVA was used to analyze if Gender was related to BI. This resulted in BI showing a statistically significant

difference between groups ( $F(1,30) = 10.040, p = 0.004$ ) which indicates that Gender has a direct relation to a tourists' BI (see Table 8). When Gender was analyzed to assess for a relationship by means of a one-way ANOVA against B (see Table 8), the results indicate a statistically significant difference between groups ( $F(1,30) = 10.276, p = 0.003$ ) which indicates that Gender has a direct relation to a tourists' B. For both BI and B, Women were noted as having higher scores than Men (see Table 7) which corresponds to the findings in the results of a direct relationship between Genders for BI and B.

The following variables were found to be non-parametric from the Shapiro-Wilk test indicating an Independent-Samples Kruskal-Wallis Tests should be conducted. When Country of Residence, Age, Education, and Previous Nature Tours were regressed against BI and B the results of the Kruskal-Wallis H tests showed that there was no significant difference between groups.

Individual tourists' BI to practice the GGVA were grouped into four categories: low intention ( $\bar{x} = 1.00 - 2.50$ ), moderately low intention ( $\bar{x} = 2.51 - 4.00$ ), moderately high intention ( $\bar{x} = 4.01 - 5.50$ ), and high intention ( $\bar{x} = 5.51 - 7.00$ ). The results showed zero tourists with low intention, zero tourists with moderately low intention, seven tourists with moderately high intention, and 23 tourists with a high intention to comply with the GGVA. The scores of individual tourists' B to comply with the GGVA were grouped into the same four categories. The case study identified zero tourists with low intention, zero tourists with moderately low intention, 12 tourists with moderately high intention, and 20 tourists with high intention to comply with the GGVA. While moderately high intention to comply with the GGVA had fewer tourists, it is of note that

two tourists had mean BI scores of less than five and three tourists had mean B scores of less than five. It is of note that the tourists within the moderately high intention range (seven) for BI and 12 for B had scores that were closer to a neutral stance ( $\bar{x} = 4.00$  on a 7-point Likert scale) in relation to practicing the GGVA than the corresponding 23 for BI and 20 for B in the high intention group.

Table 8  
*Results of One-Way ANOVA between Genders*

		Sum of Squares	df	Mean Square	F	Sig.
<b>Behavioral</b>						
Intention	Between Groups	2.485	1	2.485	10.04	0.004
	Within Groups	7.424	30	0.247		
	Total	9.909	31			
Behavior	Between Groups	3.199	1	3.199	10.276	0.003
	Within Groups	9.339	30	0.311		
	Total	12.537	31			

### ***Behavioral Intention vs Behavior***

The first steps in comparing BI and B involved comparing the self-reported behavioral intention (srBI)  $\bar{x}$  =6.87 of tourists to comply with the GGVA to the results of the calculated behavioral intention (BI)  $\bar{x}$  =5.87. This comparison suggests an observable over-prediction by tourists of their intention to comply with the GGVA. To explore if this difference was significant, a one-sample T-test was conducted on srBI utilizing the mean of BI as the test value. The T-test identified a significant difference in intention to comply with the GGVA between srBI and BI ( $p < .001$ ). As such, it was found that tourists over predict their intention to comply with the GGVA. Additionally, an observable difference between srBI and B was identified using a One-Sample T-test. The One-Sample T-test on srBI utilizing the mean of B as the test value. The results of the T-test identified that there was a significant difference between srBI and B ( $p < .001$ ), implying that tourists will additionally over-predict their intention to practice the GGVA as compared to the actual behaviors tourists will perform. As such, srBI should not be utilized as a predictor of tourists' actual behaviors. These findings were reiterated in the results of a Pearson's correlation test between srBI, BI, and B. The Pearson's correlation test identified a positive correlation between BI and B, ( $r = 0.878$ ,  $n = 32$ ,  $p < 0.001$ ), while finding no correlation between srBI and BI or srBI and B. Overall, the results found that there was a strong, positive correlation between BI and B corresponding to an increase or decrease in BI being correlated with an increase or decrease in B.

## **Observational Results**

### ***Summary Statistics***

Participant observation was conducted by the researcher in-situ and to reduce the potential for researcher bias. A random tourist was selected and followed during shore excursions. At nine-minute intervals the researcher conducted a 60 second observation of the actions of all visible tourists and then noted the results in the observation journal. These observation cycles of ten minutes a piece were conducted for the duration of the shore excursions. Observations were conducted at five different landing sites with 12 minutes of observations at Site 1, eight minutes of observations at Site 2, nine minutes of observations at Site 3, nine minutes of observations at Site 4, and nine minutes of observations at Site 5 for a total of 47 minutes of observations over a total time ashore of 470 minutes. The observation journal contained fifteen variables that the researcher used to identify activities that would be considered as non-compliant with the recommendations of the GGVA.

Table 9  
*Observations for Landing Site 1*

Landing Location 1												
Observation Point	1	2	3	4	5	6	7	8	9	10	11	12
Distance of <5 meters from wildlife												3
Distance of <15 meters from seal												
Touching Wildlife												
Feeding wildlife												
Standing/Walking between wildlife and ocean	1		1	1								
Disturb wildlife (aburpt direction change/flyoff)												
Running while ashore												
Walking off an established track								2	2			
Walk on moss and/or lichen bed												
Smoking/Light cigarette												
Graffiti/Cairn building												
Drop litter or rubbish												
Collect souvenir (small stone, feather, bone, etc.)												
Disturb or pollute lake												
Non-Native Species (specify in notes)												

The first landing site was located at an island along the Antarctic Peninsula. The total time spent ashore by the researcher was 120 minutes, during which time twelve one-minute observations were made. The weather conditions at the site were overcast with a temperature of -5° centigrade. The observations, which are noted in Table 9, show that there was one instance of three individuals approaching to a distance of less than five meters from wildlife, three instances of one individual

standing or walking between wildlife and the ocean, and two instances of two individuals walking off an established track.

Table 10  
*Observations for Landing Site 2*

Landing Location 2								
Observation Point	1	2	3	4	5	6	7	8
Distance of <5 meters from wildlife		*			1			
Distance of <15 meters from seal								
Touching Wildlife								
Feeding wildlife								
Standing/Walking between wildlife and ocean				8				
Disturb wildlife (abrupt direction change/flyoff)				8				
Running while ashore								
Walking off an established track		1						
Walk on moss and/or lichen bed								
Smoking/Light cigarette								
Graffiti/Cairn building								
Drop litter or rubbish								
Collect souvenir (small stone, feather, bone, etc.)								
Disturb or pollute lake								
Non-Native Species (specify in notes)								
* 5 tourists' observed within 5 meters of Sheathbills								

The second landing site was located on a small outcrop along the Antarctic Peninsula. The total time spent ashore by the researcher was 80 minutes during which time eight one-minute observations were made. The weather conditions at the site were overcast with a temperature of 0° centigrade. The observations, which are noted in Table 10, show that there was one instance of one individual approaching to a distance of less than five meters from wildlife, one instance of eight individuals standing or walking between wildlife and the ocean and simultaneously disturbing a penguin which continually changed directions to try and route around the group, and one instance of one



individual walking off an established track. It was additionally noted that there was one instance of five individuals being within five meters of Snowy Sheathbills due to the track that was established by the expedition staff. The Sheathbills were sleeping and did not wake up when tourists passed by, so this data point was not logged as an intentional non-compliance with the guidelines.

Table 11  
*Observations for Landing Site 3*

Landing Location 3									
Observation Point	1	2	3	4	5	6	7	8	9
Distance of <5 meters from wildlife									
Distance of <15 meters from seal									
Touching Wildlife									
Feeding wildlife									
Standing/Walking between wildlife and ocean									
Disturb wildlife (abrupt direction change/flyoff)									
Running while ashore									
Walking off an established track									
Walk on moss and/or lichen bed									
Smoking/Light cigarette									
Graffiti/Cairn building									
Drop litter or rubbish									
Collect souvenir (small stone, feather, bone, etc.)									
Disturb or pollute lake									
Non-Native Species (specify in notes)									

Tourists split into two groups. Only one group of approximately half of the tourists were observed.

The third landing site was located on the continent along the Antarctic Peninsula. The total time spent ashore by the researcher was 90 minutes during which time nine one-minute observations were made. The weather conditions at the site were sunny that progressed to overcast with a temperature of 0° centigrade. For this location, the tourists were split into two groups with the researcher being able to only observe one group while

ashore. The observations, which are noted in Table 11, show that there were no instances of non-compliance noted by the researcher at landing site 3 for the tourists.

The fourth landing site was located at an island along the Antarctic Peninsula. The total time spent ashore by the researcher was 90 minutes during which time nine one-minute observations were made. The weather conditions at the site were partially-overcast with a temperature of  $-3^{\circ}$  centigrade. The observations, which are noted in Table 12, show that there were seven observation points accounting for 18 tourists approaching to a distance of less than five meters from wildlife, two instances of four and eight individual standing or walking between wildlife and the ocean, one instance of two individuals disturbing wildlife by causing it to change directions or abruptly flyoff, and one instance of two individuals walking off an established track. Landing Site 4 also contained observation points without counts based on no direct observation of tourists intentionally violating guidelines. In multiple instances, the results show that a majority of passengers were blocking penguins' access from the sea to the rookery, which is not in conflict with the guidelines. There were also multiple instances where the queue of tourists waiting to board a zodiac to return to the vessel were blocking a penguin highway. A penguin highway is a pathway that results from repeated foot traffic by penguins over a stretch of land or snow that creates a visible trail. These instances were additionally not recorded. Two outstanding instances are of note at this site. The first occurred between the first and second observation, where an engine of a zodiac was started close to shore, which caused seven penguins to jump up and run in the opposite direction or dive into the ocean and rapidly swim away. The second observation of note

occurred between the sixth and seventh observation, when the researcher noticed a penguin resting on a penguin highway that suddenly jumped up as two tourists approached it. The penguin continued to run as the tourists followed behind it having a conversation, with the activity continuing for approximately 30 meters before the penguin left the penguin highway and created a different track that the tourists did not follow.

Table 12  
*Observations for Landing Site 4*

Landing Location 4									
Observation Point	1	2	3	4	5	6	7	8	9
Distance of <5 meters from wildlife	2	4		7	1	2		1	1
Distance of <15 meters from seal									
Touching Wildlife									
Feeding wildlife									
Standing/Walking between wildlife and ocean			4*	*	8	**	**	**	**
Disturb wildlife (abrupt direction change/flyoff)	***					2****			
Running while ashore									
Walking off an established track	2								
Walk on moss and/or lichen bed									
Smoking/Light cigarette									
Graffiti/Cairn building									
Drop litter or rubbish									
Collect souvenir (small stone, feather, bone, etc.)									
Disturb or pollute lake									
Non-Native Species (specify in notes)									
* Majority of passengers blocking access to rookery from penguins returning from the sea (not counted)									
** Que for zodiacs blocks multiple penguins travelling along 'penguin highway'									
*** Between observation points 1-2 a zodiac was turned off. When the engine was started, seven penguins within 10 meters jumped up and ran away.									
**** Between observation points 6-7 two passengers observed walking down 'penguin highway' cause penguin to jump up and run down 'highway' as they continued to follow for approximately 30 meters.									

The fifth landing site was located at an island along the Antarctic Peninsula. The total time spent ashore by the researcher was ninety minutes during which time nine one-minute observations were made. The weather conditions for this site were not collected. The observations, which are noted in Table 13, show that there was one instance of two individuals approaching to a distance of less than five meters from wildlife and one instance of two individuals walking off of an established track. Tourists at this site split by personal preference to explore the landing site with a guide or to conduct a polar plunge, which is when an individual jumps into waters that are extremely cold. Only the passengers that elected to explore the landing site were observed during this shore excursion.

Table 13  
*Observations for Landing Site 5*

Landing Site 5									
Observation Point	1	2	3	4	5	6	7	8	9
Distance of <5 meters from wildlife							2		
Distance of <15 meters from seal									
Touching Wildlife									
Feeding wildlife									
Standing/Walking between wildlife and ocean									
Disturb wildlife (aburpt direction change/flyoff)									
Running while ashore									
Walking off an established track							2		
Walk on moss and/or lichen bed									
Smoking/Light cigarette									
Graffiti/Cairn building									
Drop litter or rubbish									
Collect souvenir (small stone, feather, bone, etc.)									
Disturb or pollute lake									
Non-Native Species (specify in notes)									
Tourists Split into two groups. Approximately half to do the polar plunge and the other half to walk along shore. Observations of only the shore group.									

An analysis of the observations recorded in the observation journal show that four of fifteen variables had tourists observed as being non-compliant. These variables were A1 – Distance of <5 meters from wildlife; A5 – Standing/Walking between wildlife and the ocean; A6 – Disturb wildlife (abrupt direction change/flyoff); and A8 – Walking off an established track. Analysis of the observational data was conducted in SPSS and descriptive outputs for the data are detailed in Table 15.

Analysis of results for A1 show that out of 47 observations, there were ten observation points where tourists were observed <5 meters away from wildlife. Within these ten observation points, a total of 24 individuals were counted as <5 meters from wildlife. The frequency of these 24 individuals were four instances of one individual, three instances of two individuals, one instance of three individuals, one instance of four individuals, and one instance of seven individuals. This resulted in an average of  $\bar{x} = 0.51$ ,  $s = 1.30$  instances of tourists being <5 meters from wildlife during an observation point.

Analysis of results for A5 show that out of 47 observations, there were five observation points where tourists were observed standing/walking between wildlife and the ocean. Within these five observation points, a total of 23 individuals were counted as standing/walking between wildlife and the ocean. The frequency of these 23 individuals were three instances of one individual, one instance of four individuals, and two instance of eight individuals. This resulted in an average of  $\bar{x} = 0.49$ ,  $s = 1.20$  instances of tourists standing/walking between wildlife and the ocean during an observation point.

Analysis of results for A6 show that out of 47 observations, there were two observation points where tourists were observed disturbing wildlife (abrupt direction

change/flyoff). Within these two observation points, a total of ten individuals were counted as disturbing wildlife (abrupt direction change/flyoff). The frequency of these ten individuals were one instance of two individuals and one instance of eight individuals. This resulted in an average of  $\bar{x} = 0.21$ ,  $s = 1.20$  instances of tourists disturbing wildlife (abrupt direction change/flyoff) during an observation point.

Analysis of results for A8 show that out of 47 observations, there were six observation points where tourists were observed walking off an established track. Within these six observation points, a total of nine individuals were counted as walking off an established track. The frequency of these nine individuals were one instance of one individual and four instances of two individuals. This resulted in an average of  $\bar{x} = 0.19$ ,  $s = 0.58$  instances of tourists walking off an established track during an observation point.

### ***Observation Data Extrapolated***

Using the data software R, the bootstrap analytical method was conducted on each of the four variables (A1, A5, A6, and A8) to extrapolate the mean and standard deviation for total time that was spent ashore by passengers on the cruise vessel (see Table 14). The bootstrap analysis was run ten times to correspond with the total time passengers on the vessel spent ashore with the seed set to random number: 112358. This resulted in an extrapolated average of  $\bar{x} = 0.55$ ,  $s = 1.32$  tourists being <5 meters from wildlife (A1) during every minute that tourists spent ashore. The standing/walking between wildlife and the ocean during an observation point (A5), when extrapolated to every minute that tourists spent ashore, resulted in an average of  $\bar{x} = 0.48$ ,  $s = 1.65$ . Disturbing wildlife (abrupt direction change/flyoff) (A6), when extrapolated to the duration of time spent

ashore, averaged  $\bar{x} = 0.23$ ,  $s = 1.24$ . Variable A8 (walking off an established track), when extrapolated to the total amount of time that was spent on shore, resulted in an average of  $\bar{x} = 0.19$ ,  $s = 0.57$ .

Table 14  
*Summary Statistics for Observational Data*

Indicators		Observation		Bootstrap $x=470$ -min	
Observation Variables		$\bar{x}$	$s$	$\bar{x}$	$s$
A1	Distance of < 5 meters from wildlife	0.51	1.30	0.55	1.32
A5	Standing/Walking between wildlife and the ocean	0.49	1.72	0.48	1.65
A6	Disturb wildlife (abrupt direction change/flyoff)	0.21	1.20	0.23	1.24
A8	Walking off an established track	0.19	0.58	0.19	0.57

The participant observation was conducted over a time period of 470 minutes with 47 individual 60 second observations conducted. The overall rate of non-compliance during the individual sample periods resulted in an average rate after analysis in ‘R’ of non-compliance at 1.40 instances per minute. After the boot-strap analysis was conducted in ‘R’ on the data for a cycle of 10 repetitions accounting for the total time of 470 minutes spent ashore, the average rate of non-compliance was 1.45 instances per minute. When the non-compliance rate that was calculated from the researcher observations is extrapolated to the overall time of 470 minutes that tourists spent ashore, the result is a calculated 660 instances of tourist non-compliance with the GGVA. When the non-compliance rate that was calculated from the boot-strap analysis in ‘R’ is extrapolated to the overall time of 470 minutes that tourists spent ashore, the result is a calculated  $\bar{x}=672.10$ , 95% CI [469.70, 874.50] instances of tourist non-compliance with the GGVA.



## **CHAPTER FIVE: DISCUSSION**

The results of this case study attempt to provide an initial response to the call by the Antarctic and Southern Ocean Coalition (ASOC) (2009) that actions in the Antarctic should have “no more than a minor or transitory impact on the environment” and that “a precautionary approach should be used to manage tourism in the absence of conclusive scientific evidence about tourism impacts” (p. 3). While this research is localized to one Antarctic tourism vessel during one cruise in one season, it sets a framework for the development of expanded studies that could provide population level best-practice for behavioral compliance. The Theory of Planned Behavior’s (TPB) ability to predict both the intentions of Antarctic tourists to comply with the General Guidelines for Visitors to the Antarctic (GGVA) and their expected behaviors provides information that can be used to identify guidelines that require greater emphasis, modifications to educational strategies, or clarifications to the guidelines themselves. An understanding of the influences on tourists to comply with the GGVA can be used to mitigate the potential impact of tourism to this environment.

The purpose of this study was to explore the factors that motivate tourists to practice the GGVA and the guidelines that tourists comply with. The two research questions used to frame this study are (RQ1): how do tourists’ attitudes, subjective norms, perceived behavioral controls, and knowledge mediate their intention to comply?

and (RQ2): which guidelines are tourists practicing and not practicing in relation to the GGVA? Answers to the two research questions are informed by an analysis and interpretation of the results of the study and are detailed in the following section.

In this study, the Theory of Planned Behavior (TPB), a theoretical framework created by Ajzen (1981), was utilized to predict the behavioral intention (BI) of tourists to comply with the GGVA. The TPB, which consists of three major constructs including Attitudes (AT), Subjective Norms (SN), and Perceived Behavioral Control (PBC), was extended to additionally include Level of Knowledge as described by Vagias et al. (2014). This study found that SN had the strongest influence on tourists' BI followed by AT and PBC. Level of Knowledge was not found to have an influence on tourists' BI.

### **Research Question 1**

The first research question inquired as to how tourists' Attitudes (AT), Subjective Norms (SN), Perceived Behavioral Controls (PBC), and Level of Knowledge mediate their intention to comply. The results of the study show that the Behavioral Intention (BI) to comply with the GGVA was strongly correlated with tourists' AT, SN, and PBC. Conflicting with the findings of Vagias et al. (2014) between knowledge and LNT in their study, there was no correlation noted between Level of Knowledge of the GGVA and BI for this study.

AT is the first factor that is described in the TPB and relates to an individual's opinion on how desirable it would be to conduct a specific behavior (Ajzen, 1991). In this study, AT was found to be influential on tourists' BI to practice the GGVA. As this study only assessed one location, these findings do not directly match with those of Vagias et

al. (2014) who found that the influence of AT varied by destination. They do, on the other hand, match the influence of AT on BI that was noted by Goh et al. (2017) when assessing non-compliance in national parks. AT provides a potentially powerful insight, the questionnaires which were completed prior to tourists receiving their first lecture on the GGVA, indicate that tourists potentially have false perceptions of their ability to be close to wildlife while on Antarctic cruises and may not comprehend the problem of standing between wildlife and the ocean. Tourists identified the most inappropriate behaviors to be “painting or engraving names on man-made or natural surfaces,” “Another passenger breaks a guideline, you decide to break the same guideline,” and “accidentally dropping litter/rubbish on land or in the sea”. These attitudes, which were found to have scored the highest, were also noted as corresponding to zero participant observations of these behaviors in this study. With this information, tour operators in the Antarctic may consider focusing on positively influencing AT to encourage more tourists to practice the GGVA. Specific AT that the tour operators should focus on include “approaching wildlife that is 5 meters away” and “standing between wildlife and the ocean.” These two AT received the lowest scores in the questionnaire indicating that tourists were less likely to follow these guidelines compared to others. Additionally, corresponding to the results of the participant observation, these two AT were the most frequently observed occurrences of tourists failing to practice the GGVA at landing sites in the Antarctic.

SN, as described by Ajzen (1991), involves the individual’s perception of how strongly their peers agree or disagree with the performance of a behavior. The finding

that SN has a strong influence on BI is consistent with the findings of Goh et al.'s (2017) study assessing non-compliance in national parks and Vagias et al.'s (2014) findings of intention to practice Leave No Trace (LNT) guidelines in national parks. Their studies found SN to be an important determinant, but their strengths of correlation were lower. The results of the questionnaire found that, overall, passengers neither agreed nor disagreed with "something negative will happen to me if I do not comply with the General Guidelines for Visitors to the Antarctic." As SN has the greatest influence on BI, tour operators in the Antarctic should place an emphasis on the idea that non-compliant behavior is something that will negatively affect the experience, safety, or the environment that tourists visit. The researcher recommends a focus be placed on the negative nature of non-compliance because the researcher could not recall a time when the briefings reflected on punishments or sanctions for non-compliance. As Holden (2018) identifies, tourism experiences are outside of everyday life, and as such, have the potential to result in tourists' resisting behavioral change. Dolnicar and Leisch (2008) are in agreement that tourists are less likely to comply with a host country's laws when there is a high cost to travel to a location. With Antarctica being a high cost destination that lacks formal laws, this could be a dangerous combination resulting in higher rates of non-compliant behavior in this remote location. Additionally, Roura (2012) identifies that non-compliance can be seen in blog posts or other media and with publicly available images of non-compliance, there is a potential to create confusion among tourists on what constitutes ethical behavior. As such, there may be a need for consequences to be established to deter the rate of tourist non-compliance that was observed across the

landing sites. With SN holding the strongest correlation to tourists' BI, consequences may serve as an effective means of reducing non-compliance.

PBC, an influencing variable of the TPB, is identified as “[an individual’s] perception of whether the behavior can be performed (i.e., perceived behavioral control), both in terms of self-efficacy (‘is it easy or difficult?’) and controllability (‘do I have a little control or a lot?’)” (Kleiber et al., 2011, p. 177). In this study, PBC was found to have the same level of influence on tourists' BI as AT. As this study only assessed one location, these findings do not directly match with those of Vagias et al. (2014) who found that PBC influence also varied by destination. Within PBC, tourists reported that the most difficult task would be to tell another passenger that they are not following the GGVA. This contradicts the previous research of Powell (2008) that showed “91% of the post visitation respondents disagreed or strongly disagreed that they should ignore another photographers that repeatedly approached nesting penguins too closely indicating that a predominance of tourist would intervene” (p. 237). The assessment of intervention by Powell (2008) appears to fail to account for the bystander theory as described by Latane and Darley (1969), where an individual would not act as they deemed that it was not their responsibility. The second most difficult activity for tourists within PBC involved inspecting and cleaning all of their gear to prevent the introduction of non-native species. Understanding the difficulties expressed by tourists, tour operators in the Antarctic can focus on positively influencing PBC to encourage more tourists to practice the GGVA. Tour operators may want to encourage the reporting of non-compliant behavior to expedition staff or through the creation of defined repercussions for non-

compliant behaviors. Tour operators may also wish to implement methods that increase the PBC of tourists by marking the ends of pathways in a more obvious manner.

With BI being an indicator of Predicted Behavior (B), this supports a case for emphasizing AT, SN, and PBC in the pre-trip narrative by tourism operators. Tour operators should place a primary emphasis on SN during the voyage and should additionally consider taking steps to reduce individuals' perceived difficulty as related to behaviors that reduce environmental impacts. Ajzen (1991) affirms that PBC is a useful indicator for predicting behavior in that "the greater the perceived behavioral control, the stronger should be an individual's intention to perform the behavior under consideration" (p. 188). PBC's influence on B implies that greater behavioral compliance will occur when efforts are placed on establishing appropriate norms and relating them to actual behavioral controls before an attempt is made to modify the AT of tourists.

In assessing the Level of Knowledge of the GGVA among tourists for this study, an influence on the BI of tourists to practice the GGVA was not identified. However, a significant correlation does exist between Level of Knowledge and B, but it is important to note that in this study the relationship was found to be weak. A lack of correlation between Level of Knowledge and BI directly conflicts with the findings of Vaigas et. al (2014) who found that Level of Knowledge had a significant influence on the BI of backcountry hikers to practice the LNT principles. Ajzen (2005) identifies knowledge as a background factor that produces a greater influence on AT, SN, and PBC than it does on BI. Level of Knowledge as a background factor has potential significance in this study as it was found to have stronger correlation with PBC than AT, while no correlation was

found to exist between Level of Knowledge and SN. Tour operators should note that this study shows they will be unsuccessful in increasing a tourist's BI by increasing the tourists' Level of Knowledge, however, tour operators may be able to influence B. It should be noted that the researcher during the expedition briefings did not hear information provided about the GGVA that focused on strategies that tourists could use to avoid non-compliance. In providing information on how to avoid non-compliance, tour operators may be able to increase the PBC of tourists. Increasing tourists' Level of Knowledge on how they can avoid non-compliant behaviors could also play a role in mediating the PBC of tourists, which had a significant relationship of  $p < 0.01$ , while additionally mediating the B of tourists' ( $p < 0.05$ ) when they are ashore.

In terms of demographics, two variables stood out for the role that the TPB played in the outcomes of this study. Results show that women and North Americans scored higher than men and Europeans respectively on B, BI, srBI, AT, SN, PBC, and Level of Knowledge. Statistically, only the demographic group Gender could be analyzed through a Pearson's correlation as the other demographic variables were found to be non-parametric. Results indicate that women are significantly more likely to practice the GGVA than men.

## **Research Question 2**

The second question asked was: "which guidelines are tourists practicing and not practicing in relation to the GGVA?". The observational data showed that within the confines of this case study, four guidelines out of fifteen were observed as having tourists not in compliance, while no observations were made of tourists being out of compliance

with eleven of the fifteen guidelines that were included in the observational methodology. The small percentage of non-compliance is similar to the results of Roura (2012) who found that “as a whole, [his research] showed many more instances of compliance than of noncompliance, although it is interesting that that both types of behavior were picked up in a small sample” (p. 20). The four guidelines where tourists were observed as out of compliance included: “distance of <5 meters from wildlife, standing/walking between wildlife and the ocean, disturb wildlife (abrupt direction change/flyoff), and walking off an established track.” Moreover, the Hawthorne Effect, as described by Porta and Last (2018), could have influenced which behaviors were observed if tourists avoided the researcher’s sightlines when a non-compliant activity was conducted.

Pertierra et al. (2017) describes the site-specific guidelines in Antarctica as non-mandatory, vague, and of voluntary compliance and fail to define the penalties for non-compliance. With the GGVA similarly lacking requirements for compliance, the PBC of tourists’ may be lower as they perceive fewer outside influences controlling their actions while ashore. The results of the observational data showed that tourists’ were over twice as likely to be less than five meters from wildlife than to disturb wildlife in a manner that caused an abrupt direction change or flyoff. An example of this lack of PBC was noted during observational data collection when the researcher observed a tourist who was being watched by expedition staff, approached within the five meter separation guideline to wildlife without corrective actions or comments from the staff. The researcher overheard a male passenger quip that once the penguins realized that tourists would not harm them, the penguins no longer minded human presence. The quip by the tourist and



inaction of the expedition staff may have created a situation early on during the shore excursions where tourists' perceived that their behaviors would not be controlled.

It was found that tourists were more likely to be standing or walking between wildlife and the ocean than to walk off an established track. While tourists' responses to the questionnaire showed overall agreement that standing or walking between wildlife and the ocean was inappropriate, the observational results showed that the majority of instances of standing or walking between wildlife and the ocean occurred at locations where the established tracks were located between the ocean and a penguin rookery. The selections of these established tracks potentially resulted from the topography of the landing site that limited other walking options. Tourists' responses to the questionnaire additionally showed that they anticipated lower control over their actions on shore than on the cruise vessel. Lower scores for control on shore highlight the awareness of tourists that standing or walking between wildlife and the ocean is inappropriate. However, it appears that tourists anticipated that on shore their ability to control their own actions would be reduced.

At the fourth landing site, the researcher observed;

[a] majority of [passengers] blocking access to rookery from penguins returning from the sea" over the course of two observation points, as well as "[the] queue for the zodiacs blocking penguins route...penguins going two meters down [snow face] to beach to get around but [are] also blocked so [they] climb back up [the] two meter [snow face].

The issue of blocking penguins' routes by queuing for zodiacs recurred over four observation points and appears to demonstrate situations where tourists' fail to comply with guidelines due to the topography of the landing site and operations of the operator. Site topography would be an ideal example of the SCAR (2008) report that found "no 'one size fits all' solution" (p. 5), can be utilized for every landing site to prevent the impacts of human-wildlife interaction. However, expedition guides may wish to take additionally steps to limit these interactions with wildlife by grouping tourists into single zodiac groups that allow enough space for wildlife to be comfortable passing between.

While the tourists in this study were more likely to stand or walk between wildlife and the ocean than walk off an established track, off-track behavior did occur. While the guidelines states that tourists should "stay on established tracks whenever possible" (ATS, 2011), at multiple landing sites tourists were observed going beyond the flagging placed by the expedition staff. In all these instances, tourists were following footsteps that were already in the snow at the landing sites indicating the potential influence of SN on non-compliance. Kleiber et al. (2011) identifies that individuals are influenced by "the subjective norms that [an individual] believes [their peers] have concerning the behavior...[particularly] 'do they actually do [the behavior] or not?'" (p. 177), which may provide an explanation for tourists' off-track behavior. One such occurrence relating to peers influencing a SN was directly shared with the researcher. A tourist indicated that their group walked past a flag and, unsuspectingly, onto a snow cornice that was over the water to get a better view of a seal. They were unaware of the danger they were in until a guide told them to come back to the path. The tourist stated that: "What was scary was

that the footprints out there looked no different than to anywhere else.” The tourist’s desire to report the situation demonstrates that she recognized a failure in the system and wanted to document a problem that should be addressed. The personal experience that they described may show that the current strategies utilized by expedition guides are not effective at preventing off-track non-compliance. Expedition guides may want to explore other strategies to prevent accidental non-compliance related to the GGVA that tourists should “stay on established tracks whenever possible” (ATS, 2011).

Instances of tourists not practicing the GGVA appears to result from a lack of understanding of the GGVA, as shown by their mean scores of 4.06 on a 7-point Likert scale for Level of Knowledge. Of major note is that the GGVA published by the ATS is different from the GGVA that is published by IAATO, particularly in regards to maintaining appropriate distances from wildlife. While the ATS guidelines identify a minimum five meter distance from wildlife, the IAATO guidelines only reference this on the visitor guidelines poster but not on the visitor guidelines document. The briefing packet that was sent by the tour operator after booking a voyage additionally did not have a numeric distance from wildlife specified in their attached guidelines. The guidelines’ pamphlet that was handed out onboard the vessel was based on the 1994 Guidance for Visitors to the Antarctic adopted at the Kyoto ATCM. The 1994 document, which was superseded by the GGVA in 2011, additionally does not have a numeric distance from wildlife specified in the guidelines. These differences could create instances where the researcher gauged tourist behavior based on a stricter guideline than the one that was presented to passengers. As the ATS 2011 GGVA superseded all previous guidelines,

tourism operators in the Antarctic should use the most current edition when providing information to tourists. It would also be in the interest of ATS parties to encourage tourism operators to align their guidelines with those that are recommended by the ATS.

In exploring the observational data, this case study shows that 66 instances of non-compliance with the GGVA occurred during the 47 minutes of observation period. When the data is generalized to reflect tourist compliance for the total time spent ashore of 470 minutes, there would potentially be 660 instances of non-compliance with the GGVA. Case studies should not be extrapolated as “[they] do not lend themselves easily to generalization” (de Rond & Bouchikhi, 2004, p. 68) so generalization to the entire population of Antarctic tourists is limited. The cumulative impacts of tourism are a continuing question and the general appearance of the observational data from this study, especially in that the analysis shows an expected range of between 469.70 and 874.50 instances of non-compliance, or 111.64 instances per hour, begs further investigation.

The expected rate of non-compliance noted in this study may be considered acceptable by the Antarctic Treaty System (ATS) if it is considered “no more than a minor or transitory impact on the environment” (ASOC, 2008, p. 3). If considered acceptable, the ATS may wish to consider the recommendations of Tin et al. (2009) and Pertierra et al. (2017). Tin et al. (2009) identifies that wildlife can be impacted by human disturbance resulting in reductions in reproduction and survival and recommends that disturbances be limited. While Pertierra et al. (2017) recommend that in some instances sacrificial areas may be ideal for the concentration of human impacts for the overall benefit of the Antarctic. As such, the ATS should continue to reassess the applicability of

the GGVA and areas where human disturbance is deemed acceptable or take steps to encourage the reduction of non-compliant behaviors of tourists in the Antarctic.

As a final thought, comparisons and correlations should not be drawn between the questionnaire data and observational data as one is the sample size while the other is the entire population of the case study. Anecdotally, the results of this study provide an interesting alignment between the qualitative and quantitative data that requires further investigation. From the researcher observations, the top two observed variables of non-compliance (distance of <5 meters from wildlife and standing/walking between wildlife and the ocean) occurred at a significant rate. Similarly, the results of the questionnaire found that approaching wildlife that is 5 meters away and standing between wildlife and the ocean received the corresponding lowest attitude scores. This potentially describes an anecdotal relationship existing between low attitude scores and high rates of actual non-compliant behaviors. In other words, the questionnaire has the potential to be a good predictor of which attitudes correspond to the most frequently occurring non-compliant behaviors. It should be noted that other attitude variables additionally had scores that were only slightly higher than approaching wildlife that is 5 meters away and standing between wildlife and the ocean but were not behaviors that were observed by the researcher. As such, lack of observation on the part of the researcher does not preclude the possibility of non-compliance having occurred during this expedition.

Overall, the TPB was found to be an appropriate framework for this study as it provided discernable data on the intentions of tourists to practice the GGVA. The theory was successfully adapted from the Vagias et al.'s (2014) study to reflect the stipulations

within the GGVA. AT, SN and PBC provided insights as to the overall intention of tourists to comply and appeared to align with the results of the observational data across multiple data points. It is acknowledged that previous research has found that the TPB is unable to incorporate the intangible ideas that are present in tourism (Marsh & Woodside, 2005) and that this theory may not be able to account for the intricacies associated with tourism (Sparks, 2007). However, this study showed that TPB provided initial insights into the intentions of tourists to comply with guidelines in the Antarctic. The outcomes of other studies like Ong and Musa (2012), Duarte Alonso et al. (2015b), Kim and Han (2010), and Vagias et al. (2014) demonstrate that significant results do occur with the use of the TPB even in circumstances where it is modified or extended, like in this study.

### **Recommendations**

Tourists in this study reported a mean score of 3.91 on a 7-point Likert scale on their beliefs that they would be negatively impacted if they were found to be out of compliance with the guidelines. The belief that tourists would not experience repercussions for non-compliance could be addressed by the tour operator emphasizing a policy that provides consequences for breaking the guidelines. Tourists were observed continually approaching within five meters of wildlife while onshore, and attitudes towards this behavior scored the lowest. Maintaining a five meter separation from wildlife could be addressed by ensuring that the guidelines provided to tourists are identical in phrasing to that of the ATS. Additionally, there was a high frequency of tourists standing between wildlife and the ocean potentially due to the topography of the landing site. An initial recommendation is that the tour operators group tourists in a

manner that provides gaps for wildlife to pass in-between. On snow covered surfaces, it appeared that tourists were not always aware of where the designated track ended. It is recommended that expedition staff utilize better marking devices and post signage restricting access beyond the designated areas for shore excursions.

Anecdotally, the researcher observed that the layout of multiple landing sites created situations where tourists standing or walking between wildlife and the ocean was an unavoidable occurrence. Human-wildlife interactions were observed by the researcher to cause extra exertion on the part of some wildlife at these sites as the wildlife needed to travel greater distances to route around tourists or moved at a rapid pace to avoid human proximity. Throughout the multiple human-wildlife interactions that were observed by the researcher, a guide in multiple cases was not visible from where the researcher was observing. It is recommended that for every landing site there be enough guides ashore to enforce GGVA requirements as well as enough guides to ensure that tourists are always within view of a guide.

A greater understanding of tourists' AT, SN, and PBC may be obtained through further research that incorporates the use of a post-questionnaire. A post-questionnaire could be utilized to identify if an experience in the Antarctic creates a change in tourists' attitudes concerning their intention to practice the GGVA. Additionally, post-questionnaires could provide future researchers with information on how accurate tourists' SN and PBC beliefs were before and after their Antarctic experience potentially providing a more accurate ability to predict BI.

While this study investigated tourists' Level of Knowledge of the GGVA and found no correlation to tourists' BI, there are other levels of knowledge that researchers may find beneficial to investigate. It is recommended that future research incorporate methodologies that allow for the investigation of Level of Knowledge as it pertains to the impacts of non-compliance with the GGVA. Alternatively, future researchers may wish to identify tourists' Level of Knowledge concerning behavioral displays in wildlife that signal distress or the role Level of Knowledge plays in regard to the Antarctic environment. There are additionally other Levels of Knowledge that may be appropriate for further investigation and those recommended here should not be considered as inclusive of all possible avenues of investigation.

### **Limitations**

It is fair to say that the questionnaire in this case study may not have been the best instrument for measuring the Attitudes, Subjective Norms, and Perceived Behavioral Controls of tourists that visit the Antarctic. While the questionnaire was modelled on the ATS General Guidelines for Visitors to the Antarctic and received expert analysis, questions within the survey may have been misinterpreted due to potential syntax and/or language issues. Additionally, the exclusion of all individuals that self-identified as not fluent in English creates a skew to the population as approximately half of the passengers on the vessel did not speak fluent English.

As a case study, this research is unable to be extrapolated beyond the singular cruise of one vessel during the 2018-2019 Antarctic summer season. Case studies provide results that can only be viewed in a singular way, and as Woodside (2010) identifies,



“multiple methods in case study research usually contributes to increasing accuracy and complexity/coverage in a study more so than generality” (p. 71). The lack of correlation between Level of Knowledge and BI could have resulted because the questionnaire was provided to passengers before they received any briefings on the GGVA.

### **Future Research**

Further research into behavioral intention and actual behaviors of tourists to the Antarctic should allow for a significant portion of the population to be sampled across multiple seasons. While this study was restricted to self-identified English speakers, future researchers may wish to incorporate other languages into their studies as well as conduct multiple questionnaires within the study to identify how attitudes, subjective norms, and perceived behavioral controls change over time. While speculation surrounding the impacts of Antarctic tourism overall were made, the results of the case study demonstrate that further research should expand this study to sample a larger and more diverse population.

The researcher recommends that certain questions be revised. The finding of “driving a small boat up to a whale for a better picture” as an action that would be less appropriate than other actions may not have been an ideal question as the responsibility of the action is not in the hands of the tourist. Similarly, “another passenger breaks a guideline, you decide to break the same guideline” is a question that could have been grouped with subjective norms. Using other data analysis tools, such as factor analysis or structural equation modeling, could better align the questions within AT, SN, PBC, and Level of Knowledge. Future researchers may also wish to test if Level of Knowledge

plays a factor in tourists' understanding of what non-compliant behaviors with the GGVA entail.

Although tangible results were identified through observational data, future research could examine more effective mediums than in-situ observation. Incorporation of photography or videography may be a consideration of future research to provide opportunities to re-watch a sampling period, which would allow for review by multiple researchers. As Arnberger, Haider, and Brandenburg (2005) identify, human observers can be overtaxed during observation and video recording is a more effective option as it reduces inaccuracies. Future researchers may also be interested in conducting observational research to determine if a relationship exists between weather conditions and tourists' compliance in the behaviors they perform.

## **CHAPTER SIX: CONCLUSION**

This study created an initial framework for understanding the intentions of tourists to comply with the General Guideline for Visitors to the Antarctic (GGVA) as well as the actual behaviors of tourists while ashore in the Antarctic. An extensive literature review was conducted to develop an understanding of tourists' intentions and behaviors in the Antarctic, but little research has directly explored this topic. A dearth of previous literature demonstrated that the parties managing the protection of the Antarctic are left without valuable information that is needed to develop effective management strategies to prioritize minimal impacts and tourist compliance to the GGVA. These initial findings begin to fill what Roura (2012) identified as the gap in the literature concerning the amount of knowledge available relating to tourists' behavior in the Antarctic. While this study is not generalizable, it has provided a first step towards creating a body of knowledge which could potentially contribute to the development of management solutions that mitigate the impacts of tourism on the fragile Antarctic environment.

A key benefit to this study was the inclusion of the Theory of Planned Behavior (TPB) as a theoretical framework used to explain how attitudes, subjective norms, and perceived behavioral controls can mediate the intentions of tourists to comply with the GGVA, as well as the inclusion of Level of Knowledge on actual behaviors of tourists.

The results of this case study are benefited by the TPB, which demonstrates that insights into tourists' intention to practice the GGVA corresponds with observations of compliant and non-compliant behaviors while ashore. This study also demonstrated that the rates of non-compliance over the short durations of time spent ashore require immediate further inquiry. Utilizing a mixed method approach provides valuable information to both tourism operators and governing bodies on which guidelines tourists in this study were least likely to comply with and evidence of the factors that influence tourists' behaviors.

The results of this study did provide useful takeaways that the vessel operator and Antarctic vessel operators at large may wish to consider when conducting future expeditions to the Antarctic. These takeaways include an understanding that tourists' attitudes may correspond to the rate of non-compliant behaviors, and that the subjective norms that regulate the beliefs of tourists on the consequences of their actions should be modified to reduce rates of impactful behavior. Tourists may also potentially benefit from a more hands on approach by the expedition staff to increase their perceived behavioral controls, which in turn could increase their compliance. An increasingly hands on approach would involve the expedition staff having a greater presence around tourists that are out of compliance with the GGVA and taking action to correct non-compliant behaviors. Additionally, this case study demonstrates that AT, SN, PBC, and Level of Knowledge have the potential to influence either the intentions and/or the behaviors of tourists. An outside view into the actual behaviors of tourists while ashore along with the questionnaire results provide possible rationales for why non-compliant behaviors occur at Antarctic landing sites.

**Final Note**

As originally introduced, the number of tourists travelling to and landing in the Antarctic has increased by approximately 32 % between the 2007-2008 season and the 2017-2018 season (IAATO, 2018g). With greater accessibility to the continent and climate change making the polar environment somewhat more hospitable, there is significant potential for Antarctic tourism to continue to increase. A sustainable future for this wild space requires interdisciplinary collaboration on the part of researchers that identifies tourism best practices. The methodology utilized in this study provides measurable constructs through a theoretical framework in an effort to advance the understanding of the factors that motivate tourists in both their compliance and non-compliance with the GGVA. It is the hope of this researcher that expanded investigations on this topic include interdisciplinary collaboration in the development of policies, recommendations, and potential laws that enable the creation of informed strategies for management of tourists' activities on and around the Antarctic continent.

## **APPENDIX I**

### **General Guidelines for Visitors to the Antarctic**

All visits to Antarctica should be conducted in accordance with the Antarctic Treaty, its Protocol on Environmental Protection, and relevant Measures and Resolutions adopted at Antarctic Treaty Consultative Meetings (ATCM). Visits may only occur after prior approval by a relevant national authority or if they have met all the requirements of their national authority.

These Guidelines provide general advice for visiting any location, with the aim of ensuring visits do not have adverse impacts on the Antarctic environment, or on its scientific and aesthetic values. ATCM Site Guidelines for Visitors provide additional site-specific advice for some locations. Read these Guidelines before you visit Antarctica and plan how to minimize your impact. If you are part of a guided visitor group, abide by these guidelines, pay attention to your guides, and follow their instructions.

If you have organized your own visit, you are responsible for abiding by these guidelines. You are also responsible for identifying the features of the sites you visit that may be vulnerable to visitor impacts, and for complying with any site-specific requirements, including Site Guidelines, Antarctic Specially Protected Area (ASPA) and Antarctic Specially Managed Area (ASMA) management plans, or station visit guidelines. Guidelines for particular activities or risks (such as aircraft use, or avoiding the introduction of non-native species) may also apply. Management plans, a list of historic sites and monuments, and other relevant information can be found at [www.ats.aq/e/ep\\_protected.htm](http://www.ats.aq/e/ep_protected.htm). Site Guidelines can be found at [www.ats.aq/e/ats\\_other\\_siteguidelines.htm](http://www.ats.aq/e/ats_other_siteguidelines.htm).

### **PROTECT ANTARCTIC WILDLIFE**

**The taking of, or harmful interference with, Antarctic wildlife is prohibited except in accordance with a permit.**

#### **Wildlife**

When in the vicinity of wildlife, walk slowly and carefully and keep noise to a minimum.

Maintain an appropriate distance from wildlife. While in many cases a greater distance may be appropriate, in general don't approach closer than 5m. Abide by any guidance on distances in site specific guidelines.

Observe wildlife behaviour. If wildlife changes its behaviour stop moving, or slowly increase your distance.

Animals are particularly sensitive to disturbance when they are breeding (including nesting) or moulting. Stay outside the margins of a colony and observe from a distance. Every situation is different. Consider the topography and the individual circumstances of the site, as these may have an impact on the vulnerability of wildlife to disturbance. Always give animals the right of way and do not block their access routes to the sea. Do not feed wildlife or leave food or scraps lying around. Do not use guns or explosives.

## **Vegetation**

Vegetation, including mosses and lichens, is fragile and very slow growing. Do not damage the vegetation by walking, driving or landing on any moss beds or lichen covered rocks.

When travelling on foot, stay on established tracks whenever possible to minimise disturbance or damage to the soil and vegetated surfaces. Where a track does not exist, take the most direct route and avoid vegetation, fragile terrain, scree slopes, and wildlife.

## **INTRODUCTION OF NON-NATIVE SPECIES**

Do not introduce any plants or animals into the Antarctic.

In order to prevent the introduction of non-native species and disease, carefully wash boots and clean all equipment including clothes, bags, tripods, tents and walking sticks before bringing them to Antarctica. Pay particular attention to boot treads, velcro fastenings and pockets which could contain soil or seeds. Vehicles and aircraft should also be cleaned.

The transfer of species and disease between locations in Antarctica is also a concern. Ensure all clothing and equipment is cleaned before moving between sites.

## **RESPECT PROTECTED AREAS**

**Activities in Antarctic Specially Protected Areas (ASPAs) or Antarctic Specially Managed Areas (ASMAs) must comply with the provisions of the relevant Management Plan.**

**Many historic sites and monuments (HSMs) have been formally designated and protected.**

## APPENDIX II

### The Antarctic Treaty

*Signed at Washington December 1, 1959*

*Ratification advised by U.S. Senate August 10, 1960*

*Ratified by U.S. President August 18, 1960*

*U.S. ratification deposited at Washington August 18, 1960*

*Proclaimed by U.S. President June 23, 1961*

*Entered into force June 23, 1961*

The Governments of Argentina, Australia, Belgium, Chile, the French Republic, Japan, New Zealand, Norway, the Union of South Africa, the Union of Soviet Socialist Republics, the United Kingdom of Great Britain and Northern Ireland, and the United States of America,

Recognizing that it is in the interest of all mankind that Antarctica shall continue forever to be used exclusively for peaceful purposes and shall not become the scene or object of international discord;

Acknowledging the substantial contributions to scientific knowledge resulting from international cooperation in scientific investigation in Antarctica;

Convinced that the establishment of a firm foundation for the continuation and development of such cooperation on the basis of freedom of scientific investigation in Antarctica as applied during the International Geophysical Year accords with the interests of science and the progress of all mankind;

Convinced also that a treaty ensuring the use of Antarctica for peaceful purposes only and the continuance of international harmony in Antarctica will further the purposes and principles embodied in the Charter of the United Nations;

Have agreed as follows:

#### Article I

1. Antarctica shall be used for peaceful purposes only. There shall be prohibited, inter alia, any measures of a military nature, such as the establishment of military bases and fortifications, the carrying out of military maneuvers, as well as the testing of any type of weapons.

2. The present treaty shall not prevent the use of military personnel or equipment for scientific research or for any other peaceful purposes.

#### Article II

Freedom of scientific investigation in Antarctica and cooperation toward that end, as applied during the International Geophysical Year, shall continue, subject to the provisions of the present treaty.

#### Article III

1. In order to promote international cooperation in scientific investigation in Antarctica, as provided for in Article II of the present treaty, the Contracting Parties agree that, to the greatest extent feasible and practicable:



(a) information regarding plans for scientific programs in Antarctica shall be exchanged to permit maximum economy and efficiency of operations;

(b) scientific personnel shall be exchanged in Antarctica between expeditions and stations;

(c) scientific observations and results from Antarctica shall be exchanged and made freely available.

2. In implementing this Article, every encouragement shall be given to the establishment of cooperative working relations with those Specialized Agencies of the United Nations and other international organizations having a scientific or technical interest in Antarctica.

#### Article IV

1. Nothing contained in the present treaty shall be interpreted as:

(a) a renunciation by any Contracting Party of previously asserted rights of or claims to territorial sovereignty in Antarctica;

(b) a renunciation or diminution by any Contracting Party of any basis of claim to territorial sovereignty in Antarctica which it may have whether as a result of its activities or those of its nationals in Antarctica, or otherwise;

(c) prejudicing the position of any Contracting Party as regards its recognition or non-recognition of any other States right of or claim or basis of claim to territorial sovereignty in Antarctica.

2. No acts or activities taking place while the present treaty is in force shall constitute a basis for asserting, supporting or denying a claim to territorial sovereignty in Antarctica or create any rights of sovereignty in Antarctica. No new claim, or enlargement of an existing claim, to territorial sovereignty in Antarctica shall be asserted while the present treaty is in force.

#### Article V

1. Any nuclear explosions in Antarctica and the disposal there of radioactive waste material shall be prohibited.

2. In the event of the conclusion of international agreements concerning the use of nuclear energy, including nuclear explosions and the disposal of radioactive waste material, to which all of the Contracting Parties whose representatives are entitled to participate in the meetings provided for under Article IX are parties, the rules established under such agreements shall apply in Antarctica.

#### Article VI

The provisions of the present treaty shall apply to the area south of 60° South Latitude, including all ice shelves, but nothing in the present treaty shall prejudice or in any way affect the rights, or the exercise of the rights, of any State under international law with regard to the high seas within that area.

#### Article VII

1. In order to promote the objectives and ensure the observance of the provisions of the present treaty, each Contracting Party whose representatives are entitled to participate in the meetings referred to in Article IX of the treaty shall have the right to designate observers to carry out any inspection provided for by the present Article. Observers shall be nationals of the Contracting Parties which designate them. The names of observers shall be communicated to every other Contracting Party having the right to designate observers, and like notice shall be given of the termination of their appointment.

2. Each observer designated in accordance with the provisions of paragraph 1 of this Article shall have complete freedom of access at any time to any or all areas of Antarctica.

3. All areas of Antarctica, including all stations, installations and equipment within those areas, and all ships and aircraft at points of discharging or embarking cargoes or personnel in Antarctica, shall be open at all times to inspection by any observers designated in accordance with paragraph 1 of this Article.

4. Aerial observation may be carried out at any time over any or all areas of Antarctica by any of the Contracting Parties having the right to designate observers.

5. Each Contracting Party shall, at the time when the present treaty enters into force for it, inform the other Contracting Parties, and thereafter shall give them notice in advance, of

(a) all expeditions to and within Antarctica, on the part of its ships or nationals, and all expeditions to Antarctica organized in or proceeding from its territory;

(b) all stations in Antarctica occupied by its nationals; and

(c) any military personnel or equipment intended to be introduced by it into Antarctica subject to the conditions prescribed in paragraph 2 of Article I of the present treaty.

#### Article VIII

1. In order to facilitate the exercise of their functions under the present treaty, and without prejudice to the respective positions of the Contracting Parties relating to jurisdiction over all other persons in Antarctica, observers designated under paragraph 1 of Article VII and scientific personnel exchanged under subparagraph 1(b) of Article III of the treaty, and members of the staffs accompanying any such persons, shall be subject only to the jurisdiction of the Contracting Party of which they are nationals in respect of all acts or omissions occurring while they are in Antarctica for the purpose of exercising their functions.

Without prejudice to the provisions of paragraph 1 of this Article, and pending the adoption of measures in pursuance of subparagraph 1(e) of Article IX, the Contracting Parties concerned in any case of dispute with regard to the exercise of jurisdiction in Antarctica shall immediately consult together with a view to reaching a mutually acceptable solution.

#### Article IX

1. Representatives of the Contracting Parties named in the preamble to the present treaty shall meet at the City of Canberra within two months after the date of entry into force of the treaty, and thereafter at suitable intervals and places, for the purpose of exchanging information, consulting together on matters of common interest pertaining to Antarctica, and formulating and considering, and recommending to their Governments, measures in furtherance of the principles and objectives of the treaty, including measures regarding:

(a) use of Antarctica for peaceful purposes only;

(b) facilitation of scientific research in Antarctica;

(c) facilitation of international scientific cooperation in Antarctica;

(d) facilitation of the exercise of the rights of inspection provided for in Article VII of the treaty;

(e) questions relating to the exercise of jurisdiction in Antarctica;

(f) preservation and conservation of living resources in Antarctica.

2. Each Contracting Party which has become a party to the present treaty by accession under Article XIII shall be entitled to appoint representatives to participate in the

meetings referred to in paragraph 1 of the present Article, during such time as that Contracting Party demonstrates its interest in Antarctica by conducting substantial scientific research activity there, such as the establishment of a scientific station or the dispatch of a scientific expedition.

3. Reports from the observers referred to in Article VII of the present treaty shall be transmitted to the representatives of the Contracting Parties participating in the meetings referred to in paragraph 1 of the present Article.

4. The measures referred to in paragraph 1 of this Article shall become effective when approved by all the Contracting Parties whose representatives were entitled to participate in the meetings held to consider those measures.

5. Any or all of the rights established in the present treaty may be exercised from the date of entry into force of the treaty whether or not any measures facilitating the exercise of such rights have been proposed, considered or approved as provided in this Article.

#### Article X

Each of the Contracting Parties undertakes to exert appropriate efforts, consistent with the Charter of the United Nations, to the end that no one engages in any activity in Antarctica contrary to the principles or purposes of the present treaty.

#### Article XI

1. If any dispute arises between two or more of the Contracting Parties concerning the interpretation or application of the present treaty, those Contracting Parties shall consult among themselves with a view to having the dispute resolved by negotiation, inquiry, mediation, conciliation, arbitration, judicial settlement or other peaceful means of their own choice.

2. Any dispute of this character not so resolved shall, with the consent, in each case, of all parties to the dispute, be referred to the International Court of Justice for settlement; but failure to reach agreement on reference to the International Court shall not absolve parties to the dispute from the responsibility of continuing to seek to resolve it by any of the various peaceful means referred to in paragraph 1 of this Article.

#### Article XII

1.

(a) The present treaty may be modified or amended at any time by unanimous agreement of the Contracting Parties whose representatives are entitled to participate in the meetings provided for under Article IX. Any such modification or amendment shall enter into force when the depositary Government has received notice from all such Contracting Parties that they have ratified it.

(b) Such modification or amendment shall thereafter enter into force as to any other Contracting Party when notice of ratification by it has been received by the depositary Government. Any such Contracting Party from which no notice of ratification is received within a period of two years from the date of entry into force of the modification or amendment in accordance with the provisions of subparagraph 1(a) of this Article shall be deemed to have withdrawn from the present treaty on the date of the expiration of such period.

2.

(a) If after the expiration of thirty years from the date of entry into force of the present treaty, any of the Contracting Parties whose representatives are entitled to participate in the meetings provided for under Article IX so requests by a communication addressed to the depositary Government, a Conference of all the Contracting Parties shall be held as soon as practicable to review the operation of the treaty.

(b) Any modification or amendment to the present treaty which is approved at such a Conference by a majority of the Contracting Parties there represented, including a majority of those whose representatives are entitled to participate in the meetings provided for under Article IX, shall be communicated by the depositary Government to all the Contracting Parties immediately after the termination of the Conference and shall enter into force in accordance with the provisions of paragraph 1 of the present Article.

(c) If any such modification or amendment has not entered into force in accordance with the provisions of subparagraph 1(a) of this Article within a period of two years after the date of its communication to all the Contracting Parties, any Contracting Party may at any time after the expiration of that period give notice to the depositary Government of its withdrawal from the present treaty; and such withdrawal shall take effect two years after the receipt of the notice of the depositary Government.

#### Article XIII

1. The present treaty shall be subject to ratification by the signatory States. It shall be open for accession by any State which is a Member of the United Nations, or by any other State which may be invited to accede to the treaty with the consent of all the Contracting Parties whose representatives are entitled to participate in the meetings provided for under Article IX of the treaty.
2. Ratification of or accession to the present treaty shall be effected by each State in accordance with its constitutional processes.
3. Instruments of ratification and instruments of accession shall be deposited with the Government of the United States of America, hereby designated as the depositary Government.
4. The depositary Government shall inform all signatory and acceding States of the date of each deposit of an instrument of ratification or accession, and the date of entry into force of the treaty and of any modification or amendment thereto.
5. Upon the deposit of instruments of ratification by all the signatory States, the present treaty shall enter into force for those States and for States which have deposited instruments of accession. Thereafter the treaty shall enter into force for any acceding State upon the deposit of its instrument of accession.
6. The present treaty shall be registered by the depositary Government pursuant to Article 102 of the Charter of the United Nations.

#### Article XIV

The present treaty, done in the English, French, Russian and Spanish languages, each version being equally authentic, shall be deposited in the archives of the Government of the United States of America, which shall transmit duly certified copies thereof to the Governments of the signatory and acceding States.

IN WITNESS WHEREOF the undersigned Plenipotentiaries, duly authorized, have signed the present treaty.

DONE at Washington this first day of December, one thousand nine hundred and fifty-nine.

### APPENDIX III

## 2018 Antarctica Visitor Pre-Survey

### COMPLETE FIRST



## Adélie Penguin

Tourism to locations that are considered to be ‘Last-Chance’ destinations is rapidly increasing around the world. In the Antarctic there has been a 32% increase in the last 10 years of tourists that have participated in landed expeditions.

In 2011 the Antarctic Treaty System published an update to the General Guidelines for Visitors to the Antarctic. Little research has focused on the influence of these guidelines.

As a master's student and researcher at George Mason University with the School of Recreation, Health and Tourism, I am interested in learning about passenger experiences on Antarctic cruises.

The following survey should take between 15 and 20 minutes to complete. Please answer the following questions as candidly as possible. Your responses will be kept confidential and no information that can be connected to individual persons will be used when reporting the results of this investigation.

Thank you for your valuable time in answering these questions!

Continues on next page

Please answer the following question by selecting the answer that most describes your knowledge of the General Guidelines for Visitors to the Antarctic.

**“1” = “No Knowledge” - “7” = “Expert”**

How would you describe your current knowledge of the General Guidelines for Visitors to the Antarctic?	1	2	3	4	5	6	7

Please answer the following questions by selecting the answer that most describes your attitudes towards the activity.

**“1” = “Strongly Disagree” - “7” = “Strongly Agree”**

I intend to follow the General Guidelines for Visitors to the Antarctic during my trip.	1	2	3	4	5	6	7
I have an interest in visiting the Antarctic.	1	2	3	4	5	6	7
I will make every effort to follow General Guidelines for Visitors to the Antarctic.	1	2	3	4	5	6	7
I have an interest in participating in excursions while in the Antarctic.	1	2	3	4	5	6	7

I am determined to follow the General Guidelines for Visitors to the Antarctic.	1	2	3	4	5	6	7
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Please answer the following questions by selecting the answer that most describes your perception of the activities appropriateness.

**“1” = “Very Inappropriate”-“7” = “Very Appropriate”.**

Approaching wildlife that is 5 meters away	1	2	3	4	5	6	7
Walking across ground where moss and lichens are growing	1	2	3	4	5	6	7
Accidentally bringing non-native species in your luggage	1	2	3	4	5	6	7
Standing between wildlife and the ocean	1	2	3	4	5	6	7
Accidentally dropping litter/rubbish on land or in the sea	1	2	3	4	5	6	7
Painting or engrave names on man-made or natural surfaces	1	2	3	4	5	6	7
Collecting a small stone or other souvenir	1	2	3	4	5	6	7
Approaching fur seals	1	2	3	4	5	6	7

Continues on next page

**“1” = “Very Inappropriate”-“7” = “Very Appropriate”.**

Lighting a cigarette while ashore	1	2	3	4	5	6	7
Passengers touching wildlife	1	2	3	4	5	6	7
Other passengers taking souvenirs i.e. rock, feather	1	2	3	4	5	6	7
Driving a small boat up to a whale for better pictures	1	2	3	4	5	6	7
Another passenger breaks a guideline. You decide to break the same guideline.	1	2	3	4	5	6	7

Please answer the following questions by selecting the answer that most describes your attitude towards the statement.

**“1” = “Strongly Disagree” - “7” = “Strongly Agree”**

Other passengers on my cruise would find it acceptable for me to walk across some lichens and moss in order to get a great photograph	1	2	3	4	5	6	7
I persuaded another passenger to accompany me on this voyage	1	2	3	4	5	6	7
Other passengers on my cruise would approve of me taking a small pebble as a souvenir.	1	2	3	4	5	6	7
Something negative will happen to me if I do not comply with the General Guidelines for Visitors to the Antarctic	1	2	3	4	5	6	7
The guides think that I should comply with the General Guidelines for Visitors to the Antarctic	1	2	3	4	5	6	7

Please answer the following questions by selecting the answer that most describes your opinion towards the statement.

**“1” = “Not at all under my control”  
“7” = “Completely under my control”**

How I act on the cruise vessel while in the Antarctic is:	1	2	3	4	5	6	7
My time on the cruise vessel while in the Antarctic is:	1	2	3	4	5	6	7
The way I act on shore while in the Antarctic is:	1	2	3	4	5	6	7
My experience on the cruise vessel while in the Antarctic is:	1	2	3	4	5	6	7
My actions while in Antarctica are:	1	2	3	4	5	6	7



Continues on next page

Please answer the following questions by selecting the answer that most describes your perception of difficulty.

**“1” = “Very Difficult” - “7” = “Very Easy”**

If I wanted to, inspecting and cleaning all of my belongings to prevent the introduction of non-native species to Antarctica would be:	1	2	3	4	5	6	7
Telling another passenger that they are not following the General Guidelines for Visitors to the Antarctic would be:	1	2	3	4	5	6	7
I find following the General Guidelines for Visitors to the Antarctic to be:	1	2	3	4	5	6	7

Please fill out the following regarding your background. **All information will be kept confidential.**

1. Identify your country of residence:

---

2. Are you fluent in English? (Please circle one)

Yes

No

3. How many other nature tours of over one week in length and over 100 miles from your home have you participated in? (Please circle one)

a. 0

b. 1

c. 2

d. 3

e. 4 or more

4. What is your gender identity? (Please circle one)

Male

Female

Other

If other please list below:

---

5. What is your age range? (Please circle one)

- a. Under 18
- b. 18-29
- c. 30-39
- d. 40-49
- e. 50-59
- f. 60-69
- g. 70+

6. What education have you completed? (Please circle one)

- a. 8-11th grade
- b. High School
- c. Some College
- d. Graduated from College
- e. Professional or Graduate Degree

7. Is there anything you would like to add about your experience or the General Guidelines for Visitors to the Antarctic?

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**Thank you very much for your participation in this  
phase of the study!**

If you have any questions regarding this study or would like a copy of the results please contact John Read at [jread2@gmu.edu](mailto:jread2@gmu.edu)

## APPENDIX IV



## Antarctic Visitor Study

Hello, my name is John Read and I am a master's student at George Mason University with the School of Recreation, Health and Tourism. I am interested in learning about passenger attitudes, norms, perceptions, and observing passenger experiences on Antarctic cruises.

If you are interested in participating and are 18 years of age or older, you will be provided a survey packet with two surveys that take between 15 to 20 minutes each to complete.

The pre-survey which has an Adelie penguin on the front needs to be completed between Ushuaia and the first time that you go ashore. The post-survey which has a Weddell Seal on the front needs to be completed on the return voyage to Ushuaia before disembarking the vessel.

Survey packets may be picked up from the table in the back of the room or from me. When you have completed the surveys please drop them in the sealed box that I am pointing out.

If you have any questions regarding participation in this study, feel free to stop and talk to me at any point during the cruise.

As a final note,

\* Your participation in this study is voluntary and there are no foreseeable risks to participation. The results of this study may be published but your responses will be kept confidential and no information that can be connected to individual persons will be used when reporting the results of this investigation.

Thank you for your time.

## APPENDIX V



### Antarctic Visitor Study

Tourism has been rapidly increasing around the world. In the Antarctic, there has been a 32% increase in tourists that have participated in landed expeditions over the last 10 years.

In 2011 the Antarctic Treaty System adopted an update to the General Guidelines for Visitors to the Antarctic. Little research has focused on the factors that influence the effectiveness of these guidelines.

As a master's student and researcher at George Mason University with the School of Recreation, Health and Tourism, I am interested in learning about and observing passenger experiences on Antarctic cruises.

You are requested to complete two surveys that take between 15 and 20 minutes each to complete. The pre-survey needs to be completed between Ushuaia and the first time that you go ashore. The post-survey needs to be completed on the return voyage to Ushuaia before disembarkation.

Participants must be 18 years of age or older to complete the survey. Survey packets may be obtained from designated common areas or the researcher.

Responses and observations will be kept confidential and no information that can be connected to individual persons will be used when reporting the results of this investigation.

If you have any questions regarding this survey, please contact John Read at [jread2@gmu.edu](mailto:jread2@gmu.edu)\* Your participation in this study is voluntary and you may withdraw from the study at any time without penalty. Your consent will be indicated by filling out the survey. There are no foreseeable risks to participating in the study. The results of this study may be published but no names will be used and individual responses will be maintained in confidence by the researchers. Anonymity and confidentiality will be assured.

IRB Number: 1322552-1

## APPENDIX VI

### General Cruise Observation Checklist

**Location:** \_\_\_\_\_ **Method:** \_\_\_\_\_ **Equipment:** \_\_\_\_\_

**Date:** \_\_\_\_\_ **Start Time:** \_\_\_\_\_ **End**  
**Time:** \_\_\_\_\_ **Weather:** \_\_\_\_\_

Observatin Point	1	2	3	4	5	6	7	8	9	10
Distance of <5 meters from wildlife										
Distance of <15 meters from seal										
Touching wildlife										
Feeding Wildlife										
Standing/Walking between wildlife and ocean										
Disturb wildlife (Abrupt direction change/flyoff)										
Running while ashore										
Walking off an established track										
Walk on moss and/or lichen beds										
Smoking/Light cigarette										
Graffiti/Cairn building										
Drop litter or rubbish										
Collect souvenir (small stone, feather, bone, etc.)										
Disturb or pollute lake										
Non-Native Species (specify in notes)										

## APPENDIX VII

### *Antarctic Visitor Study*

#### INFORMED CONSENT FORM

##### RESEARCH PROCEDURES

This research is being conducted to assess the experience of visitors participating on Antarctic cruises. If you agree to participate, your conversation content may be summarized for use in the analysis of physical and psychological experiences in the Antarctic. No personal information will be gathered.

##### RISKS

There are no foreseeable risks for participating in this research.

##### BENEFITS

There are no benefits to you as a participant other than to further research concerning the experience of visitors participating on Antarctic cruises.

##### CONFIDENTIALITY

The data in this study will be confidential. Identifiers may be removed from the data and the de-identified data could be used for future research without additional consent from participants.

##### PARTICIPATION

You must be 18 years or older to participate. Your participation is voluntary, and you may withdraw from the study at any time and for any reason. If you decide not to participate or if you withdraw from the study, there is no penalty or loss of benefits to which you are otherwise entitled. There are no costs to you or any other party.

##### CONTACT

This research is being conducted by John Read, Department of Recreation, Health & Tourism, George Mason University. He may be reached at +1 (720) 608-1820 for questions or to report a research-related problem. You may contact the George Mason University Institutional Review Board (IRB) Office at +1 (703) 993-4121 if you have questions or comments regarding your rights as a participant in the research.

This research has been reviewed according to George Mason University procedures governing your participation in this research.

##### CONSENT

I have read this form and agree to participate in this study.

Note: Due to exempt research status designated by the George Mason University Office of Research Integrity and Assurance, no signature is required on this form.

Version date:

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## **BIOGRAPHY**

John Basil Read IV graduated from Rock Bridge Sr. High School, Columbia, Missouri, in 2008. He received his Bachelor of Science in Fire Science and Safety from the University of Central Missouri, Warrensburg, Missouri, in 2012. He was employed domestically and internationally as a Firefighter for seven years, as a Fire Inspector for two years working Government contracts in Antarctica and the Kingdom of Saudi Arabia, and as a Park Ranger with the National Park Service for two years. He received his Master of Science in Recreation Administration from George Mason University in 2019.