

Managing Tourism in Antarctica – A Framework for the Future

Harry Maher

A thesis submitted for the degree of

Masters of Tourism

At the University of Otago, Dunedin

New Zealand

Date: 19 December 2005

Abstract

Antarctic tourism has been the subject of significant debate in recent years, not only within the Antarctic Treaty System (ATS) but also in the wider community. A relatively recent but now well-established industry, tourism in Antarctica is characterised by high regional growth rates and the potential for significant impacts on the environments where it occurs.

This thesis addresses the research question ‘Is the current regulatory system for managing tourism in Antarctica adequate to protect the Antarctic environment?’ It examines the general theories of management of tourism and recreation in protected and wilderness areas. The importance of the relationship between site values, tourism activities, impacts and management responses is highlighted. It is noted that contemporary protected area managers inevitably put in place robust and binding legislation, site-specific management plans, and management interventions to manage wilderness areas. The tourism management framework for Antarctica is presented, in both its historical and contemporary contexts. The historical and current size and nature of the Antarctic tourist industry is analysed and presented, along with an in-depth examination of the values and attributes of the sites where that activity occurs. The actual and potential impacts of tourism in general and of the current levels of tourism in Antarctica are then discussed.

A discussion regarding the adequacy of the current ATS tourism management regime is presented. The system is found to be inadequate across a range of critical factors. The current system is characterised as reactive, legally uncertain, technically-focussed and almost totally lacking in strategic approach. Adequate protection of the sites where tourism occurs is not certain.

A range of improvements to the management of tourism in Antarctica is presented. Chief amongst these are the development of strategic policy for the sites subject to tourism, the development of management plans for key tourist sites, and the use of specific intervention tools at sites to achieve management planning objectives.

Contents

| | |
|---|----|
| Abstract | i |
| Contents | ii |
| Figures, Tables and Maps | iv |
| Acronyms and Abbreviations | v |
| Chapter 1. Introduction..... | 1 |
| 1.1 Goals and Objectives of the Research | 2 |
| 1.2 Thesis Structure | 3 |
| Chapter 2. Methodology | 4 |
| 2.1 Introduction..... | 4 |
| 2.2 Secondary Research | 4 |
| 2.3 Reflexivity..... | 6 |
| 2.4 Personal Observations..... | 7 |
| 2.5 Limitations and Assumptions of the Thesis..... | 8 |
| 2.6 Summary | 9 |
| Chapter 3. Managing Tourism in Protected and Wilderness Areas | 10 |
| 3.1 General..... | 10 |
| 3.2 Legislation..... | 15 |
| 3.3 Policies | 15 |
| 3.4 Management Strategies and Plans | 15 |
| 3.5 Management Actions | 17 |
| 3.6 The Antarctic Situation | 19 |
| 3.7 Summary | 19 |
| Chapter 4. The Antarctic Treaty System and the tourism regulatory regime..... | 21 |
| 4.1 General..... | 22 |
| 4.2 Antarctic Treaty System | 24 |
| 4.3 Non-ATS instruments | 35 |
| 4.4 Industry Self-Regulation..... | 36 |
| 4.5 Critique of the Current System | 37 |
| 4.6 Summary | 38 |
| Chapter 5. Tourism in Antarctica | 40 |
| 5.1 History..... | 41 |
| 5.2 Ship-Borne Tourism..... | 42 |
| 5.3 Airborne Tourism..... | 43 |
| 5.4 Other Tourism Types | 44 |
| 5.5 Current tourism activities..... | 45 |
| 5.6 Summary | 49 |
| 5.7 The Antarctic tourism environment..... | 50 |
| 5.8 Specific Tourist Sites – Values, Use and Impacts | 61 |
| 5.9 Summary – Ross Sea Region | 72 |
| 5.10 Antarctic Peninsula – Tourist Sites..... | 72 |
| 5.13 Summary – Antarctic Peninsula..... | 83 |
| 5.14 Tourism Impacts | 83 |

| | | |
|----------------|--|-----|
| 5.15 | Summary | 105 |
| Chapter 6. | Discussion | 107 |
| 6.1 | Performance of the Current Regulatory System | 109 |
| 6.2 | Constraints on the Design of a Tourism Management System..... | 119 |
| 6.3 | Alternative Tourism Management Systems for Antarctica | 120 |
| 6.4 | An improved Tourism Management System for Antarctic Tourism..... | 121 |
| 6.5 | Summary | 133 |
| Chapter 7. | Conclusions..... | 135 |
| References | | 137 |
| Appendix One | Components of the Antarctic Treaty System..... | 149 |
| Appendix Two | The Antarctic Treaty | 153 |
| Appendix Three | The Protocol on Environmental Protection to the Antarctic Treaty | 160 |

Figures, Tables and Maps

Figures

| | | |
|------------|--|-----|
| Figure 3.1 | Protected Area Management - Heirachy of Management Instruments | 14 |
| Figure 3.2 | Tourism/Visitor Management Techniques | 18 |
| Figure 5.1 | Antarctic Tourist Landing Trends 1992 - 2006 | 47 |
| Figure 6.1 | Management Planning/Response/Monitoring System | 127 |

Tables

| | | |
|-----------|---|-----|
| Table 5.1 | Summary Tourism Statistics 2004/05 Season | 46 |
| Table 5.2 | Detailed Tourism Statistics 2004/05 Season | 46 |
| Table 5.3 | Tourist Landing Statistics – Ross Sea Region | 64 |
| Table 5.4 | Tourist Landing Statistics – Peninsula Region | 76 |
| Table 6.1 | Potential Site Management Interventions | 126 |

Maps

| | | |
|---------|-------------------------------------|----|
| Map 5.1 | Overview map of Antarctic Continent | 53 |
| Map 5.2 | Ross Sea Region | 57 |
| Map 5.3 | Antarctic Peninsula Region | 60 |

Acronyms and Abbreviations

| | |
|--------|---|
| ANI | Adventure Network International |
| ANZ | Antarctica New Zealand |
| ANZECC | Australia and New Zealand Environmental and Conservation Council |
| asl | Above Sea Level |
| ASMA | Antarctic Specially Managed Area |
| ASOC | Antarctic and Southern Ocean Coalition |
| ASPA | Antarctic Specially Protected Area |
| ASTI | Area of Special Tourist Interest |
| ATCM | Antarctic Treaty Consultative Meeting |
| ATCP | Antarctic Treaty Consultative Party |
| ATS | Antarctic Treaty System |
| BAS | British Antarctic Survey |
| CCAMLR | Convention on the Conservation of Antarctic Marine Living Resources |
| CEE | Comprehensive Environmental Evaluation |
| CEP | Committee for Environmental Protection |
| COMNAP | Council of Managers of National Antarctic Programmes |
| CRAMRA | Convention for the Regulation of Antarctic Mineral Resource Activities |
| EIA | Environmental Impact Assessment |
| IGY | International Geophysical Year |
| IAATO | International Association of Antarctic Tourism Operators |
| IEE | Initial Environmental Evaluation |
| IMO | International Marine Organisation |
| IUCN | International Union for the Conservation of Nature and Natural Resources (World Conservation Union) |
| LAC | Limits of Acceptable Change (planning tool) |

| | |
|--------------|---|
| MARPOL 73/78 | The International Convention for the Prevention of Pollution from Ships (1973), as modified by the Protocol of 1978 |
| NGO | Non-Governmental Organisation |
| NSF | National Science Foundation (US Government) |
| SCAR | Scientific Committee on Antarctic Research |
| SPRI | Scott Polar Research Institute |
| UNESCO | United Nations Educational, Scientific and Cultural Organisation |
| VAMP | Visitor Activity Management Process |
| VERP | Visitor Experience and Resource Protection Framework |

Chapter 1. Introduction

Tourism in Antarctica is a well established industry, with recent years seeing a rapid growth in the number of tourists visiting the continent (IAATO, 2005a). This growth has, for some years now, been the subject of growing concern amongst the participants in the Antarctic Treaty System (ATS), tourist operators, non-governmental organisations and academics alike. Erize (1987), IUCN (1991), Enzenbacher (1992), Hall (1992, 1993), Szabo & Dalziell (1994), Johnston & Hall (1995), Hall & Wouters (1995), Stonehouse & Crosbie (1995), Cessford (1997), Dingwall (1997), Walton (1997), Dalziell & de Poorter (1997), Mason & Legg (1999), Giese (2000), Hoffmann & Jatko (2000), Kriwoken (2000), Bauer (2001), Tracey (2001), and IAATO (2000, 2005b), as well as a number of papers from participant countries to Antarctic Treaty Consultative Meetings (ATCM), have all raised issues regarding the potential and actual impacts of tourism at landing sites in Antarctica.

A number of researchers have raised the possibility that tourism in this fragile environment might be having quite specific impacts. IAATO (2001) discuss the physical impacts of tourist parties at specific sites; Hughes (1994) and Hughes & Davis (1995) discuss the impacts of tourism on historic sites; Patterson, Holm, Carney & Fraser (1996), Culik, Adelung & Woakes (1990), Pfeiffer & Peter (2004), Harris (1991), Thompson (1977) and Giese, in conjunction with others, (1996, 1998, 1999, 2000, 2003), all present in-depth discussions on the interaction between tourists and wildlife at Antarctic sites; Lewis, Hewitt, Riddle & McMinn (2003) present an examination of the issue of introduction of marine organisms from tourist ships; Eppley (1992), and Kennicutt & Sweet (1992) investigate oil-spills.

The regulatory regime that attempts to manage tourism and its effects in Antarctica has itself been the subject of recent analysis. While research into the effectiveness of the tourism management regime that regulates the industry in Antarctica has been, to date, relatively issue-specific, a number of legal issues associated with the enforceability of the regulatory system have been raised. Francioni (1993), Stokke &

Vidas (1996), Joyner (1998) and Polk (1998) all highlight issues of this debate and question the effectiveness and enforceability of the current regime. Some researchers, Tracey (2001) being prominent amongst them, have assessed the current regulatory system as inadequate and needing significant improvement.

1.1 Goals and Objectives of the Research

This thesis is intended to present a comprehensive study of the nature and adequacy of the current regulatory framework as it applies to tourism management in Antarctica. It is intended to build on recent and comparable research, especially that by Tracey (2001). The thesis is founded on the fundamental research question:

‘Is the current regulatory system for managing tourism in Antarctica adequate to protect the Antarctic environment?’

The goal of the research is to examine, in some detail, the extent to which the current management framework for Antarctic tourism is adequate to manage the industry in the light of the values of the sites and potential impacts, and in the light of current use levels and short to medium forecasts of tourism growth. The degree to which improvements, or indeed alternatives, to the current system are necessary, and what those improvements/alternatives might be, is also examined and discussed.

The specific objectives of the research are to:

- examine protected area tourism theory and management practice internationally by way of literature review;
- examine the current legal and regulatory tourism management system for tourism in Antarctica;
- review the history and development of tourism in Antarctica including recent developments in tourism product types and visit distribution;
- describe current industry use levels, spatial and temporal distribution, and current forecasts of future trends;

- provide an in-depth description of the values of the sites subject to tourism visitation, and the potential impacts of tourism at those sites, in part based on personal observations of the author;
- critically assess the adequacy of the present system to manage current and future levels of tourism
- present recommendations for improvements and alternatives to the current system that may provide better tourism and site management outcomes, within the context of the ATS system.

1.2 Thesis Structure

In terms of tourism and the regulatory systems that are set up to manage tourism, it can be said that there are four linked elements to any tourism situation; the tourism activities, the sites where that activity occurs, the actual and potential impacts of those activities at those sites, and the management responses to that suite of activities and impacts. This thesis is structured so as to provide a description of these linked elements as they are relevant to Antarctica. Firstly an examination of protected area tourism management theory is provided, following which the legal framework for Antarctic tourism management is discussed. Comparisons are drawn between the current Antarctic system and international practice. The tourism industry in Antarctica is then described. The key numerical, spatial and temporal attributes of the Antarctic tourism industry are presented and analysed.

A description of the Antarctic environment and in particular the sites where tourism occurs is provided, followed by a discussion relating to the potential and actual impacts of tourism in general and at those sites. An in-depth discussion relating to the effectiveness of the current regulatory framework is then presented, drawing on the critiques of a number of commentators and researchers. Conclusions regarding shortcomings in the current system are reached, and recommendations for an improved tourism management framework for the Antarctic are made.

Chapter 2. Methodology

2.1 Introduction

This chapter describes the methodology and boundaries of the thesis. A particular mix of methodological approaches was chosen for the writing of the thesis, and certain assumptions and limitations have been addressed in order to make the exercise practicable and of value to this research area. The methodologies employed are described first, followed by a statement of the limitations and assumptions.

The methodology of this thesis is a mix of secondary research and personal observations of Antarctic tourism. In the main the thesis is based on secondary research involving literature review and information gathering and analysis. This is complemented by primary research in the form of observations conducted by the author directly in the Antarctic tourism industry. It is considered that, given the nature of the research question, and the difficulties in conducting other primary research in such a remote and expensive-to-reach location, this mix of methodologies best suited the specific research question of this thesis.

This chapter describes the research methodologies and discusses the limitations and assumptions inherent in the thesis.

2.2 Secondary Research

The methodology of secondary research consisted of sourcing relevant documents relating to the thesis research question, Antarctic tourism in general, and relating to wider issues of tourism management in protected areas. The literature reviewed included academic publications, particularly those from the universities with dedicated Polar research programmes (e.g. Scott Polar Research Institute (SPRI) at Cambridge University); reports from Antarctic Treaty Consultative Meetings (ATCM) and ATS sub-committees (e.g. Committee for Environmental Protection,

CEP); papers submitted by participant countries to the annual ATCM meetings; recommendations, decisions and agreed protocols emanating from the ATCMs; governmental legislation and policies of participant governments; industry research and self-regulation documents, especially from the International Association of Antarctic Tour Operators (IAATO); and research and papers produced by the international legal fraternity, particularly those examining the unique legal framework of Antarctica. In addition to the material directly relating to tourism in Antarctica, research and literature relating to tourism management approaches in natural protected areas internationally was examined and reviewed. As much as was possible given the relatively limited volume of literature relating to Antarctic tourism, the secondary research has targeted contemporary literature, as in a rapidly growing and changing industry such as the Antarctic tourism industry, some types of research (e.g. numerical analysis of the industry) becomes out-of-date very quickly. The key sources of quality analysis and debate were revealed to be the papers emanating from the academic researchers (e.g. the *Polar Record* of the Scott Polar Research Institute), and the tourism industry by way of IAATO. Only limited reference is made to documents emanating from the annual ATCM meetings. Surprisingly, on examination these papers and studies contributed little to the research question, and only selected papers will appear referenced through the thesis.

The strength of this approach lies primarily in the availability of immediately relevant analysis and discussion on the ATS and tourism management. This is a relatively narrow field of research, and the fact that other researchers have specifically investigated this very question, albeit often in only a partial fashion, means that there is an adequate level of comparative information available. As stated previously, the literature review revealed a high level of variability in the quality of relevant research, and a large number of items, particularly from the ATCM process, were found to have added little or no value to the exercise. The drawback to this heavy reliance on secondary research is that the writer is reliant on the accuracy and level of analysis of others for some key pieces of information, there being significant difficulties in verification in such a remote locale.

Alternative or additional options for secondary research are considered limited. The pool of relevant and contemporary literature relating to the subject matter is not

particularly large, and by examining contemporary in-depth studies of this subject by other researchers (e.g. Tracey, 2001), the majority of the relevant literature can be identified. It is not considered that, subject to the thesis limitations and assumptions as set out below, any significant items of research relevant to the research question and this thesis have escaped review.

2.3 *Reflexivity*

In support of the literature review methodology, the research is also informed by the author's own observations of Antarctic tourism, along with the insights and experience gained from approximately fifteen years experience as a manager (for the Department of Conservation) of tourism activities in New Zealand's protected area system.

The author's experience over the last fifteen years in tourism management has brought to this thesis an in-depth understanding of both the theory of tourism management in protected areas, as well as the practice of implementing those theories in the reality of the protected area environment. This experience includes first-hand management of tourism impacts, development of tools and approaches to manage impacts, and, in recent years, leading a full review and re-design of the Department of Conservation regulatory regime for terrestrial tourism in protected areas (including implementation actions). Study tours looking at tourism management systems in protected area agencies in Australia, the United States of America and Canada have been contributed to this experience, giving a first-hand international perspective. The author has been a contributor to international protected area studies, including the Australia and New Zealand Environmental and Conservation Council 1999 report on "Commercial Management – Processes in the Delivery of Park Services". A thorough understanding of tourism management has been gained and this understanding is brought to this research by way of the cognitive analysis of different aspects of the Antarctic regulatory system, and in the development of an improved system.

The author has also utilised strong personal contacts with participants in the Antarctic regulatory regime and in the tourism industry to help inform the thesis. In particular

informal personal communications with staff from Antarctica NZ, Quark Expeditions, and Antarctica Heritage Expeditions have assisted in directing the research and checking the development of ideas.

2.4 *Personal Observations*

The personal observations of Antarctic tourism were gained in the course of participation as a New Zealand Government ‘observer’ on board a 26-day tourist cruise ship voyage to the Ross Sea Region (Quark Expeditions, I/B Kapitan Khlebnikov) in February and March 2005. The voyage featured 112 passengers and around 10 guides, and landed at six sites in the Ross Sea Region. The ‘observer’ role required the author to accompany the crew and customers on all landings on the New Zealand sub-Antarctic islands and on the Antarctic continent in the Ross Sea Dependency. The primary purpose of the role was to observe compliance of the company with the conditions of their permit (issued by the New Zealand government under the Antarctica (Environmental Protection) Act 1994 to authorise their activities) and the Initial Environmental Evaluation (IEE) prepared by the company. The role included accompanying all tourist landings at all sites, with the observer required to land first with expedition staff and leave the landing site last. Specific observer tasks included keeping a daily report of the tourist activities, recording numbers landed, sites visited, tourist and guide behaviours and interactions with wildlife at the site and historic features. At the conclusion of the voyage a full report was furnished to Antarctica New Zealand (ANZ) and the Ministry of Foreign Affairs and Trade. This report summarised the level of compliance of the company with the permit and IEE, and commented on the general effectiveness of the existing regulatory systems at the sites. The role also involved direct physical impact monitoring of the tourist activities for the ANZ ‘VISTA’ monitoring scheme for the Ross Sea Region tourist sites.

Participation in this tourist voyage in the observer role has brought strength to this thesis by way of first-hand experience of the nature and conduct of the tourism activities, the nature of the sites where the tourists regularly land in the Ross Sea Region, the potential and actual impacts of those landings, and also the effectiveness of the current regulatory system. This has enabled the author to assess with some

direct experience the research of others, and to interpret the general theories of protected area management to the Antarctic context by way of personal understanding of the tourism industry in Antarctica.

2.5 Limitations and Assumptions of the Thesis

Firstly there are some limitations inherent in the parameters that surround a Masters level thesis project. The constraints of the Thesis Regulations mean that the depth to which subject matter can be investigated is limited in a Thesis with a relatively broad subject matter such as is the case with this thesis. In practice this means that discussions are presented, arguments examined and conclusions reached, but there is not the space within the parameters to fully investigate matters of detail. An example of this is analysis of the spatial and temporal distribution of tourism in Antarctica. While detailed statistics are presented, there is an ability to analyse that data to a much greater degree, and, for example, examine the sub-sectors of ship-borne tourism (e.g. adventure tourism from ships) at a much finer level. The space constraints of this thesis do not allow such detail. This is not detrimental to answering the research question in any way, but does mean that less detail of this sort will be present than otherwise might be the case.

A number of the previous researchers into this general area have devoted varying degrees of effort to making comparisons between the management of tourism on the Antarctic continent and the management of tourism in the world's sub-Antarctic islands, and in the Arctic polar regions. This research has been carefully examined, along with the basis for these comparisons, and the validity of the end results, and it is concluded that, for this thesis at least a detailed examination of Arctic and sub-Antarctic tourism management is neither warranted nor appropriate. Hall & Johnston (1995) and Tracey (2001) both acknowledge the fundamental difference between tourism management in the Antarctic and these other areas, namely sovereignty, or the lack of it in the Antarctic context. Richardson (1999) specifically questions the value of these comparative studies. For this reason, and also because of the limitations

of size and depth of analysis inherent in the boundaries to this thesis, no attempt has been made to undertake such comparisons.

From the point of view of research methodologies, other primary research options which could have been used were considered but not implemented. Qualitative approaches such as direct surveying of participants in the ATS tourism regulatory system were a possibility, but, given the truly international nature of the industry and its participants, and the remote nature of the locations and the difficulties of access to operators and clients, the time and financial implications of this made such an approach impractical for this thesis.

2.6 *Summary*

This thesis utilises a mix of secondary research (by way of literature review) and primary research by way of personal observations of Antarctic tourism. This is complemented by the author's own experiences in managing tourism in protected areas. Additional primary research methods were considered impracticable for this particular research question, mostly because of the time and cost implications associated with the remoteness and difficulty of access to the Antarctic tourism industry. This mixed approach is considered to have strengths in the form of access to relatively contemporary analysis in the research area, and in the relevant and contemporary personal experience of the author in the Antarctic tourism industry itself.

Chapter 3. Managing Tourism in Protected and Wilderness Areas

The objective of this chapter is to introduce the reader to the general theoretical context to managing tourism in protected and wilderness areas. The aim of this is to enable readers to understand what issues, challenges and responses are discussed in the international literature, in order that a comprehensive understanding of the Antarctic system in the theoretical context can be made. In the most part this chapter is based on a comprehensive review of the international literature relating to managing recreation and tourism in protected and wilderness areas. Much of this is related to tourism/recreation management in the North American protected area system.

The chapter commences with a general overview of theoretical models for managing tourism in protected areas. Leading contemporary researchers and their work are introduced, as are definitional issues and a discussion on some limitations to the discussion. An 'ideal' model for a hierarchical regulatory system is presented and then described in detail. A brief comparison of the theoretical model with the current Antarctic model is discussed, in preparation for more in-depth discussions later in the thesis. The chapter has been set out so as to provide readers with a logical progression from general theory to more detailed theory and on to an introduction to the application of that theory to the Antarctic situation.

3.1 General

A review of the international literature indicates that tourism management systems in protected areas around the world generally share one or more of three key features; a sound and binding legislative foundation, a system of management planning that creates goals and objectives for management, and the use at sites of a series of actions by the protected area managers that are designed to deliver on the requirements of the

legislative framework, and achieve the goals and objectives identified by the planning system (e.g. IUCN, 1991; Eagles, McCool & Haynes, 2002; Pedersen 2002). Another common theme from the literature reviewed is the linkage between the activities of tourists, the values and attributes of the sites where that activity occurs, the impacts (both potential and actual) that accrues from that activity and the ensuing management responses to those impacts. The research by Mathieson & Wall (1982), Hammitt & Cole (1998), Eagles & McCool (2002), Eagles, McCool & Haynes (2002), Pedersen (2002) and Newsome, Moore & Dowling (2002) all discuss this linkage.

In order to examine and discuss an improved tourism management system for Antarctica, it is therefore necessary to also examine, at least at a general level, how these key features interact in protected area management theory. This chapter presents and discusses the various planning approaches that have been developed in the international protected areas scene for the management of tourism and recreation activities. There are several objectives to this discussion. Firstly it is intended to introduce to readers the generic principles of managing tourism in protected areas. This is so that the discussion that will follow in this thesis regarding the role of planning in current and potential regulatory frameworks for tourism in Antarctica can properly be placed in the context of how management of tourism is approached internationally for protected areas. A second objective is to introduce possible management approaches and theories that have been applied elsewhere, or have been suggested be applied for Antarctica (e.g. Davis, 1999), in order that they be understood in the concluding sections of this thesis that relate to the design of an improved regulatory framework for Antarctica. Lastly it is considered important to examine and discuss the limitations that might affect the application of international theoretical models of tourism/recreation management in protected areas, to the Antarctic situation.

It should be understood that this chapter will only discuss tourism management models as they apply to protected area management. There are a large number of tourism management models in existence that are designed to address a wide variety of tourism issues and situations. Many of these models and approaches relate to urban or rural tourism situations. Antarctica is ostensibly a protected area (ASOC, 2004), and the values and attractions of the tourist sites, and the activities that are carried out

at those sites, have much more in common with the sites and activities in protected areas such as national parks than they do with non-protected areas. Therefore it is considered that it is only those models that have been designed for protected areas will have any real relevance for this discussion.

Some understanding of definitional issues is also necessary. Tourists, visitors and recreation are terms used interchangeably in this chapter, usually depending on which planning framework is being discussed at the time. In many protected areas visitation, tourism and recreation are treated as quite different activities (e.g. Department of Conservation NZ Visitor Strategy, 1996), with much debate in the literature over definitions of ‘tourist’ and different types of tourist. In the Antarctic context all visitors are from another country, but all are involved in recreation, so the terminology in reality becomes meaningless. Many of the management models discussed in the literature, for example Davis’ (1999) discussion on the application of the ‘Limits of Acceptable Change (LAC)’ model, are actually models for managing recreation, not tourism per se., but in the Antarctic context the difference becomes meaningless, and the recreation models may be considered just as valid as the tourism models.

One final comment needs to be made about the generic regulatory frameworks and tourism management models discussed in this chapter. Many of the approaches, particularly those used in the North American, New Zealand and Australian protected areas systems that have been suggested for application to Antarctica, have a broad content that relates to managing visitor satisfaction (e.g. Visitor Experience and Resource Protection Framework VERP). In the situations where these approaches have been developed and implemented there exists a legal framework that requires the protected area agency to manage for visitor satisfaction. An example of this is the New Zealand Conservation Act 1987 (that regulates management of tourism in national parks and other conservation areas in New Zealand) which has, at Section 6(e), a requirement on the Department of Conservation to “...foster the use of natural and historic resources for recreation...”. No such legal imperative to manage for visitor satisfaction exists for Antarctica. The ATS system provides only for the peaceful use and protection of Antarctica (Article 1-1 and Article IX-1(f)), and does not require the protection or provision of experiences for tourists. Some researchers

(e.g. Maher, Steel & McIntosh, 2003) have undertaken research into this area, but, while it is accepted that assessing the benefits to tourists of their Antarctic experiences may have value in terms of justifying tourism as a valid activity, in terms of discussing and designing a regulatory system (which is the purpose of this thesis), managing for visitor satisfaction is not considered to be a relevant feature.

A number of valuable overviews of the history and application of management frameworks for tourism in protected areas are available. Chief amongst these are Hammitt & Cole (1998), Eagles & McCool (2002), Eagles, McCool & Haynes (2002), and Newsome, Moore & Dowling (2002), all of which provide in-depth and contemporary examinations of both planning processes and management actions with respect to tourism. The author's own observations of the application of these theoretical frameworks within protected area agencies (NZ Department of Conservation, US National Parks Service, Parks Canada and Australian state and federal government agencies) is also a valuable resource for this discussion.

Generally it appears that one of the fundamental aspects of management of visitors to protected areas is having in place both a robust planning framework and the ability and intent to act on the results of that planning. Eagles, McCool & Haynes (2002) in their report for the IUCN on 'Sustainable Tourism in Protected Areas' note (2002. p. 159):

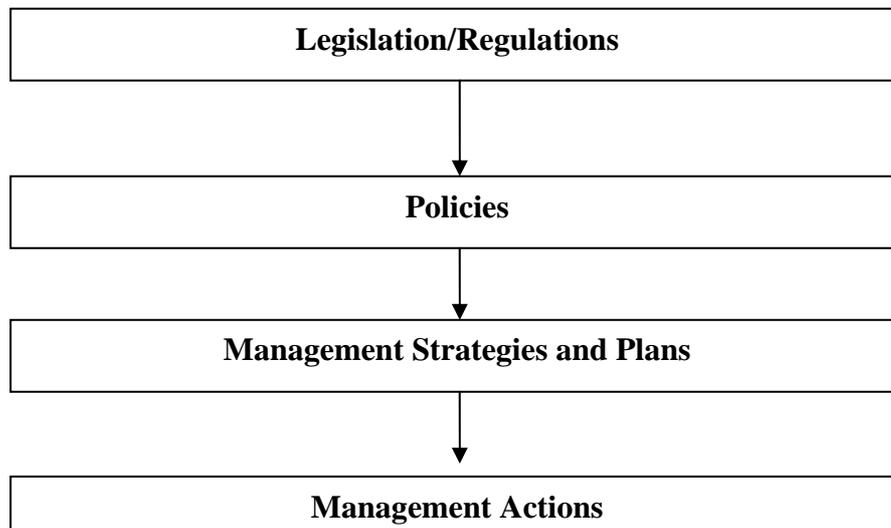
“These guidelines suggest that national and international organisations need to encourage governments to make improvements (in the management of protected areas) in the following critical areas:

1. Support for effective legislation, with adequate resources for implementation
2. Creation of national policies on protected areas and management of tourism (as well as education about the environment and conservation), and
3. Development of a management plan for each protected area, covering all activities, including tourism, to ensure that objectives are achieved and resources are well-used.”

These principles are re-enforced in the United Nations Educational, Scientific and Cultural Organisation (UNESCO) manual on “Managing Tourism at World Heritage Sites (Pedersen, 2002), and in the Australia and New Zealand Environment and Conservation Council (ANZECC) report on ‘Commercial Management – Processes in the Delivery of Park Services’ (ANZECC, 1999). A sound legislative framework, good planning systems, and the use of a range of management tools to achieve desired outcomes, would therefore appear to be fundamental requirements for the management of any protected area. Certainly the ‘Western’ protected areas jurisdictions of New Zealand, the USA, Canada and Australia all have, or are endeavouring to develop, these fundamental elements of their regulatory systems (author, personal observations).

In most cases this framework takes the form of a hierarchical system as follows:

FIGURE 3.1 - Protected Area Management: Heirachy of Management Instruments



Source: Author

3.2 *Legislation*

The first important aspect of the theoretical model is the grounding in a sound legislative framework (Eagles, McCool & Haynes, 2002). This theme is a common thread to the literature examined, and is important in the Antarctic situation. As will be shown later in this thesis, the current legal foundation for managing tourism in Antarctica is reported as being uncertain and unclear (e.g. Joyner, 1998). The goals and objectives that are developed as an early step common to all of the models will inevitably have their basis in the legal objectives of the jurisdictional legal framework. In the case of Antarctica this framework, while different in many ways from those of sovereign nations elsewhere, still would appear to require clear objectives for the management of the continent.

3.3 *Policies*

Many international management models use formal policies as a means to interpret the relevant legislation into the context of the situation at hand (Pedersen, 2002). An example of this is the New Zealand “General Policy for National Parks” (NZCA, 2005) and the “Conservation General Policy” (DoC, 2005). Both these documents provide guidance for managers and public (and industry participants) regarding such things as the siting of accommodation facilities and the provision of recreational opportunities. In most cases these policies formally inform management plans and strategies, and provide valuable guidance to management participants.

3.4 *Management Strategies and Plans*

Newsome et al. describe planning for visitors as being “the process of setting goals and then developing the actions needed to achieve them”, and further, “...the basic task of planning is to visualise the area, that is, the product, as visitors and managers wish it to be in the future” (2002, p. 147). A review of the recent literature observes the development and existence of a wide variety of visitor management systems,

largely occurring in the North American protected area system since the 1970s (Eagles & McCool, 2002). These various models have been developed in an attempt to provide protected area managers with planning tools that can enable them to produce management plans and other statements of desired goals, objective and desired outcomes, upon which management actions can be based. A variety of approaches exist, with Eagles & McCool (2002) and Newsome et. al. (2002) both noting and analysing at least six different models. Examples include the LAC model (Stankey, Cole, Lucas, Petersen and Frissell, 1985) and the Visitor Experience and Resource Protection Framework VERP (USDA, 1997). The commentators note that all of the models have been applied in part or in whole in various protected areas around the world with varying levels of acceptance and success.

It is not the intention of this thesis to provide an in-depth analysis of each of the models and compare them to each other. To do so is not necessary in answering the central research question of this thesis. Suffice it to say that it will be argued that an integrated and comprehensive tourism management system would include the use of a planning model with attributes that are generally acceptable and applicable to Antarctica. In general the models that are analysed in the literature are largely derivative of each other and focus significantly on the management of visitor experiences (Boyd & Butler, 1996 in Newsome et al 2002). Generally there are two types of models; those that can be said to be generally ‘anthropocentric’ or focussed on human outcomes such as visitor satisfaction, and those that can be considered “ecocentric” or environmental focussed. The VERP approach is a typical anthropocentric model, while of the many models it appears that the LAC model is possibly the most ‘ecocentric’ or environmental focussed of the many approaches (Eagles & McCool, 2002). Given that the ‘legal’ mandate for management of tourism in Antarctica arguably does not include an objective of managing visitor experiences (as noted previously in this chapter), and given that the sites where tourism occurs are often highly susceptible to environmental damage (Hoffmann & Jatko, 2000), there may be a strong argument for suggesting that the LAC model may possess the best attributes for being part of the Antarctic tourism management system.

Management plans are an existing feature of the Antarctic management system. Antarctic Treaty Consultative Party (ATCP) agencies have written, and are writing or

reviewing, individual management plans for Antarctic Specially Protected Areas (ASPAs) and Antarctic Specially Managed Areas (ASMAs). In terms of the management of tourism at those sites, it is currently not clear if, and to what extent, specific planning models such as those discussed in the chapter, have been utilised in the production of those planning documents.

3.5 *Management Actions*

The development and application of planning frameworks is only part of the picture with respect to managing tourism in protected areas. The other part is the issue of the interaction between the planning frameworks and management actions. Hammitt & Cole (1998) make a significant point of this, describing the relationship between the formulation of goals and objectives for protected areas, and the management actions required to achieve those goals. Newsome et al (2002) and Eagles & McCool (2002) also examine this issue. This is an important issue in that it links the planning for outcomes (which several researchers have argued is a missing but needed activity in Antarctica) and the achievement of those outcomes through a regulatory regime. The author has argued previously (Maher, 2004) that planning for protected areas must inextricably be linked to decisions about how those goals and objectives will be realised through action.

Newsome et al summarise the possible types of regulatory or management reaction to planning outcomes into two main streams (2002, p. 197):

- “Site or visitor management, where site management focuses on actions at the sites (e.g. track hardening) and visitor management focuses on managing the visitors themselves (e.g. regulation, information)
- Direct or indirect management, where direct management actions restrict individual choice (e.g. regulation of access) and indirect management actions seek to influence visitors (e.g. information)”

It is possible to describe the potential actions of managers (in the Antarctic context this is the ATCPs and the industry) as occurring along a continuum, from reasonably

‘soft’ and indirect interventions such as information and advocacy, through to ‘hard’ or direct actions, such as physical site works or restrictions on access to various sites. Managers are able to choose various actions in order to achieve certain outcomes that result from the application of the aforementioned planning frameworks, depending on the circumstances of the case. It is also possible for a regulatory system to involve ‘movement’ along the continuum of intervention choices, choosing other ‘harder’ interventions should the previously tried ‘soft’ interventions fail to achieve the intended outcomes (Newsome et al, 2002). It appears from the literature that the researchers consider there to be a distinct relationship between the activities of tourists/recreationists, the attributes of the sites involved, the degree to which the sites are vulnerable to impact, and the appropriate management response required. Hammitt & Cole (1998) structure their book on this matter in exactly this way, and Eagles & McCool discuss the linkages between these elements extensively. Newsome et al also refer to this linkage, and present the two main approaches with respect to management response in a diagrammatic form as follows:

FIGURE 3.2 - Tourism/Visitor Management Techniques

| | | |
|--------------------------------|---|-------------------------------|
| Indirect Management | Locating Facilities Managing Facilities Site Restoration | Site Management |
| | Information and Education Fees | |
| Direct Management | Regulating Visitor Use <ul style="list-style-type: none"> ▪ Numbers ▪ Group size ▪ Length of stay ▪ Enforcement | Visitor Management |

Source: Newsome et al (2002, pg. 199)

The participants in the management of tourism in Antarctica are already involved in a number of different types of management actions as described above. The use of

information and education in particular (an indirect management approach) has been widely used by the ship-borne tourism industry for some time through the IAATO guidelines and information sources (IAATO, various), and the ATS legislative framework has adopted these tools by way of Recommendations. IAATO has also ventured into the area of direct visitor management by way of self-imposed limits on the sizes of groups allowed to land at sites on the continent (IAATO, 2005). Proposals for additional actions such as those contained in the La Jolla impacts workshop report (Hoffman & Jatko, 2000) represent a mix of site and visitor (or direct and indirect) management actions. The selection and application of different management techniques in the Antarctic will be discussed more fully in subsequent sections of this chapter.

3.6 *The Antarctic Situation*

This chapter has examined and presented the features common to tourism regulatory systems for protected areas, as described in the international literature and gained from the author's personal observations. The current regulatory regime for Antarctica contains some of the features described above, but is devoid of policy and is only partially-developed in the other aspects (Tracey, 2001). For example the use of management plans to guide management of tourist landing sites is limited in general and not present at all in the Antarctic Peninsula. This 'gap' between the international theory and the current practice in Antarctica is a fundamental aspect of the research question of this thesis. The matter will be examined in detail in the subsequent chapters.

3.7 *Summary*

Examination of the international literature suggests strongly that the management of tourism in protected areas requires three fundamental components to be in place in the regulatory system:

1. Appropriate and binding legislation and the resources to implement it

2. The use of applicable planning approaches to develop goals and objectives for the management of the places where tourism occurs
3. A range of direct and indirect management techniques that can be used to manage the impacts of visitors and achieve the goals and objectives as developed by the planning processes, and as envisaged by the legislation.

The literature also indicates that there are clear linkages between site values, tourism activities and impacts, and the management responses to the activities and impacts. Some sites are more sensitive to impact than others, and some activities have more potential for impact than others. Management responses to activities and impacts therefore need to be set in the context of the sites where the activities occur.

The Antarctic is to all intents and purposes a protected area, with a tourism regulatory system. It would seem logical therefore to assume that the generally accepted 'ideal' attributes of a tourism management system for a protected area as identified from the literature review, and as observed from international protected areas practice, should also be in place for the Antarctic where legally possible. Some elements of such a system are in place already (e.g. some of the indirect management techniques have been implemented through the ATS and by self-regulation by IAATO) but it appears that the application of these principles to Antarctica has by no means been done in a structured, comprehensive or even conscious manner. The introduction of all the appropriate components of an 'ideal' management and regulatory system to Antarctica is considered necessary.

Chapter 4. The Antarctic Treaty System and the tourism regulatory regime

This chapter outlines and discusses the regulatory framework that tourism activities in Antarctica currently operate within. A description and explanation of the various aspects of the regulatory regime, including analysis of the history of the system, and current issues relating to the development of the various aspects of the regime is presented. It is not intended in this chapter to provide a discussion on the strengths, limitations and weaknesses of the current system. This critique will be provided in Chapter Six in a more general discussion of not only the quality of the current system, but also an analysis of improvements, extensions or alternatives that would provide better management outcomes for Antarctic tourism.

The objective of this chapter is to place the discussions that will conclude this thesis, specifically the discussions on alternative or improved tourism regulatory frameworks, within the context of the current tourism regulatory system and its performance to date in managing Antarctic tourism. It is also intended that this chapter provide a link to the previous chapter regarding generic tourism management models, by discussing how those generic principles have been applied in Antarctica. The matter of the ideal application of the theory of managing tourism in protected areas is discussed in the penultimate chapter of this thesis.

It is suggested in this chapter that the Antarctic tourism management system has three basic elements; the ATS, non-ATS instruments such as international conventions, and the industry self-regulation initiatives such as voluntary codes of conduct. In-depth description of each of the components then follows. The ATS is described first in the chapter. The history of the development of this system through to 1991 is set out. The development of the Madrid Protocol in 1991 is then presented in a specific section, highlighting the importance of this ATS instrument with respect to tourism management. The ongoing development of the ATS from 1991 to the present is then discussed so that contemporary developments can be understood. The non-ATS

components are then set out, followed by the industry self-regulation initiatives before the chapter is concluded. This structure has been chosen to present a logical and easily understood picture of all the system elements contiguous with each other.

It is obvious from the discussion to follow that the primary element of the regulatory framework is the ATS system. Most of the discussion to follow in this chapter is devoted to that component. In part this is reflective of the larger quantum of research and literature on the ATS system (compared to the other two components), and partly this is due to the significantly more comprehensive and influential nature of the ATS system as a part of the regulatory framework.

4.1 General

Firstly, for this discussion it must be noted that the regulatory framework for tourism in Antarctica operates in a unique legal situation without peer anywhere else in the world. This unique feature is the lack of sovereignty. Almost all researchers and commentators on this issue highlight this point. No country has sovereignty over Antarctica. It is the only situation in the world here a land mass is not subject to the sovereignty of a country. It is this issue possibly more than any other that distinguishes Antarctica from other tourism management discussions, and will form part of the key discussions on the chapters to come.

The literature to date that examines the ATS and its relevance and impact on tourism in Antarctica typifies much of the research in this general area, namely that the rapid growth and changes in the tourism industry itself, the active role of IAATO in developing tourism management initiatives, and the comparably slower but still significant responses from the ATS system, has meant that a number of the pieces of research have become largely outdated, at least in terms of a contemporary discussion on the more recent developments of the ATS system as it is in 2005. a comprehensive review of the literature suggests that there are three distinct but not unrelated entities that make up the regulatory framework for tourism in Antarctica:

1. the Antarctic Treaty System (ATS),

2. non-ATS conventions, measures and legislation
3. industry self-regulation

IAATO (2005) have provided a listing of the various elements of the regulatory regime as it applies to tourism operators in an Information Paper to ATCM XXV. These are set out in Appendix One to this thesis. The next three sections of this chapter briefly summarise the components as introduction to a more in-depth examination of each of them.

4.1.1 The ATS System

The ATS system consists of the aggregation of Antarctic Treaties, Laws and Regulations, and Resolutions etc. passed over time by the ATCP nations. The foundation element to this system is the Antarctic Treaty of 1959 (see Appendix Two). This has been supplemented over the years by a large number of additional instruments such as the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR, 1980), and, with more relevance to tourism, the 1991 Protocol on Environmental Protection to the Antarctic Treaty (the Madrid Protocol, see Appendix Three).

Over the years ATCP nations have also enacted over sixty separate legislative instruments to support the regulatory framework, as well as a number of additional policies and guidelines.

4.1.2 Non-ATS components

In the tourism context the non-ATS components of the tourism regulatory system are the international agreements relating to aviation and shipping. These are relevant to tourism management as all tourists travel to the Antarctic continent by either ship or aircraft, and it is the international agreements that regulate this traffic in international waters and airspace (where much of the normal sovereign jurisdiction of governments does not apply).

Of particular importance to the management and regulation of tourism by cruise ship in Antarctica is the issue of prevention of marine pollution. Discharge from ships is regulated by the International Convention for the Prevention of Pollution of Ships, adopted by the International Maritime Organisation (IMO) in 1973 and modified in 1978 and known as MARPOL 73/78)

4.1.3 Industry Self-Regulation

The 'self-regulation' component of the regulatory system consists of the various guidelines and operating procedures adopted by the members of IAATO. These have built up gradually over the years and now form a comprehensive and, at times, in-depth set of self-imposed controls on the activities of IAATO members.

This chapter is structured from this point so as to separate these three parts of the system and discuss them separately, even though there are many overlaps and dependencies between the parts of the regime. The year of 1991 is used as a 'boundary' for part of the discussions relating to the ATS. This was the year that the Madrid Protocol was agreed upon by the ATCP nations, and in many ways that event represents the most significant development with respect to management of tourism in Antarctica in recent decades.

4.2 Antarctic Treaty System

4.2.1 History of the Antarctic Treaty System (1959-1991)

The history of the Antarctic Treaty System is well documented. Two accessible, well-presented and, most importantly, contemporary, summaries on this subject can be found in the Antarctica NZ (2003) 'Information Sheet – History of the Antarctic Treaty', and the 2004 paper by Bastmeijer & Roura (2004) on the ATS system. Tracey (2001) also provides valuable insights into the development of the system, as do Joyner (1998) and Richardson (1999).

Antarctic exploration began in the late 19th-century, primarily related to expeditions seeking commercial gain from activities such as whaling and sealing. The first half of the 20th-century saw ongoing state-sponsored expeditions to many parts of Antarctica (e.g. the British Expeditions of Scott and Shackleton), and also continued commercial incursions onto the Peninsula Region. After more than fifty years of exploration and occasional commercial exploitation, by the 1950's seven countries had made territorial claims to the continent, three of those claims (Argentina, Chile and the United Kingdom) being overlapping. The USA and Russia did not lay claims at the time but openly reserved the right to do so. The International Geophysical Year (IGY) of 1957 brought together the scientific community (and resulted in a significant increase in activity on the continent), and the resultant goodwill led directly to the creation of the Antarctic Treaty. This occurred in 1959, and the Treaty amongst the twelve nations that were directly involved in the IGY effectively suspended these territorial claims and created the consultative system that remains in force, albeit with some modifications, to this day.

The Treaty in its original form was surprisingly short, and had as its primary objective the setting aside of Antarctica to be used only for peaceful purposes, with no military activity (ANZ, 2003). The full text of the Treaty is appended to this thesis as Appendix Two. Through Article IV of the Treaty, all political claims to territory below 60-degrees south were 'frozen' by the agreement of the parties, and no new claims or enlargements of existing claims are permitted. Bastmeijer & Roura (2004, p. 768) characterise this as "an agreement to disagree", and suggest this aspect has actually been one of the secrets to the ongoing success of the Treaty. Scott (2003, p. 474) describes Article IV as "this unique device of de-coupling the task of management from the problem of sovereignty".

Since the 1959 Treaty was agreed, the governance framework for Antarctica has been supplemented by a suite of other legal agreements (Tracey, 2001). The original Treaty plus these additional instruments, as listed in Appendix Two to this thesis, now form what is commonly known as the Antarctic Treaty System.

Under the ATS there are effectively three categories of country with respect to the decision-making processes:

1. Consultative Parties (ATCP), being countries that are signatories to the Treaty that have active scientific programmes on the continent,
2. non-Consultative Parties (non-ATCP), being countries that are signatories to the Treaty but who do not have active scientific programmes on the continent,
3. non-Treaty nations, being countries that are not signatories to the Treaty.

There are now more than forty-five countries who are signatories to the Treaty (Antarctic Treaty Secretariat 2005) and these countries hold an annual meeting to discuss matters of common interest. These meetings are referred to as Antarctic Treaty Consultative Meetings (ATCM). Decisions are made in a “multi-phase process” (Joyner, 1998, p.404), whereby various ATCPs firstly informally discuss a proposal for a Recommendation and agree on its wording. The next step is for the draft Recommendation to be formally submitted to the annual ATCM. In plenary session in the ATCM the Recommendation is adopted by consensus. ATCP representatives from the ATCM then recommend approval of the adopted Recommendation to their respective governments. Governments can, and sometimes do, decide not to accept the recommendation of their representatives. The final phase is that of ‘approval’ whereby the Recommendation only becomes ‘effective’ for each ATCP government when it has been approved domestically by all the other ATCP governments (Joyner, 1998).

Several committees have also been set up under the auspices of the ATS, in particular with reference to tourism the Committee for Environmental Protection (CEP). Until 1995 all decisions taken at the ATCM were referred to as ‘Recommendations’ (ANZ, 2003). These Recommendations were theoretically binding on the ATCP countries, although there has been ongoing debate on the extent of this. Since 1995, this has been replaced by a three-tier decision system:

- Measures; which cover legally binding texts and agreements
- Decisions; which cover administrative matters such as Rules of Procedure for ATCM, and
- Resolutions; which deal with non-binding agreements and understandings.

Antarctica NZ (2003) report that over 200 Recommendations, (before 1995), and Measures, Decisions and Resolutions (after 1995) have been adopted up to 2003 through twenty-six ATCMs. Additional to these are four key formal Conventions to the ATS (Scott, 2003);

1. the Convention for the Conservation of Antarctic Seals, 1972
2. the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR), 1980
3. the Convention on the Regulation of Antarctic Mineral Resource Activities, 1988, and
4. the Protocol on Environmental Protection to the Antarctic Treaty (the Madrid Protocol), 1991.

With respect to Recommendations that address tourism issues, a number of researchers have specifically examined the development of the ATS in this matter. Tracey (2001) and Richardson (1999) both look at the matter in some detail. Specific Recommendations relating to tourism were passed at irregular intervals during the decades of the 1970s and 1980s (Tracey, 2001). It seems the adoption of regulations for tourism was somewhat ad hoc and reactive. Richardson (1999) notes that, between 1966 and 1982, only six Recommendations were adopted to address tourism, and that no Recommendations at all were passed during the period 1982-1992. 1975 seems to have been when the first substantial regulatory instruments were introduced for tourism. Recommendation VIII-9 (1975) dealt with tourism and asserted “the necessity to restrict the numbers of places where large numbers of tourists may land so that the ecological effects may be monitored” (Heap 1994 in Tracey 2001, p. 182). The concept of Areas of Special Tourist Interest (ASTIs) was introduced, and a ‘Statement of Accepted Practices and the Relevant Provisions of the Antarctic Treaty’ was also developed for promulgation to tourism operators. In 1979 ATCM X passed Recommendation VII-9 ‘Guidance for Visitors to the Antarctic’. Interestingly, no ASTIs were ever designated and ATCM discussions on tourism were mainly focussed on technical and minor issues through to the late 1980s. It was by around 1989 that the ATCPs saw the need for a much improved system of management of environmental issues in the Antarctic, including tourism issues, which eventually resulted in the Madrid Protocol in 1991. Richardson (1999) argues that the ATCP

concern regarding tourism was generated in part by the rapid increase in tourism numbers in the late-1980s, which in turn, ironically, may well have been itself exacerbated by the international publicity that NGOs such as Greenpeace generated relating to their concerns about tourism.

4.2.2 The Madrid Protocol and Tourism

The ‘Protocol on Environmental Protection to the Antarctic Treaty’, commonly known as the Madrid Protocol, came about largely as a result of the failure of the ATCPs to agree on the ‘Convention for the Regulation of Antarctic Mineral Resource Activities (CRAMRA)’ in the 1980s, and reflected a growing awareness of the actual and potential environmental damage occurring on the continent. The Protocol was first mooted in 1989 shortly before the ATCM XV, and was concluded and signed in 1991. Ratification by the ATCPs of the Protocol and Annexes I – IV took until 1998 to be completed (after the ATCPs had all passed domestic legislation to enshrine to Protocol in legally binding instruments). Interestingly Annex V (Protected Areas) was adopted separately and not ratified until well after the rest of the Protocol and Annexes.

Tracey (2001, p. 394) argues that “the Protocol now constitutes the main environmental protection instrument of the ATS”. Most commentators seem to support this view, for example Money (1993), Stonehouse & Crosbie (1995), Ensminger & McCold (1999) and Bastmeijer & Roura (2004). Rothwell (2000 p. 591) provides a concise summary, noting that “the 1991 Protocol on Environmental Protection to the Antarctic Treaty has created for the first time an integrated environmental protection regime in Antarctica.”

The full text of the Protocol is appended at Appendix Three. The description to follow in this chapter concentrates primarily on the aspects of the Protocol and its Annexes that relate to tourism activities. Firstly the Protocol applies to all human activities in the Treaty area, including the activities of ATCP national science programmes, individuals, companies and non-governmental activities. The objective of the Protocol is set out in Article 2, being “the comprehensive protection of the Antarctic

environment and dependent and associated ecosystems and hereby designate Antarctica as a natural reserve, devoted to peace and science.”

Article 3 provides the environmental principles of the Protocol, primarily being “the protection of the Antarctic environment...and the intrinsic value of Antarctica, including its wilderness and aesthetic values.” Article 3 also notes that human activities in the Treaty area are to be planned and conducted so as to limit adverse effects, including cumulative effects. This Article in 3(2) sets out the range of environmental effects that these principles are designed to avoid, including most of the effects usually associated with tourism activities in Antarctic. Central to achieving these principles is the concept of assessment of impacts prior to the commencement of activities, and the monitoring of activities being conducted. Section 4 of Article 3 notes that, inter alia, tourism activities shall take place in a manner consistent with the principles of Article 3 and shall be modified, suspended or cancelled if they result in, or have the potential to result in, impacts on the Antarctic environment.

Article 8 and Annex I provide the detail for this system of Environmental Impact Assessment (EIA) as described in Article 3. This article specifically mentions tourism. Three levels of ‘threshold’ or triggers for differing levels of EIA are set out in Article 8, with the corresponding level of assessment set out in Annex I:

- activities with less than a minor or transitory impact may be conducted “as of right”
- activities with a minor or transitory impact require a Initial Environmental Evaluation (IEE), and, dependent on the outcome of that, these may proceed either “as of right”, or require a Comprehensive Environmental Assessment (CEE).
- activities with more than a minor or transitory impact require a CEE.

Under the EIA provisions of Annex I each of the ATCP nations are required to establish “appropriate national procedures” for assessments of activities related to that nation. Guidelines for the preparation of different levels of EIA are provided by the Council of Managers of National Antarctic Programmes (COMNAP). All tourism

operators associated (by flag state or other means) with signatory ATCP countries are theoretically bound by these EIA procedures.

The Protocol (by way of Article 11) also provides for the creation of the Committee for Environmental Protection (CEP) which has a role to advise the ATCPs on environmental issues and prepare draft recommendations for ATCM. The Protocol also has four additional annexes that, apart from Annex II, in themselves have a bearing on tourism activities.

- Annex III addresses waste disposal and waste management, including discharges of wastes from ships.
- Annex IV is on marine pollution, and provides a number of operating requirements for ships and reference to international agreements such as MARPOL 73/78
- Annex V provides for the establishment and ongoing management of protected areas in Antarctica; being either Antarctic Specially Protected Areas (ASPAs) or Antarctic Specially Managed Areas (ASMA). A number of the tourist-landing sites in Antarctica are associated with either ASPA or ASMA protected areas.

The Protocol (Article 16) requires the parties to develop and place into an additional Annex to the Protocol, being “rules and procedures relating to liability for damage resulting from activities taking place in the Antarctic Treaty area”. Tracey (2001) notes that agreement on this matter has proved difficult for ATCPs, and this Annex (Annex VI) has only recently been agreed at the 2005 ATCM XXVIII.

The Protocol is given effect to by way of domestic legislation for each of the signatory nations. Examples of such legislation include the Antarctica (Environmental Protection) Act 1994, an act which is stated to be “binding on all New Zealanders in Antarctica, all tourists visiting the Ross Dependency and passengers on tour ships leaving for Antarctica from New Zealand ports” (ANZ, 2003, p. 5). Another example is the Antarctic Science, Tourism and Conservation Act of 1996, enacted by the legislature of the USA.

While comprehensive critique of the Protocol as part of the tourism management regime in Antarctica will be set out in the penultimate chapter of this thesis, at this point it is worth noting the comments of Francioni (1993) on the structure and form of the Protocol. Francioni notes that the Protocol is designed as a ‘framework’ agreement, with much of the content being placed in functional annexes so that amendments and revisions can be conducted much more efficiently. He also notes that the wording of Article 9, which links the Protocol to the Treaty, means that,

“only the Consultative Parties can participate in decisions concerning the adoption of further annexes or amendments to existing annexes, such decision-making must occur by consensus, and any new measure of environmental protection, or amendments to those actually in force, must be accepted by the Contracting States, whether Consultative or non-Consultative Parties.”
(Francioni 1993, p. 58)

4.2.3 Development of the Current ATCP Regulatory Framework – 1991 to 2005

One indicator of the development of the tourism management regime for Antarctica is the progression of the ATS through debate and agreement amongst the ATCPs, both at ATCM and between meetings (at, for example, the Antarctic Treaty Meeting of Experts (ATME) meetings). It is this debate that theoretically drives the programme of additional Measures, Decisions and other instruments that effect tourism, and where the larger issues may or may not be dealt with.

Two valuable sources of objective analysis of the ATCP debate are Bastmeijer & Roura’s 2004 discussion on regulating Antarctic Tourism, and the ongoing papers from the Antarctic and Southern Ocean Coalition (ASOC) on this issue and on the performance of the ATCPs. It would appear from the commentary, and an examination of the papers put to ATCM and ATME during this period, that since the relatively intense period of activity in 1991 that resulted in the introduction of the Madrid Protocol, the recent debate amongst the ATCPs relating to regulation of tourism has been somewhat spasmodic. Bastmeijer & Roura (2004) note that almost

immediately on the completion of the Madrid Protocol, several consultative parties began to question whether or not the Protocol was going to be adequate to regulate tourism. At the 1991 and 1992 ATCMs proposals were made for a separate Annex for tourism to be added to the Protocol, but these proposals did not come to fruition. The abandonment of the draft Tourism Annex to the Madrid Protocol provides an interesting insight into the politics of the ATCPs and their views on tourism regulation. Tracey (2001) notes that France, Chile, Germany, Italy and Spain were the chief proponents of the draft Annex. The basic premise of these countries was that the general provisions of the Protocol were not precise or specific enough on the matter of tourism, the use of Recommendations were not necessarily legally binding and that there was a risk of inconsistency between countries and the possible exploitation of loopholes. At the time Tracey reports that the USA and New Zealand in particular did not support the Annex, believing that implementing the existing provisions of the Protocol was a better approach to managing environmental impacts. A third option was apparently proposed by the United Kingdom and Australian representatives, calling for a review of the existing activities and impacts, and an examination of the existing ATS instruments, with a view to promoting additional ATS instruments if needed. The lack of consensus meant that, under the ATS operating rules, the Annex could not proceed and the proposal was abandoned.

Since the demise of the draft Tourism Annex the ATCPs seem to have gone back to a rather low-key and ad hoc approach to tourism regulation (Richardson, 1999). At the 1994 ATCM (ATCM XVIII in Kyoto) consensus was reached on Recommendation XVIII-1. This Recommendation included guidelines for visitors to the Antarctic, and guidelines for the organisers of 'non-governmental' expeditions. It would appear that the guidelines for visitors came directly from the guidelines for tourist ship operators developed by IAATO in the late 1980s and early 1990s (IAATO, 2002). Bastmeijer & Roura (2004) also observe that between 1994 and 2001 tourism received only passing interest from ATCPs, and no further developments were made in the formal ATS tourism management system.

The United Kingdom presented a valuable paper to the 2003 XXVI ATCM (United Kingdom, 2003) on the regulatory framework for tourism. In that paper it was noted (2003, p. 6) that ATCM Recommendations adopted prior to 1991 "... now have

limited relevance to the current management and regulation of Antarctic tourism.” The paper went on to suggest that the key regulatory mechanisms (in 2003) were the Madrid Protocol, Recommendation XVIII-I, and Resolution 3 (1995 & 1197) regarding post-visit reporting, and Resolution 6 (1999) regarding non-Consultative Parties.

The period 2001 to 2005 appears to have been a period of more intense debate on the tourism issue. The 2003 ATCM seemed sufficiently concerned to mandate a special ATME on ‘Tourism and Non-Governmental Activities in Antarctica’, held in Norway in March 2004. While the meeting was clearly intended to deal substantively with the issue of tourism, ASOC (2004, p. 3) summarised the meeting from their point of view as follows:

“The ATME did not address legal mechanisms to regulate commercial tourism. ASOC raised considerations such as the need to limit the overall level of tourism, but that issue was not discussed further. However, a distinct shift has occurred in Parties’ thinking about the need for regulation, with declining reliance on industry self-regulation and increased acceptance of a central role for the Antarctic Treaty System in establishing the regulatory basis for the industry.”

There is evidence of a growing recognition of the importance of the tourism regulation debate, noted both by ASOC as mentioned above, and by Bastmeijer & Roura (2004), who observed that, unlike previous ATCMs, the 2004 meeting included tourism as a core agenda item. A number of ‘technical’ extensions to the ATS (made under Article IX of the Treaty) in regards to tourism were made at the 2004 ATCM XXVII. These included a Measure relating to Insurance and Contingency Planning for Tourism and Non-governmental Activities in the Antarctic Treaty Area. The ATCM also adopted, in conjunction with this Measure, ‘Resolution 4; Guidelines on Contingency Planning, Insurance and Other Matters for Tourism and Non-governmental Activities in the Antarctic Treaty Area’. These guidelines supplement those attached to the 1995 Recommendation XVIII-1. Both ASOC (2004) and Bastmeijer & Roura (2004) comment that, in their view, these formal decisions

remain focussed on technical issues relating to tourism, rather than any particularly substantive issues of debate about the regulatory framework.

The 2005 XXVIII ATCM was held in June 2005 in Stockholm, Sweden. A review of the Working and Information papers, as well as the reports of the intercessional groupings and the ancillary committees such as CEP and COMNAP reveal a very similar pattern to the 2004 ATCM; viz:

- A small number of papers specific to tourism issues relative to the total number of papers presented to the ATCM (nineteen out of a total of 195 papers).
- An apparent propensity of the papers that were presented to focus on ‘technical issues’, e.g. accreditation schemes, localised site guidelines, introduction of non-native biota, and the annual IATO statistical reports.

Probably the most important outcome of ATCM XXVIII as far as tourism is concerned is the finalisation of the ‘Liability’ Annex (Annex VI) to the Madrid Protocol. This Annex was required by Article 16 of the 1991 Madrid Protocol, and was under negotiation for over six years prior to its adoption at ATCM XXVIII. The Annex applies to environmental emergencies in the Treaty Area, arising from the operations of tourism, science and all other governmental and non-governmental activities. The Annex requires operators to make contingency plans and take preventative measures to avoid emergencies, and requires prompt response action to any emergencies that do arise. Operators that fail to take action are deemed to be liable for all costs arising, and ATCP states may take action against each other in respect of costs incurred and damage caused. Operators are required to carry sufficient insurance to cover their liabilities under the Annex. The Annex now awaits ratification through domestic legislation of the ATCP parties.

4.3 *Non-ATS instruments*

Tracey (2001, pp. 190-193) provides possibly the most comprehensive analysis of the non-ATS regulatory environment for tourism operators. The following comments summarise his analysis.

Tourism operators who conduct activities within the Antarctic Treaty area are also subject to a range of international agreements that apply in the Treaty area. In the main part these are related to shipping issues as is demonstrated by the IAATO summary of non-ATS regulatory instruments (section 4.2 of this chapter). These shipping agreements are administered by the International Maritime Organisation (IMO), and are primarily focussed on safety and marine pollution issues. IMO conventions apply to the high seas, including the sea areas of the Treaty area. Most, but not all, states are usually party to the IMO instruments.

For ship-borne tourism in the Treaty area, the main considerations with respect to international instruments are safety and marine pollution control. Safety issues are covered by *The International Convention for Safety of Life at Sea 1974 (SOLAS)*; and the *International Convention for the Prevention of Pollution from Ships 1973, as modified by the Protocol of 1978 (MARPOL 73/78)*. While these legal instruments do not have any particular tourism or Antarctic focus, their provisions do apply in the most part to tourism ship operators, and presumably provide some level of regulation of the activities of ships in the Treaty area. Tracey also reports that a specific *International Code of Safety for Ships in Polar Waters* is being developed by IMO, but is as yet unfinished. A search of the IMO website in 2005 reveals no trace of such a convention either established or under development, indicating that the convention may have been abandoned.

Aviation operations to and over Antarctica are generally covered by the *Chicago Convention 1944* and its subsequent amendments. Like the marine conventions, these instruments are general and not specific to either tourism or the Antarctic, but do provide a degree of regulation of aviation activities in the area.

4.4 Industry Self-Regulation

4.4.1 Development of the Industry Self-Regulation System 1991 - 2005

‘Self-regulation’ of the tourist industry refers to the initiatives taken by the tourist operators themselves to place conditions or restrictions on their activities in Antarctica in order to enhance safety or protect the environment. This form of regulation is carried out almost entirely by IAATO. The Association was formed in 1991 with seven of the original tourism operators to the continent banding together “to promote safe, appropriate and environmentally sound private-sector travel to Antarctic destinations” (IAATO, 2005). IAATO currently has seventy-eight members from fourteen countries. Operators are mostly from the cruise ship sector, although land-based and aircraft companies are also members (IAATO, 2005).

Over the years since the inception of IAATO, a series of specific self-imposed measures have been implemented to deliver on the stated objectives of the Association. Generally these measures seem to be mostly related to behavioural and operationally focussed issues. The first set of industry visitor guidelines for tourism in Antarctica were developed by IAATO in 1990 by the founding operators, before the official creation of IAATO (Splettstoesser, 2000). The Association was formally invited to attend ATCMs from 1992, and from that date has tabled various papers and reports at each of the ATCM held since. In 1994, at the XVIII ATCM in Kyoto, the IAATO operational guidelines, which had by then been modified after several seasons of use, were used as the basis for Recommendation XVIII-1 ‘Guidance for Visitors to the Antarctic’ and ‘Guidance for those Conducting Tourism and Non-Governmental Activities in Antarctica’ (Splettstoesser, 2000; IAATO, 2005).

IAATO also requires its members to abide by a series of by-laws; included in which are the following (IAATO, 2005):

- A limit of 100 passengers ashore at any one time
- Only vessels of 500 passengers or less are permitted to undertake landings

- Vessels with capacity over 500 passengers must conduct cruise-only operations
- Compliance with all guidelines and procedures

Splettstoesser (2000) puts forward the view that IAATO is to be seen as a significant positive element in the ATS system, and notes that the variety of IAATO initiatives have resulted in discernable improvements in the management of tourism in the Antarctic. Other entities such as ASOC appear less convinced, perceiving IAATO to be well-intentioned but possibly unprepared to impose realistic restrictions in its members.

4.5 Critique of the Current System

A number of researchers and commentators have raised questions over the adequacy and legality of the formal instruments of the ATS tourism management system (Francioni, 1993; Enzenbacher, 1995; Johnson & Hall, 1995; ASOC, 2002/2003/2004; Stokke & Vidas 1996; Joyner, 1998; Polk, 1998; Richardson, 1999; Tracey, 2001; Molenaar, 2005; ASOC, 2005).

The main issue relates to the extent to which the ‘Recommendations’ and other legal ATS instruments that emanate from the ATCM meetings effect Treaty parties of different ‘Consultative’ status, and how in turn that enables control and management of tourism operators of different types. The legal position appears not totally clear-cut, Joyner (1998) clarifies it to a large extent when he notes that approved and finalised measures clearly bind the ATCP governments that have approved them and enshrined them in domestic legislation. He believes it is also reasonable to assume, but open to more debate, that non-Consultative Parties will also be bound by these measures, since these countries are bound as signatories to the Treaty to abide by Treaty provisions, including new measures. However these countries did not participate in the decision-making process and have not considered and enshrined the measures in domestic legislation. Non-Treaty countries are clearly not bound. Francioni (1993), Stokke & Vidas (1996), Joyner (1998) Polk (1998) and ASOC (2005) all highlight issues of this debate, ranging from the enforceability of Recommendations made

under ATCM rules, through to the reach and *vires* nature of domestic legislation intended to control tourism and other human activities.

Many researchers and commentators also perceive the system of ATS legal mechanisms to be fragmented, disjointed and having been developed in an ad hoc manner (Hall, 1992; Beck, 1994; Joyner, 1998; Richardson, 1999; Molenaar, 2005). The debate referred to earlier in this chapter regarding a specific Annex to the Treaty for tourism is reflective of the difficulties in this area, and the incremental and reactive process of developing regulatory instruments appears to remain as the *modus operandi* for the ATS.

Another issue is that of implementation of the system of formal instruments. The United Kingdom Working Paper to the XXVI ATCM (2003, p. 9) reports that in 2003, “It is still evident that not all Parties have domestic legislation that enables them effectively to manage or control tourism activities in Antarctica”. In part this relates to an absence of legislation (as is reported in the case of Canada, and non-Consultative Party), or in other cases significant differences in interpretation of key instruments in the enactment of domestic legislation.

4.6 Summary

The Antarctic Treaty System, including the regulatory system for Antarctic tourism, actually consists of a large number of individual but linked regulatory mechanisms, ranging from the formal ATS instruments to domestic legislation that gives effect to the Treaty, to international law and industry self-regulation.

The operation of this system is not without its areas of debate and doubt, and this should not come as a surprise given the background to the establishment of the Treaty itself. In particular a number of commentators on international law have highlighted several areas where the operation of the ATS in managing a range of human issues in Antarctica, including tourism, can be questioned and debated. In particular these questions relate to matters of the legality and enforceability of the ATS portion of the regulatory framework. Despite these questions, the consensus of the legal fraternity

seems to be that the ATS approach has stood the test of time, and provides a reasonable model on which to base current and future management of tourism.

This is an important point in the overall examination of an improved regulatory and management system for tourism in Antarctica. As discussed in Chapter Three, without a robust and appropriate legal foundation to the management system, the other appropriate components (e.g. planning system, management techniques to intervene at sites) are always going to be difficult to develop and implement.

Chapter 5. Tourism in Antarctica

The objective of this chapter is to provide an in-depth discussion of the history and current nature of the tourism industry in Antarctica, the nature of the sites where that tourism occurs, and the potential and actual impacts of tourist activity at those sites. In Chapter Three it was shown that the international literature indicates that there is a linkage between these elements (Mathieson & Wall 1982, Hammitt & Cole 1998, Eagles & McCool 2002 and Newsome, Moore & Dowling 2002), and that the relative nature and intensity of any one of the elements has a fundamental effect on the regulatory framework response to them. The size, distribution growth patterns and impacts of the Antarctic tourism industry are elements that are fundamental to a proper understanding of the adequacy of a regulatory regime to manage the industry (Hoffman & Jatko, 2000), and therefore are best presented and understood prior to any examination of the impacts of the activity and what responses to it are necessary. Likewise Chapter Four described the current regulatory framework for tourism in Antarctica, and an assessment of the adequacy of that system will be aided by an understanding of the industry itself and the nature of the sites where tourism occurs.

This chapter is the largest in the thesis and is set out in three main sections;

1. the first describing the industry and its attributes,
2. the second describing the sites where the industry conducts its activities, and
3. the third describing the impacts of tourism in general and in the Antarctic context.

This approach is considered crucial to provide a complete understanding of the relationship between the tourism industry in Antarctica, the values of the places where it occurs, and the actual and potential impacts of that activity at those places. Without this understanding the comprehension and analysis of the design of an improved regulatory system would be considerably more difficult. Splitting the discussion

between different chapters risks a fragmented understanding of the inter-relationships between use, sites and impacts.

Within the first section an historical overview of the industry is provided, followed by up-to-date statistics of the industry. The Antarctic environment is then presented firstly in overview and then in detail, by region and then by actual tourist landing site. All of the main Ross Sea Region sites, and the ten most-visited Antarctic Peninsula sites, are also described in detail. The third section introduces international research and theory regarding the impacts of tourism, and then applies that to the Antarctic situation referencing contemporary research and the author's personal observations in the Ross Sea Region. Specific impact themes are identified from relevant literature and then impact issues are presented theme-by-theme for ease of understanding.

5.1 History

The history of tourism in Antarctica is now well researched and documented. Reich (1980), Codling (1982, 1995), Headland (1994), Stonehouse (1992, 1994), Stonehouse & Crosbie (1995) and Tracey (2001) all provide wide-ranging and in-depth discussions on the historical beginnings of the industry, and Enzenbacher (1992, 1993 & 1994) in particular provides a wealth of data on tourist numbers through the 1980s and 1990s.

Of all the various papers and reports, two relatively recent papers possibly form the most current basis of an examination of the history of Antarctic tourism. Headland (1994) and Codling (1995) both present thorough and well-researched studies into the origins of tourism to the Antarctic continent, and this research can be supplemented with updated data on tourism visitation trends as collated and presented by IAATO.

In general, the literature categorises the discussion of the history of tourism into two primary tourism types; ship-borne tourism, and tourism based around the use of aircraft. It would appear that these two main types of tourism have quite different progenies and attributes, in particular in the historic sense.

5.2 *Ship-Borne Tourism*

Headland (1994) notes, as do other commentators, that ship-borne tourism to the Antarctic continent was preceded by tourist voyages to the sub-Antarctic islands, with the earliest known record being the carrying of tourists on a New Zealand government expedition to Campbell, Auckland and Macquarie Islands starting in 1882. Headland and Codling (1995) both observe that the earliest forms of tourism to Antarctica were associated with expeditions whose primary purposes were mail delivery, trade or re-supply of scientific parties. From about the 1920s fare-paying tourists were transported to the Antarctic Peninsula Region on board a variety of mostly South American ships that were servicing parties based in the area for science or commerce.

Ship-borne tourism appears to have remained sporadic throughout the early part of the 20th century, and Headland (1994) notes attempts by Thomas Cook and others to organise tourist voyages that failed for various reasons to eventuate. Dedicated tourism cruises by ship probably began in the summer of 1958/59, when Headland records the landing of tourists on the Antarctic Peninsula by the Argentinean vessel 'Les Eclaireurs'. From that point ship borne tourism gradually built up but remained irregular and largely unscheduled, until about 1966, when regular ship visits were made to the Antarctic Peninsula area.

Headland expresses a belief that 'modern' ship-borne tourism to Antarctica began with the Linblad Explorer in 1970. He comments that "This may be regarded as the beginning of the modern period of Antarctic tourism..." (Headland 1994, p. 272). Stonehouse & Crosbie (1995, p 222) use the term 'The Linblad Way' to describe the introduction, by Lars-Eric Linblad, of a style of expedition that features "...ships of up to about 140 passengers, guided ashore and afloat by experienced staff. Each voyage becomes an 'expedition' with lectures, briefings and shore landings. Lecturers are often scientists...". This style of voyage quite possibly remains the primary approach to ship-borne tourism to this day (as opposed to large ship cruises with few if any landings).

The development of ship-borne tourism has not been totally linear in its growth. IAATO (2005b) note that over the last fifteen years or so there have been several stages of growth. The ships used in the early ‘Linblad’ era tended to be larger and conduct longer voyages with fewer landings than is now the case. Following the collapse of the USSR, a large number of small capacity Russian ice-strengthened vessels became available at competitive rates, and many of the companies involved chartered these ships (and still do). This led to a rapid increase in the number of vessels involved, and a change in the itineraries towards shorter trips with fewer passengers but more landings. IAATO (2005b, p. 3) report that an element of regression may be occurring, noting that:

“...more recently the trend has shifted towards an increase in the number of large vessels (200-500 passenger capacity) offering a more traditional form of cruising with an element of expedition oriented activities where more passengers make fewer landings. In addition an increasing number of considerably larger vessels (c. 1000 passengers) offer cruise only, no landing, programmes.”

Whilst tourism in Antarctica has increased rapidly and significantly over the last ten-fifteen years, this numerical growth also has not been completely consistent. IAATO (2005b) again report that decreases in the number of tourists occurred in 2000/01 and 2001/02, possibly as a result of large numbers in the previous ‘Millennium’ year, and also as a result of world events such as 9/11 and SARS.

Ship-borne tourism is still the most popular form of tourism to Antarctica, with ships transporting 27,324 or 97% of the total 28,202 tourists taken to Antarctica in the 2004/05 austral summer (including 5,027 non-landing cruise ship passengers but excluding overflights) (IAATO, 2005a).

5.3 *Airborne Tourism*

Airborne tourism to Antarctica appears to have commenced in December 1956 when a Chilean national airline DC-6B overflew the Peninsula with sixty-six passengers on

board (Headland 1994). The following year tourists were landed at McMurdo Station by a Pan Am Stratocruiser aircraft flown from Christchurch, New Zealand. Sporadic overflights and landings continued at a variety of permanent or semi-permanent landing sites on the continent from this time, but apart from the regular landings at Patriot Hills, never reached any real level of regularity. Of possibly more significance was the advent in 1977 of overflights from Australia and New Zealand by large commercial airliners operated by Qantas and Air New Zealand. Around forty flights carrying over 11,000 passengers were conducted between 1977 and 1979 (Tracey, 2001), but this sector of the industry was discontinued after the ‘Erebus’ crash of an Air New Zealand DC-10 in November 1979. In the last ten years overflights have recommenced in a partnership between Croyden Travel of Australia and Qantas, conducting up to ten overflights with a Boeing 747 aircraft each season. In the 2004/05 tourism season 2,030 passengers were carried on overflights (IAATO, 2005a).

Landing of tourists by aircraft, apart from the sporadic exercises conducted by the Chilean and Argentinean governments, has largely focussed on the commercial activities of Adventure Network International (ANI) and their use of ‘blue-ice’ landing strips at the Patriot Hills in the Antarctic Peninsula area. Tracey (2001) reports that ANI operate a seventy-person capacity tent camp at Patriot Hills serviced by Hercules and Twin Otter aircraft, with most of the tourism now being related to private climbing and polar trekking expeditions. ANI landed 190 passengers in the 2004/05 season (IAATO, 2005a). A further 657 tourists were landed on King George Island in the Peninsula Region by Aerovias DAP, a Chilean company utilising land-based facilities on the island and offering a mix of day trips and overnight experiences.

5.4 *Other Tourism Types*

Attempts have been made to over the years to use existing scientific infrastructure on the Antarctic continent as the basis for tourism product. Hall & Wouters (1995), Headland (1994), Tracey (2001) and Stonehouse & Crosbie (1995) all comment on the actual use of ATCP country bases or associated facilities (mostly associated with

Chilean and Argentinean bases on the Peninsula) and proposed 'hotel' type accommodation facilities on the continent. While possibly the most significant tourism use in Antarctica in terms of potential environmental impact, to date this sector of the industry does not appear to have come to any significant tangible reality.

The one other sector of the tourist industry worth a mention is that of small yacht visits. While relatively small in overall numbers (IAATO, (2005a) estimate an annual visitation of around 1,000 passengers), the sector is of note due to the fact that these yachts undertake their visits to Antarctica almost totally unreported and unregulated.

5.5 Current tourism activities

To gain an understanding of the optimum management system for Antarctic tourism it is necessary to first gain an understanding of some of the basic attributes of the tourism industry on the continent. One aspect of this is an examination of the values and attributes of the sites where the tourist activity occurs (this discussion is presented later in this chapter). The other basic understanding is of the nature and numerical status of the industry as it currently is.

Most of the operators of commercial tours to Antarctica are members of IAATO. In 2005 the Association had seventy-eight members from fourteen countries. As a condition of their membership of the Association these operators are required to report to both IAATO and the US National Science Foundation (NSF) details of their tours, landing sites and numbers of passengers carried and landed. The NSF does not publish the summaries of these operator reports, but IAATO does, both in their own information and in a comprehensive overview of Antarctic tourism for each austral summer, to the annual ATCM. This annual IAATO summary report therefore is the best current source of definitive information on the size, distribution, diversity and recent trends in tourist activity right across Antarctica. For this chapter reference will be made to the IAATO overview of Antarctic tourism for the 2004-2005 season, as presented by IAATO to the 2005 ATCM XXVIII held in Stockholm in June 2005 (IAATO, 2005a, see Table 5.1 page 46).

TABLE 5.1 : Summary Tourism Statistics 2004/05 Season

| Type of Tourism | Total number of Passengers Landed (not including officers, staff or crew) |
|----------------------------------|---|
| ship based tourism with landings | 22,297 |
| ship based tourism no landings | 5,027 |
| air/land based tourism | 878 |
| overflights | 2,030 |
| Total visitors | 30,232 |

Source: IAATO (2005a)

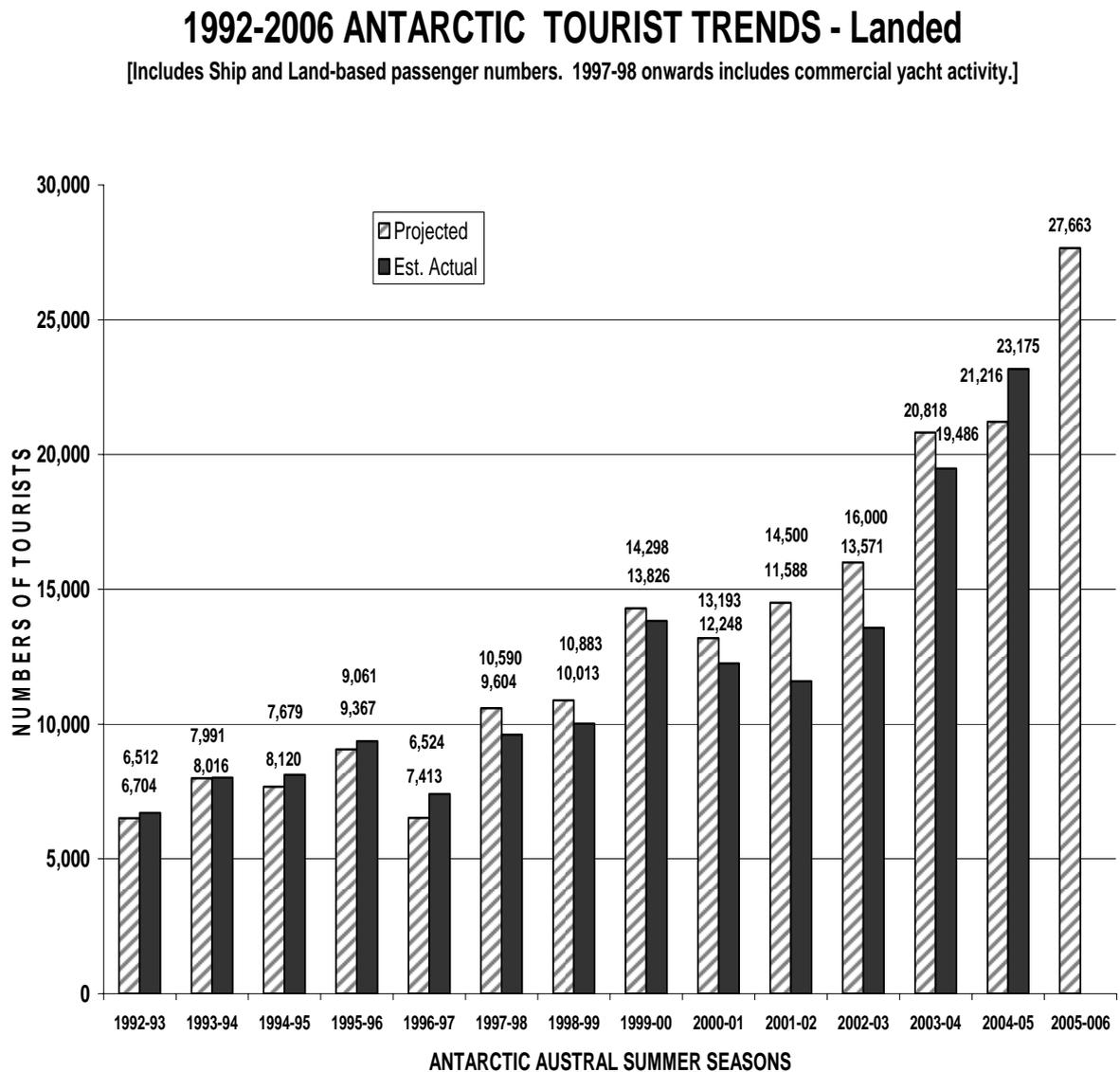
TABLE 5.2 : Detailed Tourism Statistics 2004/05 Season

| Type of Tourism | Number of Departures | Total number of Passengers Landed (not including officers, staff or crew) |
|---|----------------------|---|
| IAATO ship-based cruise landings : Peninsula Region | 165 | 16,535 |
| IAATO ship-based cruise landings : Ross Sea Region | 5 | 383 |
| IAATO sailing vessels/yachts | 7 | 37 |
| IAATO Air/Ship cruise | 4 | 130 |
| IAATO large ship cruise only (no landings) | 4 | 4,358 |
| Non-IAATO large ship cruise only (no landings) | 1 | 669 |
| Non-IAATO small ship/yacht - Peninsula Region | 17 | 1,124 |
| Non-IAATO large ships with landing – Peninsula Region | 8 | 4,088 |
| IAATO air/land-based tourism | Varies | 878 |
| IAATO overflights Peninsula Region | 9 | 462 |
| IAATO overflights continental Antarctica | 4 | 1,568 |

Source: (IAATO, 2005a)- Note: These figures are IAATO estimates of totals. In some cases, e.g. actual numbers of tourists landed at the Ross Sea Region sites, actual numbers may differ slightly)

This information makes most sense when it is put in the context of trend information regarding tourism numbers over the last decade or so. In this way one can examine the degree to which tourism is increasing, and from that data consider the degree to which the potential for immediate and potential impacts to occur on the Antarctic environment. Overall IAATO (2005a) note a 13% increase in ship-based tourism with landings over the 2003/04 season. The figure of 22, 297 passengers landed from ships is very nearly double the number of passengers landed in the 2001/02 season.

FIGURE 5.1 – Antarctic Tourist Landing Trends 1992–2006



Source: IAATO, 2005b

Specific aspects of this analysis of numbers are worthy of comment. Many researchers have made comment in the past, when discussing increases in Antarctic tourism, on three elements of the tourism numbers that seem to be interpreted as indicators of potential high risk or impact on the environment (e.g. Stonehouse & Crosbie 1995, Tracey 2001). There is a perception that there is:

- A large increase in the number of sites being visited,
- An increase in the diversity of tourism types being offered and undertaken by tourists, and
- A significant number of ‘unreported’ landings by small private yachts in the Peninsula Region.

These aspects of the annual tourism activity are seen by some to be amongst the key problem areas that a management regime would be designed to address, the hypothesis seemingly being that as well as increasing in overall volume and frequency, tourism in the Peninsula Region in particular is rapidly spreading to previously unvisited sites, is rapidly introducing new activities, and has a significant ‘rogue’ or uncontrolled element operating in the form of unreported yacht visits. In order to test the veracity of these views, it is considered most appropriate to examine what is probably the best contemporary analysis of the tourism data, which is present in the form of an in-depth analysis of the type and spatial spread of tourism landings, especially in the Peninsula Region, commissioned by IAATO in 2004 and reported to the ATCM XXVIII in 2005 (IAATO, 2005b), along with the 2005 IAATO overview (2005a). These reports, (the 2005b report covers the period 1999/2000 to 2003/2004) note:

- While the number of tourists landed in the period 1999/2000 to 2003/2004 increased appreciably, the number of sites used did not show any notable increase,
- Consistent with other earlier studies, the majority of the landings are concentrated at a small number of sites,

- There has been an increase in the number of multiple visits per day at some Peninsula sites, particularly during the 2003/2004 season. This increase appears to have occurred at the most visited sites,
- During 2003/2004 season, five of the fifteen most popular Peninsula sites received visits on approximately two-thirds of the days during the summer season,
- Only one new tourism activity had been introduced for the 2004/05 season, that being the use of a hovercraft to access landing sites. All other activities such as camping, scuba diving, skiing, climbing and kayaking are reported to have been operating for at least five years.
- The quantum of non-IAATO small yacht landings reported is 1,124, including small ships, out of a total of 22,297 landings from ships and boats. It is reasonable to infer that unreported yacht landings would be less than 1000 persons per annum or less than 5% of the total visitation.

5.6 Summary

Tourism in Antarctica has developed over a number of decades to become largely dominated, at least in numerical terms, by the ship-borne, site-landing 'expedition' model first pioneered by the Linblad vessels (Hoffman & Jatko 2000, Tracey 2001). Other types of tourism such as aircraft-based tourism, yacht-based tourism and overflights, while they have grown over the years in their own right, have not achieved the same growth rates or absolute size of the original ship-borne model (IAATO 2005a). The implications of this for tourism management in Antarctic are many, and the chapters to follow will concentrate, not exclusively, but in large part, on the management of cruise ship voyages with landings as the primary sector of the Antarctic tourism industry.

Ship-borne tourism to the Antarctic Peninsula Region is growing at a very rapid rate (IAATO, 2005a). It appears that there are few limits at present to these rates of growth, and the growth in numbers is occurring at a very small number of the total available tourist landing sites. Contrary to popular belief, there appears to be little

evidence to support the notion that tourism is also ‘diversifying’ rapidly, either in spatial or temporal terms, or in terms of the types of activities being undertaken (IAATO, 2005a). The primary feature of Antarctic tourism at present is very large numerical increases in tourists landed from cruise ships at a relatively small number of the 150 or so sites available around the continent.

5.7 *The Antarctic tourism environment*

5.7.1 *Overview*

Any discussion regarding the management of tourism in Antarctica would be incomplete without a description of the physical and environmental values and attributes of the sites that host the tourism industry, along with an examination of the actual and potential effects of tourism at those sites (Hoffman & Jatko, 2000). Without an understanding of the relationship between site values and potential impacts from tourism it would not be possible to properly examine the adequacy of the existing regulatory system to protect those values from those impacts, or indeed to be able to design and improved system.

The purpose of this section is to provide a preliminary overview of those parts of the Antarctic continent that play host to tourism activity. It is intended that this will provide readers with an initial understanding of the general values and attributes of the continent, in preparation for the discussions which will follow in subsequent chapters relating to tourism impacts in Antarctica in general, and the discussion relating to the specific sites subject to tourism and the potential and actual impacts at those sites. Literature from a variety of sources is referenced, as well as the author’s own observations of tourism in the Ross Sea Region as gained through participation as a New Zealand government ‘observer’ during a month-long tourist cruise to the Ross Sea Region.

It has long since become a cliché to refer to Antarctica as the ‘coldest, highest, driest and windiest’ of the seven continents (e.g. IUCN, 1991; Smith 1994). Adjectives such as ‘barren’ and ‘inhospitable’ are commonly used, and those who have not visited

Antarctica usually hold pre-conceptions of vast tracts of featureless icefields. While technically these descriptions are quite true, at least for the majority of Antarctica, they do little to assist in providing an understanding of the geography and environmental attributes of the continent itself. Firstly, the term “Antarctica’, whilst correctly referring to the continent itself, in the context of tourism and management systems is usually inferred to refer to all that area south of the 60-degree South line of latitude. Not only is this the commonly used definition of Antarctica as seen in the tourism related literature, but it is also the technical and ‘legal’ area of the Antarctic Treaty System (Article VI, Antarctic Treaty 1959). Map 5.1 on page 53 shows the Antarctic Continent and the boundary of the Antarctic Treaty Area.

Surprisingly there are only a limited number of good quality overviews relating to the geography of Antarctica as an entirety. Tracey (2001), and the Scientific Committee on Antarctic Research (SCAR, 2005), are possibly the only two really comprehensive overviews. Brief general discussions are available from other sources, but these tend to be mainly in the way of introductions to more specific discussions.

The area of the continent proper, including all ice shelves and islands is quoted as 13,661,000 square kilometres (SCAR, 2005), approximately the size of the U.S.A and Mexico combined (Dingwall, 1997). The contiguous area of Southern Ocean that adjoins it (and which itself is usually part of the tourism product) represents a further 36 million square kilometres of area (Hall, 1992). This adjoining area is important to this discussion as the vast majority of tourists who visit Antarctica do so by way of shipping through the Southern Ocean, either from Australia and New Zealand, or from South America. Impacts from this tourism can occur in the surrounding waters as well as on the continental land itself, and some of the attractions of the tourism product are actually in the Southern Ocean rather than on the Antarctic continent.

The continent of Antarctica is almost completely covered in ice, the average thickness of which is reported to be over 2000 metres (Kriwoken & Rootes, 2000), while the maximum known thickness is 4,776 metres (SCAR, 2005). The interior of Antarctica is typically a high, flat plateau, with the average height being 2,500 metres above sea level (asl), the height at the South Pole being 2,835 metres asl, and the highest peak on the continent (Vinson Massif) being 4,897 metres asl (SCAR, 2005).

In winter months sea ice forms on the Southern Ocean surrounding Antarctica, and this can spread for up to 1000 kms north of the continent in some seasons (Tracey, 2001). SCAR (2005) reports that the summer minimum (March) coverage of sea ice is an estimated 4 million square kilometres, while at winter maximum (September) this can spread up to 22 million square kilometres. There are ice-free areas at the fringe of the continent in various parts of Antarctica, but these are small and comprise only a fraction of the area of the continent. The SCAR summary (2005) reports that the area of exposed rock in the Antarctic as being 48,310 square kilometres, or some 0.4% of the continent.

FIGURE 4 - Map of whole continent

Climatically Antarctica is known for its extremes of cold and wind. The SCAR statistics (2005) notes that the winter mean temperature for the Antarctic Peninsula region only drops as far as -9° C. This is in marked contrast to the coastal region of the continent, where the mean temperature in summer is 0° C, dropping to -18° C to -29° C in winter, and the Antarctic Plateau region, where the mean summer temperature is -40° C and the mean winter temperature is -68° C. The lowest temperature ever recorded in the Antarctic (and in the world in fact), was -89.2° C at Vostok Station in July 1983. The highest recorded wind velocity was 327 kilometres per hour at Dumont Durville Station in July 1972.

From a geographical perspective, and to a large extent a tourism perspective, Antarctica is usually divided into two reasonably distinct parts; East Antarctica including the Antarctic Peninsula, and West Antarctica including the South Pole area and the Ross Sea Region (Tracey, 2001). The two areas are largely separated by the Transantarctic Mountains, a 4800-kilometre chain of mountains rising to altitudes of over 4500 metres asl. Geologically the two areas are quite different, with East Antarctica being a large landmass with a crustal thickness of between thirty and forty kilometres, and covered in a very thick sheet of ice, whereas West Antarctica is actually an archipelago of islands with a much thinner crust and with relatively less ice cover (NZAI, 2001). The IUCN goes as far as noting that Antarctica “geomorphologically, is two continents” (IUCN, 1991, p. 10).

In the tourism context the vastness of the continent is of little relevance. Of more importance is the size of the area available for practicable visitation. The area of exposed mountains and rock surface is only 0.4% of the total area of the continent. Tourist visitation is largely concentrated on these ice-free areas, primarily because access is easier, and additionally because these sites are also the sites of major fauna and historical interest. These ice-free areas are also the sites of the research stations of the ATS countries. The historic sites and the sites of current human activity such as bases are also often, because of the sparsity of ice-free areas, co-located with the biologically rich sites, thus increasing the likelihood of direct, secondary and cumulative impacts at the sites and the approach routes to them (ASOC, 2004).

From a tourism perspective, the general division of Antarctica into East and West is reflected in the patterns of use of the Antarctic by tourism operators (IAATO, 2005a). Based on the density of tourist use, which in itself is a function of the attractiveness and popularity of the general areas for tourism, the two primary parts of Antarctica can be further sub-divided into two distinct areas; these two regions being the Ross Sea Region, and the Antarctic Peninsula Region (Tracey, 2001). By far the vast majority of the tourism visitation occurs in the Antarctic Peninsula Region, with only a fraction of the use occurring in other areas, and most of that being in the Ross Sea Region (IAATO, 2005a). In the 2004/05 season IAATO (2005a) report that 27,819 tourists visited East Antarctica, almost all of them to the Antarctic Peninsula. By contrast, only 383 tourists visited West Antarctica, mainly to the Ross Sea Region.

The fauna of Antarctica is one of its major drawcards, in particular the seabirds and seals. Most authors note the abundance of these wildlife species around the coastal margins of the continent, with the IUCN report noting (1991, p.17) that, “for the naturalist, the Antarctic regions are especially the abode of seabirds and seals”. The same report notes that Antarctica plays host to seven species of penguin, and six species of seal. While the number of species present is not that large, the populations of some of them are reported as especially numerous. As an example, Erickson & Hansen (1990 in IUCN 1991) estimate there to be 12-15 million Crabeater seals in Antarctica, some 800,000 Weddell seals, and 750,000 Elephant seals.

One important aspect of Antarctica sets it apart from other tourism destinations possibly to a greater extent than the climatic and physical aspects; namely that it is the only continent, and probably the only tourist destination, with no indigenous population. While humans live on the continent all year round, almost entirely related to ATCP scientific programmes, and there have even been some people born on the Antarctic continent, there never have been any permanent inhabitants of any part of the continent.

The natural environment of Antarctica is the very drawcard that attracts tourists to the continent. While it might be expected that Antarctica would be a relatively homogenous continent in terms of natural values, it would appear, in fact, that there are significant regional differences in the landscape and natural values (Naveen,

1997). In particular the Antarctic Peninsula, being more temperate and having possibly higher biodiversity values, is observed by many commentators as being quite different in its tourist values to the Ross Sea Region (the other main area of tourism activity). This level of variance in values and attributes may well have an effect not only on the future of tourism growth in the different parts of Antarctica, but also in the way in which management of tourism in the different regions is approached.

5.7.2 The Ross Sea Region - General

One of the best sources of general information on the Ross Sea Region and its values is the 2001 'State of the Environment Report for the Ross Sea Region of Antarctica' (NZAI, 2001). The first comprehensive state of the environment report written for any part of Antarctica or the Southern Ocean, it was produced in order to provide a summary level overview of the current state of knowledge about the region, and to provide a framework for the management of activities in the area (NZAI, 2001).

The Ross Sea Region is approximately 3000 km almost due south of New Zealand, and is centred on the Ross Sea and the large indented bay of McMurdo Sound (see Map 5.2, following page). Along with the Peninsula Region, it is one of the few areas of Antarctica that features relatively large areas of ice-free ground, and it is also one of the few areas where a large sea (the Ross Sea) extends far to the south from the normal continental margin. The landscape is dominated by the Transantarctic Mountains which border the western edge of the region, the largest ice shelf in the world (the Ross Ice Shelf), the active volcanos of Mounts Erebus, Melbourne, Terror and others rising to over 3000 metres above sea level, and by the unique 'Dry Valleys' on the western coast of McMurdo Sound (NZAI, 2001).

The NZAI report also notes that this region boasts the longest river in Antarctica and some of the most pristine freshwater lakes in the world. The biology of the region is noted as being 'often unique, and includes a diverse marine environment, and terrestrial fauna and flora that survive freezing and arid ice-free environments' (NZAI, 2001, p. 1.3).

Map 5.2 - Ross Sea Region

There are a number of ice-free headlands in McMurdo Sound that host four internationally significant historic huts from the 'Heroic Era' of Antarctic exploration, as well as some thirsty other sites of historic significance and a number of active and non-active ATS programme bases and research huts (NZAI, 2001). It would appear that the Ross Sea Region holds the major concentration of historic sites and monuments in Antarctica (Hughes & Davis, 1995).

Looking at the terrestrial environment, the Ross Sea Region is dominated by glacial ice (over 95 % of the region is covered by ice), but approximately half of the ice-free ground of Antarctica occurs in the region, much of it in the Dry Valleys area west of McMurdo Sound. These Dry Valleys represent the largest continuous expanse of ice-free ground in Antarctica (some 6000 square kilometres) (NZAI, 2001), and have recently become the subject of tourism visitation by helicopter.

Flora diversity and abundance is generally low in the region compared to other parts of the continent, mainly restricted to limited numbers of lichens and mosses. There are no land-based vertebrate animals or flowering plants. The Ross Sea itself is a rich marine environment, and this is reflected in the reasonably abundant presence of marine species. From a tourism perspective, the most important of these marine species is probably the bird species, notably penguins. Eleven species of sea bird (including penguins) breed in the Ross Sea Region, including Emperor, Adelie and Chinstrap penguins (NZAI, 2001). While the avian biodiversity of the Ross Sea Region is reportedly low compared to other parts of Antarctica, the penguin species in particular are of significant attractiveness to tourists and tourist operators. The Emperor and Adelie penguins congregate in very large breeding colonies on the ice-free areas of the Ross Sea Region, and the NZAI report (2001, p. 5.20 – 5.22) notes that the area has 30% of the world's Emperor penguin population and the two biggest colonies in the world. Adelie penguins are known to breed at around thirty-five rookeries in the region, with a total of about 1 million breeding pairs representing over a third of the total Antarctic breeding population (Woehler, 1993 in NZAI, 2001).

Tourist visits to the Ross Sea Region are almost entirely by icebreakers or ice-strengthened ships sailing into the Ross Sea from New Zealand or Tasmania (or occasionally from the Antarctic Peninsula), and south into McMurdo Sound, visiting

the ice-free capes and headlands, the Dry Valleys and the various ATCP national programme bases along the coastline.

5.7.3 The Antarctic Peninsula - General

The Antarctic Peninsula Region is in many ways a significantly different area to the Ross Sea Region. Reaching north to 63 degrees south (with some of the flanking islands reaching almost to 60 degrees south), it is the closest part of Antarctica to another continent, being some 800 kms or two days sailing south of the southern tip of South America (Naveen, 1997), compared to the Ross Sea Region which can be up to ten days sailing from Tasmania or New Zealand (Hall & Wouters, 1995). Probably more mountainous than the Ross Sea Region (at least in terms of the areas in close proximity to the popular tourist landing sites), the Peninsula is generally considered to have a milder climate than the Ross Sea Region, remains ice-free for longer periods, and is said to have a wider range of attractions (Tracey, 2001). Naveen (1997, p. 18) contrasts the main Antarctic continental area with the Peninsula by noting that by contrast the Peninsula “offers a profusion of otherworldly animals, colourful and obvious lichens and mosses, a milder and wetter climate, parades of icebergs, and panoramas of ice-clad mountains and still-active volcanos.” Map 5.3 on the following page shows the main geographic features of the Peninsula Region.

The climate and fauna of the Peninsula Region is also quite different to that of the Ross Rea Region. Enzenbacher (1992) attributes the greater popularity of the Peninsula as a tourist destination not only to its relative proximity to South America (and the large USA market) meaning shorter sailing and flying times, but also to a milder summer climate than elsewhere in Antarctica, diverse and abundant wildlife offering photographic opportunities and relative freedom from pack ice for landings compared to other parts of the Antarctic coast.

Compared to the Ross Sea Region the Peninsula Region has only a limited number of historic sites and monuments, with the main features being the abandoned whaling stations at Deception Island (Hughes & Davis, 1995).

Map 5.3 - Antarctic Peninsula

In common with the Ross Sea Region, most of the tourist landing activity is associated with ice-free areas, and sites of fauna interest (such as penguin colonies), historic sites and ATS national programme bases. Interestingly, a large number of the tourist landing destinations are actually on islands off the coast of the Antarctic continent along the Peninsula, rather than on the continent itself.

5.7.4 Other Areas of Tourist Activity - General

The one other main area of Antarctica of interest in terms of tourism is the Patriot Hills/Vinson Massif area. Patriot Hills is the site of the semi-permanent base of Adventure Network International (ANI), a Canadian based-company that specialises in flying clients into a semi-permanent seventy-person capacity camp next to a blue-ice airstrip in what is essentially continental Antarctica (Tracey, 2001). Whilst ANI customers can choose from a large number of ‘adventure’ type activities such as ski-touring and special flights to the South Pole (ANI, 2005), much of the focus traditionally has been on climbing expeditions to the summit of Vinson Massif, Antarctica’s highest peak at 4897m. This is accessed from the Patriot Hills camp. The camp itself is on permanent ice in continental Eastern Antarctica, at 1000 metres above sea level and some 1076 kms from the South Pole (ANI, 2005).

5.8 Specific Tourist Sites – Values, Use and Impacts

The section to follow provides detailed information on a selection of specific sites that are most commonly visited by tourists to Antarctica. The section will describe the physical and environmental attributes of the sites, and comment on any natural and historic values where these are known to be documented. The potential and actual direct and cumulative impacts of tourism activities at the sites are referred to where information on these impacts is documented or can be reliably inferred.

The primary intent of this section is to provide an in-depth understanding of the inter-relationship between site values and use and impacts. Until now most of the available

literature on tourism use of sites in Antarctica has tended to deal with the values/use/impacts relationship in a relatively general way (e.g. IUCN, 1991). Generalisations and broad-brush approaches seem to be commonly used as the basis for assessing management strategies. Where in-depth analysis of site values and attributes has been undertaken (for example the Oceanites inventory work in the Antarctic Peninsula Region), little or no ongoing discussion of the relationship between those observations and the management frameworks and approaches that might be necessary to address them has followed.

Generalised action/consequence discussions have their pitfalls, as they risk failure to take account of site-specific issues, and the possible need to devise different strategies for different site types or use/impact types (Pedersen, 2002). Likewise scope-limited discussions that address only values and impacts without addressing responses also add only a limited contribution to the knowledge base (Newsome et al, 2002).

By providing an in-depth analysis of not only the site values, uses and impacts, but also by connecting that to management responses, it is hoped to firstly advance the knowledge of the current impact of tourism on the environment, and secondly to project that information directly into an in-depth discussion of the possible and optimum management responses that might be required.

5.8.1 Ross Sea Region – Tourist Sites

Tourism to the Ross Sea Region is currently entirely by way of cruise ships, with landings onto the tourist sites being by zodiac, helicopter or sometimes on foot across fast ice directly from the cruise ships themselves. In the 2004/05 season only two companies operated cruises to the region; Quark Expeditions, using the I/B “Kapitan Khlebnikov”, and Heritage Expeditions, using the M/V “Spirit of Enderby”.

While there are a number of sites that have been visited by tourist expeditions over the years, it would appear that for most of the expeditions a core set of six landing sites are targeted for landings, plus the two ATCP base locations at Terra Nova Bay (the Italian base) and the McMurdo Station/Scott Base complex at the head of McMurdo

Sound. Possibly the best source of information on the values, uses and potential impacts of tourism at these sites is the Antarctica New Zealand (ANZ) 'Ross Sea Region Antarctic Specially Protected Area Management Plans 04/05' (ANZ, 2004a). This publication is a compendium of the management plans that have been developed by ANZ for the areas in the Ross Sea Region that have been designated as either an ASMA or ASPA under Annex V of the Madrid Protocol

Each of the tourist landing sites in the Ross Sea Region is either an ASPA or an ASMA. The Management Plans for each site specify restrictions on tourist use of the sites. For all the sites entry is by permit only, with the permit being issued to the tourist expedition operator by the New Zealand government. The plans also specify visitor number limitations and access restrictions.

Unless otherwise stated, the detailed site information presented below on the tourist sites in the Ross Sea Region is sourced from the ANZ Management Plans. This information has been supplemented by the author's personal observations of tourism use of the sites gained as a New Zealand government observer aboard the I/B Kapitan Khlebnikov on a Quark Expeditions tourist voyage through the Ross Sea region in February 2005. For the purposes of this discussion, and in general alignment with the tourist voyage itineraries, the sites will be described in a generally north to south direction.

In the 2004/05 season IAATO (2005a) reports that 383 tourist passengers were landed from five cruise ship voyages to the Ross Sea Region tourist landing sites.

TABLE 5.3 – Passenger Landings at Ross Sea Region Sites

| SITE | NUMBER OF PASSENGERS LANDED |
|--|--|
| Cape Adare | 457 |
| McMurdo Station (Hut Point) | 266 |
| Cape Royds | 502 |
| Cape Hallett | 140 |
| Canada Glacier, McMurdo Dry Valleys | 366 |
| Cape Evans | 323 |

Source – IAATO (2005a)

5.8.1.1 Cape Adare

This is generally the first of the tourist sites encountered by cruise ships travelling south into the Ross Sea, and is, for many tourists, their first landing on the Antarctic continent. The Cape area itself is reasonably large, The ASPA management plan describes the Cape area as “a generally ice-free, prominent volcanic headland”, and goes on to describe the general area as a “large, flat, triangular area of shingle” (ANZ, 2004a, p. 224). The shingle spit is around four kilometres in length, and two kilometres across, bounded by Robertson Bay to the west, and the Adare peninsula to the east. The whole Cape area is the site of one of the largest Adelie penguin rookeries in all of Antarctica (ANZ, 2004a).

In the south-west portion of the Cape area are the historic relics that form the primary attraction for tourist landings. There are three historic structures close together, being the living hut and storeroom built in February 1899 during the British Antarctic (‘Southern Cross’) Expedition lead by Carsten E. Borchgrevink, plus the remains of another hut structure built later by one of Captain Robert Falcon Scott’s expeditions.

The 'Borchgrevink' structures consist of the well-preserved hut, and an associated storeroom. They were used for the first winter spent by humans in Antarctica. The hut in particular is in relatively good order and contains a large number of historical artefacts. The storeroom is in poorer conditions but is still of significant historical significance and interest to tourists.

Approximately thirty metres from Borchgrevink's Hut is the collapsed remains of a hut built in February 1911 by members of the "Northern Party of Robert Falcon Scott's "Terra Nova" Expedition. The hut was also used for wintering over, but is now in a poor state of repair and almost completely dilapidated. Associated with this structure, and Borchgrevink's structures, is a variety of historic artefacts ranging from ship anchors to preserved supplies and even an historic toilet.

Immediately around the three historic structures is ASPA No. 159. This ASPA, which is basically confined to the area occupied by the various structures and scattered relics, is in place to protect the historic artefacts from disturbance. The ASPA conditions include:

- maximum number of forty persons within the ASPA at any one time
- maximum number of four persons inside Borchgrevink's Hut at any one time
- annual maximum number of visitors 2000
- no helicopter landings within the area

Another historic site, the grave of the first human to be buried on the Antarctic continent, (Hanson's Grave) is located on a ridge over 1000 feet above the penguin colony and historic huts complex, and is rarely visited by tourist parties.

Completely surrounding these historic structures is the Adelie penguin rookery. This rookery is the biggest in the Ross Sea Region and contains more than 200,000 pairs of penguins (NZAI, 2001). These birds can, at times, block access for tourists to the historic structures and even to the landing beach itself. There are also Skua nests in the vicinity, and Weddell seals commonly haul up on the beach front of the Cape.

Landings at Cape Adare are normally made by zodiac onto the beach front a few hundred metres from the ASPA, with tourists then traversing the general Cape area, and the ASPA around the historic huts, on foot.

With respect to potential impacts from tourism use of the area, the ground surface of the general Cape Adare area, including that of the ASPA area immediately around the historic huts, is generally hardened gravel, which is essentially 'cemented' by penguin guano. It appears largely immune to damage from foot traffic. The presence of a very large Adelie penguin colony in and around the ASPA and the zodiac landing sites raises the issue of wildlife disturbance and disease introduction.

5.8.1.2 Cape Hallett

Like Cape Adare, this site is a headland of continental Antarctica jutting out into the western Ross Sea. Also like Cape Adare, it is a low, relatively flat area of ice-free gravel and rocks and is the site of a substantial Adelie penguin colony. Of special interest to tourists at Cape Hallett is an important and diverse (by Antarctic standards) area of vegetation, the penguin colony, spectacular mountain scenery and the remains of a now-abandoned New Zealand/United States research base, which is being progressively removed by Antarctica New Zealand.

Most of the Cape Hallett area is contained within ASPA 106, an area of approximately seventy-four hectares which was established to protect in particular the vegetation area and the large Adelie penguin colony (66,000 breeding pairs in 1987). Inside the ASPA is a 'managed zone' for tourism, which is effectively a narrow strip around the seaward edge of the ASPA, skirting the penguin colony and avoiding the vegetation areas. This is the area of the ASPA to which tourist foot traffic is restricted.

Access to the site for tourists is normally by way of zodiac landing into a small sheltered cove away from the penguin colony and vegetation, or by helicopter to one of two designated helipads in the same vicinity. Access around the site is on foot by way of the tourist 'managed zone' within the ASPA.

Potential impacts from tourism at Cape Hallett include damage by foot traffic and impacts on the avian fauna colonies. While much of the surface area of the Cape Hallett ASPA appears to be relatively immune to damage, the ASPA Management Plan does report several areas where moss, lichen and algae vegetation is present and where impacts could occur from foot traffic. The presence of a large penguin colony means that impacts could also occur in the form of disturbance and disease introduction.

Restrictions on tourist use of the ASPA mostly relate to use of designated helicopter landings sites, and restriction of tourist movement to the 'managed zone' within the ASPA.

5.8.1.3 Cape Royds

Cape Royds is the northernmost of the tourism sites on Ross Island, at the head of McMurdo Sound. The primary tourist attraction is the well-preserved Shackleton's Hut, built in February 1908 by the British Antarctic (Nimrod) Expedition of 1907-1909. The hut site is on an ice-free headland with commanding views across McMurdo Sound to the Royal Geographic Range and also up to Mt Erebus. In extremely good condition, Shackleton's Hut has a large number of artefacts still intact and sited within it. Structures associated with the hut include a latrine, stables for horses, dog kennels and even a garage created for the first motor vehicle bought to and used in Antarctica.

The Cape also hosts the southernmost Adelle penguin colony in the world and some of these penguins occupy nests and live immediately adjacent to the hut. The penguin colony and Shackleton's Hut are protected by way of ASPA 121 for the colony and ASPA 157 for the hut and the foot approaches to the hut.

Tourist access to the site is normally by way of zodiac landing at an adjacent bay (Backdoor Bay) and then by foot for several hundred metres to the hut and penguin colony. On occasion access can be directly from the cruise ship across fast ice, or by helicopter to one of several designated helipads near the site.

The surface of the Cape Royds area is quite different to the headland sites of Cape Adare and Cape Hallett further north. The surface is volcanic scoria which is often loose and prone to displacement and compacting by foot traffic. There are also potential impacts on historic relics from tourist foot traffic around the environs of the hut, and additionally potential impacts from interactions between tourists and the penguins that inhabit the area.

The ASPA conditions for the Backdoor Bay area restrict access for tourists by helicopter, and restrict overflying. For the historic hut site ASPA, the following conditions apply:

- maximum number of forty persons within the ASPA at any one time
- maximum number of eight persons inside Shackleton's Hut at any one time
- annual maximum number of visitors 2000

5.8.1.4 Cape Evans

Cape Evans is also on Ross Island in McMurdo Sound, and is approximately ten kms south of Cape Royds. The main tourist feature at this site is the "Terra Nova" hut built in January 1911 by the British Antarctic (Terra Nova) Expedition led by Robert Falcon Scott. This hut, which is the largest of the historic huts in the Ross Sea Region, was the base from where Scott and his party left on their ill-fated attempt to reach the South Pole first. Also at the site is the "Cross on Wind Vane Hill", another important historic site commemorating the death of three members of a support party of Shackleton in 1916. Like the other huts, the site is very well preserved and features a large number of artefacts including a desiccated dog still tied to its kennel.

The site is protected by ASPA 155. Like Cape Royds, the site surface is loose and soft volcanic scoria prone to damage and tracking, which could occur from tourist traffic. Access to the hut is normally by zodiac landing or helicopter landing at an established ATCP research campsite approximately 250 metres from the ASPA and historic hut. Tourists normally walk directly to the hut site largely along the sea frontage, or access

the hut by way of a circuit to “Skua Lake” which is immediately behind the hut and the ASPA area.

The ASPA conditions for the Cape Evans historic hut and environs apply the following restrictions on tourist activity:

- maximum number of forty persons within the ASPA at any one time
- maximum number of twelve persons inside Scott’s Hut at any one time
- annual maximum number of visitors 2000
- no helicopter landings within the area

5.8.1.5 Hut Point, Ross Island

Also on Ross Island in McMurdo Sound, Hut Point is the site of the “Discovery” hut built by Captain Robert F Scott in 1902. The hut was used by Scott’s first expedition, his later (and ill-fated) 1910-1913 expedition, and also by Ernest Shackleton on two expeditions in 1907-1909 and also in 1914-1917. The ANZ Management Plan compendium (ANZ, 2004a, p. 215) notes that;

“The Hut Point site is one of the principal sites of early human activity in Antarctica. It is an important symbol of the Heroic Age of Antarctic exploration and, as such, has considerable historical and cultural significance”.

Much like the other historic huts in the Ross Sea Region, the hut is generally very well preserved and contains a large variety of original artefacts. Unlike the other huts there are no artefacts outside the immediate boundaries of the hut itself.

The hut itself is situated on an ice-free headland approximately 500 metres to the west of the western extremity of the United States McMurdo Station. The immediate environs of the hut are heavily modified and a road has been constructed to within a few metres of the hut site. Access to the hut is by way of this road, and tourists (and

base personnel) access the hut on foot (approximately ten minutes walk) or by vehicle from McMurdo Station.

The ASPA conditions for Hut Point and Discovery Hut are:

- maximum of eight persons in the hut at any one time
- annual maximum number of visitors 2000 (2004 annual usage approximately 1000)
- no helicopter landings in the vicinity of the hut

5.8.1.6 McMurdo Dry Valleys, Canada Glacier ASMA

The McMurdo Dry Valleys are a particularly significant landscape in the Antarctic context, being variously described as the largest ice-free region in Antarctica, a unique ecosystem of low biodiversity and reduced food-web complexity, and containing unusual microhabitats and biological communities as well as special geological features (ANZ, 2004b). The area is effectively a cold desert, with no rain, minimal precipitation from snow, and extreme winds. The Dry Valleys are valued for their intrinsic values, and the Dry Valleys have been designated as an ASMA.

Antarctica New Zealand and the US Government jointly prepared a management plan for the Dry Valleys ASMA in 2004, and the management plan text and associated plans and diagrams are contained within the ANZ 'McMurdo Dry Valleys ASMA Manual' (ANZ, 2004b). One specific site within the ASMA area, near the Canada Glacier, has been further designated as a 'Tourism Zone' within the ASMA. This Tourism Zone is the only site in the Dry Valleys where tourism may occur, and was selected as a site where "safe and easy access and movement within the area can be reasonably assured with minimal impact to science activities or the environment" (ANZ, 2004b, p. 10).

The ANZ Manual for the Dry Valleys notes the following with respect to the general area (ANZ, 2004b, p 5):

“The McMurdo Dry Valleys are also valued for their wilderness quality. They represent a nearly pristine environment largely undisturbed and uncontaminated by humans. The dramatic landscape, composed of high ridges and sweeping valleys, and contrasts of ice-free and glacier-covered terrain creates unique vistas with high aesthetic value.”

Tourist cruises to the Ross Sea Region have, in recent years, started to visit the Canada Glacier Tourist Zone in the Dry Valleys as part of their regular itineraries. Access is only by helicopter as the Tourism Zone is approximately sixty kilometres from Scott Base and approximately forty kilometres from the nearest position that an ice-breaker usually can be positioned in McMurdo Sound. The site, which is roughly square in shape and no more than 200 metres long along any one side, is dominated by a low (approximately thirty metres high) hill and is essentially completely covered in loose moraine gravel and rocks. Features of interest include a number of mummified seal carcasses that are thought to be several hundred years old, a small patch of moss/lichen vegetation, and the adjacent snout of the Canada Glacier ablating into the Dry Valley itself.

Tourists are landed at a designated helicopter landing site and are then led by expedition guides around a roughly circular track that encompasses the more popular features of the zone.

The site is characterised by a loose and friable moraine surface, and the transiting of tourists around the usual circuit has immediate and visible physical impacts on that surface in the form of tracking and trenching. The effect of high winds and snowstorms between tourist visits seems to remedy most of the impacts and a specific track or trench system has yet to be established. The ASMA management plan does not specify any particular limits on the numbers of tourists that can access the zone, but does provide a number of items of guidance to tour operators.

5.8.1.7 Other Sites in the Ross Sea Region

Lower numbers of tourist landings occur at sites of wildlife interest such as Coulman Island, Franklin Island, Cape Bird, Scott Island and the Possession Islands (NZAI, 2001). It would appear that, numerically at least, compared to the level of activity occurring at the main historic sites and the Dry Valleys, the use of these sites is not as significant as for the sites described above.

5.9 Summary – Ross Sea Region

The tourist landing sites in the Ross Sea Region, with the possible exception of the Canada Glacier site in the McMurdo Dry Valleys, demonstrate a number of common features that are relevant to their management as tourism destinations; they are generally ice-free and easy to traverse on foot, all show some propensity for physical site impacts from foot traffic, all bar one site hosts historic relics of one type or another, and they all have significant wildlife values. The Canada Glacier site is also ice-free and subject to impacts from foot traffic, but has only limited specific biological values that could be at threat from tourism activities.

This would appear to indicate that there are a relatively small number of management issues relating to tourism at the Ross Sea Region sites. In particular the issues of wildlife-tourist interaction, and physical impacts from foot traffic, would appear to be common issues between sites.

5.10 Antarctic Peninsula – Tourist Sites

Given the rapid recent increases in the levels of tourist visitation to sites on the Antarctic Peninsula (IAATO, 2005a), information and discussion on the sites and the use of those sites can become out-of-date quite quickly. Hence much of the early-1990s literature (e.g. Enzenbacher, 1993) tends to be of only limited usefulness when

it comes to discussing contemporary tourism use of these sites. The best current source of information and discussion on the values and uses of the Antarctic Peninsula sites would appear to be the 1997 'Oceanites Site Guide to the Antarctic Peninsula' (Naveen, 1997) and the 2003 'Compendium of Antarctic Peninsula Visitor Sites' (Naveen, 2003), both being particularly in-depth and tourism focussed reports produced by Ron Naveen of Oceanites Incorporated. These publications are based on a minimum of ten years of on-site research and inventory activity at the sites in question. The Hoffman, & Jatko (2000) publication of the proceedings of a workshop on the environmental impacts of tourism in the Peninsula region also provides background information on the site values, uses and potential impacts, and Tracey's 2001 PhD thesis, supplemented by the annual IAATO data and statistics, are additional useful reference materials.

Further commentary on the values and 'sensitivity' of regularly visited Peninsula sites is also contained in two Information Papers submitted by IAATO to the 2005 ATCM XXVIII (IAATO, 2005b & 2005c). These papers address the IAATO 'Site Specific Guidelines' for tourist landing sites in the Peninsula Region, and present valuable analysis of not only site usage but also an assessment of site sensitivity to impact.

The primary geographic units of the Antarctic Peninsula region are shown on Figure 6. Generally speaking the 'tourist' area of the Antarctic Peninsula can be said to be within that area bounded by Elephant Island in the north, Erebus & Terror Gulf and the Weddell Sea to the northeast, and just below the Lemaire Channel to the south. The northern portion of the Peninsula is officially known as Graham Land, with the southern portion being known as Palmer Land (Naveen, 1997). The tourist destination area is normally considered to include King George Island and the rest of the South Shetland Islands group, but not the South Orkney Islands and the South Georgia Island group, because, although these island groups are sometimes part of Antarctic Peninsula cruise itineraries, they are both considered to be too far north to be discussed as part of the Antarctic Peninsula proper, and it could be argued that both island groups have more in common with the sub-Antarctic Islands of the Southern Ocean than they do with the Peninsula sites.

Not surprisingly given the almost complete dominance of ship-borne tourism as the means by which tourist access and utilise the sites, typically the peninsula landing sites are immediately adjacent to the coast, relatively easily accessible by ship and zodiac, and contain easily accessed fauna, historical, geographical and human-interest values that make them attractive to tourists and cruise companies alike. Some of the sites are associated with ATCP research bases.

It is interesting to note that, despite the significantly larger number of tourist landing sites and landings made in the Peninsula Region as compared to the Ross Sea Region, this numerical dominance is not reflected in the number of ASPA or ASMA areas in the Peninsula as compared to the Ross Sea. In fact, CEP (2005) reports that there are only two ASPA areas associated with main tourist landing sites in the Peninsula (both associated with the Whalers Bay site), whereas all of the most popular Ross Sea Region sites are either ASPAs or ASMAs.

While more than 150 different sites in the Peninsula region were visited by tourist parties in the period 1989 through to 2004 (Hoffman & Jatko, 2000), most of the cruise-ship based tourism was, and still is, concentrated on about forty of these sites (Naveen, 1997, Hoffman & Jatko 2000, IAATO, 2005b). As an example of this, Naveen (2003, p. 252) reports that in the period 1989 – 2003, 72.8% of the total number of zodiac landings at tourist sites on the Antarctic peninsula occurred at twenty of the approximately 150 sites, and some 74.6% of the total number of tourists landed were landed at those sites. This is supported by the IAATO (2005b, p.8) analysis, which reports that “in 2003/04, 10 landing sites absorbed 53% of the visits, while 20 landing sites absorbed 71% of the visits”.

The objective of this part of this chapter is to present a description of the site-specific values and attributes of the sites visited by tourists, so that a context for the management of tourism in Antarctica can be provided. It is considered that for the Peninsula sites an understanding for readers of the relationships between site values, use levels and patterns, and impacts, can just as readily be developed by way of examination of the most popular and studied sites, as it can through an examination of all 150-odd sites that have been visited over the years.

Supporting this proposition is the issue of the specific research that has been conducted in the last ten years or so into the impact of tourism at individual sites in the Peninsula Region. Most of this research relates to the commonly visited forty or so sites as presented by Naveen (1997, 2003), and concentrating on the sites that are both highly-visited and intensely studied will enable cross-referencing to that impact research for the purposes of further discussion on impact monitoring and mitigation. Examples of this research and the links to the site descriptions include Acero & Aguirre at Half Moon Island and Hope Bay (1997), Stonehouse (1992) at Half Moon Island, Pfeiffer & Peter (2004) at Penguin Island, Harris (1991) at King George Island, and also Kennicutt & Sweet (1992) and Eppley (1992) with respect to the *Bahia Paraiso* oil spill near the US Palmer Station. All of these sites have been studied by Oceanites (Naveen 1997, 2003) and many of them feature in the top ten most-visited site listings.

So, for the purpose of satisfying the objectives of this chapter, the discussion will concentrate on the values, uses and potential impacts of tourism at sites in the Peninsula based on the ten most commonly visited sites as shown by IAATO statistics, utilising the site descriptions and discussion of Naveen (1997). This discussion will only discuss numbers of landed tourists. Some cruises do not land passengers at these sites, and so do not present the same issues of use and impact.

Using the IAATO (2005a) statistics for landings at sites on the Antarctic Peninsula, the most popular sites in the 2004/05 season are listed below. Presented in this analysis are not only the total number of passengers landed at the sites in question, but also the number of visits for each site, and the number of multiple visit days for each site. These additional figures are included so as to provide a more comprehensive indication of both volume and frequency of visitation at the sites. This is important, as it may be that the frequency of visits to a site, in terms of both visits per season and visits per day, may be an important issue with respect to cumulative impacts, especially at sites with bird and marine mammal species present.

TABLE 5.4 – Antarctic Peninsula Tourist Landing Statistics

| SITE | Number Of Passengers Landed 03/04 Season | Number of Ship Visits 04/05 season | Number of Two-Visit Days | Number of Three-Visit Days | Number Of Passengers Landed 04/05 Season |
|---|---|---|---|---|---|
| Whalers Bay | 11,044 | 114 | 27 | 7 | 10,403 |
| Half Moon Island | 10,124 | 64 | 10 | 0 | 9,651 |
| Neko Harbour | 6,873 | 78 | 10 | 1 | 9,326 |
| Port Lockroy (Jougla Point & Goudier Island) | 9,570 | 80 | 19 | 2 | 8,892 |
| Cuverville Island | 8,786 | 84 | 18 | 1 | 8,815 |
| Almirante Brown Station, Paradise Bay | 7,446 | 65 | 10 | 1 | 7,395 |
| Waterboat Point | 4,258 | n/a | n/a | n/a | 4,056 |
| Hannah Point | 4,786 | 61 | 10 | 1 | 3,873 |
| Aitcho Islands | 4,907 | 55 | 9 | 1 | 3,488 |
| Petermann Island | 6,573 | 76 | 13 | 3 | 2,625 |

Source: IAATO, 2005a - Note: The IAATO statistics have recently started reporting Jougla Point & Goudier Island in Port Lockroy as two separate sites. In the past they have been reported as one site (Port Lockroy), and both Hoffmann & Jatko (2001) and Naveen (1997, 2003) refer to the two sites as “Port Lockroy”. The sites are very close together and it seems that most passengers who land at Goudier Island also land at Jougla Point. For this reason the two sites will be discussed as if they were one site.

Unless otherwise stated the general and specific site descriptions set out below are sourced from both the 1997 ‘Oceanites Site Guide to the Antarctic Peninsula’ (Naveen, 1997) and the 2003 ‘Compendium of Antarctic Peninsula Visitor Sites’ (Naveen, 2003).

5.10.1 The South Shetland Islands

Four of the most popular landing sites on the Peninsula tourist itineraries are in the South Shetland Islands (Whalers Bay, Half Moon Island, Aitcho Islands and Hannah Point). These are the first landing sites encountered by tourists after they cross the 770 kilometre wide Drake Passage from South America, and must often be a welcome relief to seasick tourists. The South Shetland Islands consists of a chain of eleven main islands (and many smaller ones) spread out roughly northeast to southwest for 540 kilometres off the northern tip of the Peninsula. This region is the most heavily visited part of the Antarctic continent, with Naveen reporting that in 1997 more than 45% of all tourist landings in the Peninsula occurred in this region. The islands that make up the region are characterised as being the “warmest, wettest and most colourful part of the continent” (Naveen, 1997, p. 31). The tourist landings sites, of which there are fourteen that are regularly used, are all readily accessible and exhibit attributes of wildlife, historic and human interest for tourists.

5.10.1.1 Whaler’s Bay, Deception Island

Whaler’s Bay is the primary landing site on Deception Island, which is a small, ring-shaped volcanic island in the south-eastern portion of the South Shetland group. Consistently in the top five visited sites over the last fifteen years (IAATO, 2005), the main attractions of the site include the remains of a Norwegian whaling station, an abandoned British Antarctic Survey (BAS) station, an historic cemetery buried by volcanic ash, nesting petrels and gulls, visiting Weddell, Crabeater and Antarctic fur seals, and a spectacular volcanic landscape. As well as visiting the historic relics along the beach frontage, tourists can also climb to a breach in the caldera wall called ‘Neptune’s Window’. Bauer (2001) observes that the site can hardly be classified as pristine, on account of the large concentration of abandoned equipment and the damage wreaked by frequent volcanic eruptions. He suggests that the biggest attraction of the site is the human history. Naveen (1997 & 2003) reports potential impacts primarily related to human foot traffic around the site (over 10,000 tourists

visited in 2004/05) on sensitive vegetation areas, and on the scoria track to 'Neptune's Window'. The IAATO (1995c) report classifies the site as 'low sensitivity' and notes easy access around the site and the potential for physical impact on the Neptune's Window and Bailey Head tracks.

5.10.1.2 Half Moon Island

Half Moon Island is a small two-kilometre long island in the middle of the South Shetland group. The values of the island for tourists include breeding chinstrap penguins, blue-eyed shags, petrels and other flying birds, and regular haul-outs of sea elephants, Weddell seals and fur seals. The scenery is reported as being spectacular and there are some good hiking opportunities on the island. Bauer (2001) notes the site to be easily accessible and set against the spectacular mountain scenery of the nearby Livingston Island. Site impact issues mainly focus around disturbance to the nesting bird species. The IAATO (2005c) classification for this site is 'low/medium', with a comment that caution is required to avoid impact to tern nesting sites.

5.10.1.3 Aitcho Islands

Nesting chinstrap and Gentoo penguins and nesting southern giant petrels inhabit this island in reasonably large numbers, as do elephant seals and fur seals. Access is relatively good for zodiac landings, and in terms of site values in addition to the breeding bird populations, extensive moss beds are also present, as are whalebones on Whalebone Beach. IAATO (2005c) note the site to be of 'high' sensitivity, with diverse flora and fauna dictating that caution is required in path selection for tour guides. Naveen (2003) reports site sensitivities in the form of potential disturbance to the breeding colonies and also that the moss beds that are reasonably close to the tourist landings sites are likely to be prone to damage from foot traffic.

5.10.1.4 Hannah Point

Sited on the south coast of Livingston Island, Naveen (1997, P. 58) reports this site to be “a microcosm of Antarctic Peninsula fauna, with three species of penguins, kelp gulls, blue-eyed shags, southern giant petrels, and snowy sheath-bills nesting in close proximity”. This site is another of the consistently most popular sites in the Peninsula, and it received nearly 3900 visitors in the 04/05 season. Landings are by zodiac, and the landing beach is reported as being very restricted. This in turn may cause potential impacts from tourist use of the site interacting with the breeding bird populations. The IAATO (2005c) sensitivity classification for this site is ‘high’, with a note calling for restricted movement of tourists due to high species diversity, a restriction of group sizes to twenty maximum, and the need to stay off certain areas where Southern Giant Petrels nest.

5.11 Northwest Antarctic Peninsula

This part of the Antarctic Peninsula is characterised by mountainous islands, protected bays and narrow channels (Naveen, 1997). This part of the region is approximately 200 kilometres in length, and the sites that are of greatest interest to tourism operators lie mostly in the small islands and bays of the Gerlache Strait between the Peninsula proper and the large Anvers Island that lies to the west of it.

5.11.1 Cuverville Island

This site is a small rocky islet with a significant amount of moss cover, breeding Gentoo penguins, hair grass in patches and brightly coloured lichens. The scenery is excellent, and there are ample opportunities for tourists to hike in several directions from the landing beach. The Gentoo colony is one of the largest in the region, with around 5,000 pairs (Naveen, 1997). This is a consistently well used site, and in the

2004/05 season just over 8,800 passengers were landed on the island. Primary potential impacts appear to be related to the moss and hair grass beds at higher elevations on the island, and from human/wildlife interactions. IAATO (2005c) report a 'low to medium' sensitivity occurring in the late season relating mostly to the potential for impacts on molting birds.

5.11.2 Port Lockroy

Wienke Island lies at the south-western end of the Gerlache Strait, and Port Lockroy, on its western flank, is the most popular landing site in the Northwest Peninsula area. In the 04/05 season 8900 tourists were landed at the two sites in the bay, Jougla Point and Goudier Island. This site was the fourth most visited site in the Peninsula for that year, and is regularly one of the two or three most popular landing sites in the Peninsula (Naveen, 1997). Sometimes reported as two landings sites, Goudier Island and Jougla Point are in fact less than 100 metres apart, and it would appear that the majority of the passengers landed at one site also visit the other.

The site features a restored BAS hut on Goudier Island, a reasonable number of breeding Gentoo penguins at Point Jougla, whalebones on the beaches and particularly spectacular glaciated scenery in the immediate vicinity. Landings are made by zodiac to relatively sheltered landing sites, which may go some way to explaining the consistent popularity of this site.

Potential site impacts include disturbance to the Gentoo penguins due to the restricted nature of the site near the Jougla Point landing site. For this site IAATO (2005c) advise a 'low/medium' sensitivity relating to nesting bird species.

5.11.3 Almirante Brown Station, Paradise Bay

One of the 'icon' visitor sites on the Peninsula, Almirante Brown Station is another site in the North-western region that consistently ranks in the top ten most visited sites. It would appear that the site is favoured more for its scenery, and the

opportunity to set foot on the Antarctic continent proper, rather than any flora or fauna values per se. Apart from Waterboat Point, also in Paradise Bay, and Neko Harbour just to the north, all the other regularly visited sites are situated on islands of the coast of the Peninsula itself.

The station was almost completely burnt in a fire over a decade ago, and only a summer research hut remains. Tourists mostly engage in zodiac cruising around the adjacent bays and glaciers, and climb the fifty-metre snow slope behind the station for spectacular views of Paradise Bay.

While there are some Crabeater seals, Gentoo penguins and blue-eyed shags living in the general vicinity, there seems to be limited potential for impact from tourist visits to this site. The site receives a 'low' sensitivity rating from IAATO (2005c) with a note that there is minimal flora and fauna present.

5.11.4 Waterboat Point, Paradise Bay

This is another continental landing site in Paradise Bay, and takes its name from a historic 'waterboat' that remains there as a legacy of a 1920's research expedition to the site. Other historic relics exist on the site, which is also the site of the Chilean Gonzalez Videla Station. There are only modest numbers of fauna species at the site, but nesting Gentoos do apparently surround the historic artefacts at times, and it can be presumed that some level of potential impact may occur from interactions with tourists. Interestingly this site does not receive a sensitivity rating in the IAATO (2005c) site specific guidelines. It is not clear why this is so.

5.11.5 Neko Harbour

This site appears to be another site, like Almirante Brown Station, where visitation is primarily focussed on the scenery and the hiking opportunities, rather than the biological values of the site. Naveen (1997, 2003) reports that most of the tourists that use this site do so to hike up to a viewpoint overlooking the spectacular Gerlache

Strait. Apart from some limited interaction between tourists and the low numbers of avian species present, there appears to be only low levels of potential impacts from tourist visitation. IAATO (2005c) gives the site a ‘low/medium’ rating for sensitivity but without any specific reasons as to why this score is given.

5.12 *Southwest Antarctic Peninsula*

Most tourist cruise itineraries to the Peninsula appear to use the Lemaire Channel and Petermann Island as the southern limit of their voyages. The Lemaire Channel is one of the iconic scenic locations in the whole of Antarctica, and few if any cruises do not target a passage through this narrow but spectacular strait.

5.12.1 Petermann Island

Petermann Island lies just to the south of the southern end of the Lemaire Channel, and is reported as a snow-covered and domed island with a rocky coastline and many small bays. The island hosts the southernmost breeding colony of Gentoo penguins as well as other avian species, and is well noted for its spectacular scenery. Some historic relics relating to BAS activities and an abandoned Argentine research hut are also attractions for tourists. Some 2,625 tourists landed on this island in the 04/05 season, which was significantly lower than the previous season. This may be related to weather conditions at this site during the summer.

The island appears to be rugged and largely immune to human physical impacts. Potential impacts from tourists use seem to be largely related to the interactions with the penguin breeding colony. The IAATO (2005c) rating for this site is ‘medium’, presumably on account of the presence of Gentoo penguins.

5.13 Summary – Antarctic Peninsula

The majority of the most commonly visited tourist sites in the Peninsula Region of Antarctica appear to be small, island-located, beach landing sites with specific wildlife attractions. In most cases this is related to penguin and shag colonies, and also haul-out sites for sea elephants and seals. Issues relating to the management of the interaction between tourists and wildlife will be present. Compared to the Ross Sea Region sites there are only limited levels of historic values at the Peninsula sites, so the potential impacts on these values are comparatively less of an issue. Many of the Peninsula sites appear to have sensitive vegetation values present, which is not generally the case in the Ross Sea Region, and this presents issues with respect to management of tourist foot traffic.

5.14 Tourism Impacts

The purpose of this section of this chapter is to present a discussion on the general and specific impacts of tourism in natural areas as it is relevant to the Antarctic situation. The objective of this discussion is to provide an understanding of the different types of impact that can, at times, be associated with natural area tourism so that the potential impacts of tourism in Antarctica can later be assessed and discussed, and the management framework for tourism can be better understood.

It is also intended that this section of the chapter provide a linkage for readers between the preceding general and specific site descriptions and a discussion regarding impacts of tourism in Antarctica. The objective of this is to provide an examination of the types of impacts that might occur in the context of the nature of the sites where tourism is concentrated.

There is a significant body of literature relating to tourism/recreation ecology and the impacts of tourism on natural areas. Mathieson and Wall (1982), Liddle (1997), Hammitt and Cole (1998), and Newsome, Moore & Dowling (2002) all provide

specific insight into this issue. Much of the research traverses the full range of potential tourism types, including vehicle use, hotel development, 'ecotourism', aviation and other classifications of tourism activities. Given the nature of Antarctic tourism as discussed previously in this thesis, it is intended that the discussion here is focussed on the literature and research associated with tourism impacts relating to 'ecotourism', as opposed to the impacts from more infrastructure based tourism or tourism involving mechanised transport such as vehicles. This decision is based on a view that Antarctic tourism is a form of 'ecotourism', in that it exhibits the attributes of focus on low clients volumes, wildlife interaction, educational value and elements of 'wilderness' (Splettstoesser & Folks, 1994; Hoffman & Jatko, 2000). There are a plethora of definitions of ecotourism, but most would support a recent definition (Honey, 1999), where 'ecotourism' is described as tourism that involves travel to fragile natural and protected areas in a fashion that strives to be low impact and small scale. The similarities between the basic Antarctic tourism model, i.e. cruise-ship based guided tourism to sites of known ecological/historical/scenic values, and the tourism described in this and other definitions can be argued to be sufficient to be able to narrow the discussion on Antarctic tourism to the generally accepted discussion on 'ecotourism'.

5.14.1 *Impacts - General*

There are many quality discussions on ecotourism activities and impacts. Amongst the more relevant and helpful for this discussion are Mathieson and Wall (1982), Liddle (1997), Hammitt and Cole (1998), and Newsome, Moore & Dowling (2002). All of these publications focus on the impacts of recreation-type tourism on the values of natural areas, and appear most relevant to the Antarctic situation.

A number of the authors in this field discuss tourism impacts in terms of direct, indirect and cumulative impacts. Direct impacts are those that arise directly from the activities of the tourists, for example trampling of vegetation (Liddle, 1997). Indirect impacts arise as a consequence of the general activity of tourism, but not necessarily from the tourists themselves (Mathieson & Wall, 1982). Ballast water pollution from the ships that carry tourists may be an example of this. Cumulative impacts can be

characterised as “a number of different smaller impacts which, when combined, result in a much larger and significant impact situation” (Newsome, Moore & Dowling 2002, p. 134).

The same discussion that provides us with this definition of cumulative impacts (Newsome et al, 2002) also goes on to discuss tourism impacts in terms of two relatively distinct types of impacts;

- ‘ecological’ impacts, being impacts mainly associated with wildlife values, and including disturbance to such things as feeding patterns, breeding, resting, and also changes in predation behaviour.
- ‘environmental’ impacts, being physical impacts such as trampling of plant species and sensitive areas, physical impacts around built structures, waste and rubbish issues etc.

Newsome et al also suggest that tourism impacts can be both positive as well as negative, and reference Phillips (1985), Murphy (1986) and Wall (1994) to support this contention.

Hvenggaard (1994) describes a similar list of impacts from tourism activities, including wildlife disturbances, pollution and unregulated recreation.

5.14.2 *Tourism Impacts in Antarctica*

Whilst the impacts of tourism activities in general has been well researched and discussed in academic and other literature, the area of the impacts of tourism in Antarctica are relatively less well researched (Hoffman & Jatko, 2000). This is probably not surprising given the relatively small size of this sector of the global tourism industry, and the relatively limited opportunities for researchers to observe tourism activities directly and study potential and actual impacts. Notwithstanding this, the attractions of the Antarctic continent, and the special nature of the legislative framework that tourism operates within on the continent, has provided sufficient

incentive for a modest number of researchers to look at this issue over the last couple of decades.

The purpose of this chapter is to provide a comprehensive overview of the literature relating to the impacts of tourism in Antarctica. In most cases this involves relatively recent research and papers, at least compared to the literature relating, for example, to tourism impacts in national parks in Western Hemisphere countries. By providing a comprehensive discussion on the actual and potential impacts of tourism in the Antarctic, it is hoped that a clear and direct relationship can be established between the effects and impacts of tourism, at the sites where those impacts occur, and the industry and regulatory responses that would best address those effects and impacts.

Erize (1987), IUCN (1991), Enzenbacher (1992), Hall (1992, 1993), Szabo & Dalziell (1994), Johnston & Hall (1995), Hall & Wouters (1995), Stonehouse & Crosbie (1995), Cessford (1997), Dingwall (1997), Walton (1997), Dalziell & de Poorter (1997), Mason & Legg (1999), Giese (2000), Hoffmann & Jatko (2000), Kriwoken (2000), Bauer (2001), Tracey (2001), and IAATO (2000, 2005b) all provide valuable general descriptions of the potential and actual impacts of tourism at landing sites in Antarctica. Various Information Papers and Working Papers on the subject have also been presented to ATCM over the years. Most of the discussion in these various papers is presented as background or context material for general discussions on the full gambit of issues surrounding tourism in Antarctica.

A number of authors have investigated and presented discussion of more specific aspects of tourism impacts. IAATO (2001) discuss the physical impacts of tourist parties at specific sites; Hughes (1994) and Hughes & Davis (1995) discuss the impacts of tourism on historic sites; Lewis, Hewitt, Riddle & McMinn (2003) present an examination of the issue of introduction of marine organisms from tourist ships; and Eppley (1992), and Kennicutt & Sweet (1992) investigate the impacts of the *Bahia Paraiso* oil-spill accident. A number of articles have been also been written on the interaction between tourists and wildlife at Antarctic sites, mostly on the interaction between humans including tourists and penguin species in the Antarctic Peninsula region. For example Patterson, Holm, Carney & Fraser (1996), Culik, Adelung & Woakes (1990), Pfeiffer & Peter (2004), Harris (1991), and Thompson

(1977) all present in-depth discussions on the human-penguin interaction issues. Giese, in conjunction with others, (1996, 1998, 1999, 2000 & 2003) has been prolific in the area of researching human/wildlife interactions in the Antarctic context.

From this literature it is possible to identify several common 'themes' with respect to the types of impact of tourism. These themes of potential and actual impact can be generalised as follows:

- physical damage to the landscape,
- interference with wildlife, particularly avian species,
- introduction of weeds and diseases, particularly to avian species such as penguins
- marine pollution and introduction of non-endemic marine organisms,
- impacts on historic artefacts,
- interference with ATCP science programmes,
- safety issues

Several authors have highlighted the temporally and spatially uneven and concentrated nature of Antarctic tourism (e.g. Tracey, 2001). As discussed in this chapter, the majority of tourism activity takes place at a relatively small number of sites. Tracey (2001) points out that the majority of the use also occurs over a relatively short period of time and Pfeiffer & Peter (2004) point out that it is also concentrated at a time of the year when wildlife numbers are often at a maximum, breeding cycles are at a critical stage, and ground conditions are at their most vulnerable. Hall (1992) supports this assertion, noting the relationship between the primary tourist seasons and the avian breeding season in Antarctica. IAATO (2005b, p. 1) also note this, stating, "The juxtaposition of high density breeding areas and a concentration of human activity at specific points throughout the Antarctic has, inevitably, provoked concern over ecological disturbance". Whilst Headland (1994) calculated that tourism activities represented 0.52% of the time spent ashore by personnel from science programmes, Pineschi (1992) makes the valid counter-argument that the tourism use is spatially concentrated in a way that science programme activities are not.

One of the objectives of this chapter is to discuss the specific types of impact that tourism has, or might have, on the Antarctic environment, by way of examination of the available literature and by way of consideration of the wider research area of tourism impacts and application of that discussion to the Antarctic situation. It is considered that this discussion is best presented by way of individual discussions on the individual areas of impact as identified above, along with a discussion of the other types of impact seen in other wilderness tourism situations but not necessarily yet documented in Antarctica.

Of the various papers and articles, possibly the best of them, and certainly the best contemporary publications, with respect to understanding the potential and actual impacts of tourism, are the Tracey (2001) PhD thesis, and Hoffmann & Jatko's (2000) proceedings of a workshop of Antarctic tourism experts. The workshop was dedicated to looking at the cumulative impacts of ship-based tourism in the Antarctic Peninsula region, and the workshop proceedings provide an excellent contemporary overview of the issue, using relatively recent information. Reference will be made to these publications frequently in this discussion, as well as the more specific research papers on the individual impact areas themselves.

It is important to note at this stage of the discussion that the information and research that is currently available on the impacts of tourism in Antarctica is by no means complete or even that comprehensive. Hoffmann & Jatko (2002, p. v) note in the context of ship-based tourism to the Antarctic Peninsula:

“Currently available information is insufficient to accurately predict how or to what extent the physical features and biota at particular sites may be affected by repeat visits or to accurately predict the frequency and duration of visits likely to produce particular effects or how those effects might best be avoided.

A number of studies have been and are being done that provide the kinds of data needed. It is not clear, however, whether these studies are providing all of the needed information, and, if not, what additional research and monitoring are necessary to resolve the uncertainties”.

Stonehouse & Crosbie (1995, p. 222) had previously noted that, whilst there appeared relatively little impact of tourism at the commonly used tourist landing sites, “that damage is not immediately apparent does not mean that it is absent. We still have to measure possible long-term effects, for example of multiple visits to breeding colonies of penguins, and indeed to establish the baseline data against which such long-term effects may be measured.” Tracey (2001, p. 112) notes that “Few research programs with rigorous experimental designs have been completed, or are even underway, monitoring is practically non-existent, and empirical data sets are few”.

Despite these areas of uncertainty, particularly around the matter of cumulative impacts, which are not uncommon in the international studies of the impacts of tourism, there is a sufficient body of research to at least make some superficial observations and conclusions regarding this area.

The secondary research methodology used to support the discussion in this section of this chapter is also complemented by the author’s own observations of tourist activity at Antarctic tourism landing sites, gained while accompanying a Quark Expeditions voyage to the Ross Sea Region in 2005. First hand observations of the activities of tourists and the immediate and obvious effects of the activity were possible in this role, and, as much as is reasonable and applicable, these observations have been utilised to assist with the discussion in the sections to follow.

5.14.3 *Physical Impacts*

Repeated visits to ice-free landing sites by groups of tourists may have environmental impacts on the sites in a number of ways. The primary impact is caused by the concentrated foot traffic of the tour parties around the sites, and the repeated grounding of boats and passage of passengers on beaches may also disturb sand and gravel and affect erosion patterns (Hoffman & Jatko, 2000). The direct effects of these activities includes soil compaction and the creation of footpaths, the trampling and destruction of fragile moss and grass species (predominantly an issue at the Peninsula Region sites), and direct erosion caused by foot traffic on loose scoria-covered hillsides (Hoffman & Jatko, 2000). The susceptibility of the sites to damage from foot

traffic is linked to their coastal situation and the fact that in most cases the surface thaws during the austral summer, which is when the tourist visits occur, making them more prone to damage (Mason & Legg, 1999). IAATO (2001) and Naveen (2003) both discuss the potential for impact from foot traffic at sites where loose and friable surface conditions occur, for example the Canada Glacier Dry Valleys in the McMurdo Sound area. The author has witnessed these impacts first-hand at this site in 2005. The movement of some 100-odd passengers and guides on the Quark Expedition around the prescribed 'track' at the Dry Valleys site clearly resulted in a deepening and widening of the footpath over the seven hours of the visit. Some evidence of previous visits (in terms of foot tracking) was also visible at the start of the visit.

Tracey (2001) reports a study conducted near Scott Base investigating the effect of foot traffic of different types of soils, and notes that impacts from relatively low levels of use became apparent almost immediately, and that a conclusion was reached that for most Antarctic soil types there is a very low threshold at which obvious and probably permanent damage occurs (Campbell, Claridge & Balks, 1998 in Tracey 2001).

The creation of tracks and footpaths can be both a direct physical impact and a visual issue, in that some heavily used footpaths may be visible from some distance off, affecting the pristine nature of the site geography. Evidence of this type of impact can be seen at several of the Ross Sea Region sites; at Cape Evans on the track to Memorial Cross, and at the Canada Glacier Dry Valleys site by way of the track to high point of the ASMA (personal observations, Maher 2005). In the Peninsula Region an example is the impacts on the scoria track to "Neptune's Window" at Whaler's Bay, Deception Island (Naveen, 2003).

Indirect impacts from foot traffic can include water and wind scouring along the worn tracks. This can lead to an exacerbation of the erosion even when the tour groups have left and retard recovery of the affected sites (Hoffman & Jatko, 2000).

Naveen (1997 and 2003) also notes the presence of actual and potential impacts at the Peninsula sites from trampling of fragile moss, grass and sometimes lichen beds

associated with the landing sites. Davis (1998) likewise discusses the potential for tour groups to affect areas of moss, lichen, grass or algae at the Hannah Point site. Generally researchers appear to agree that an exacerbating factor for this issue is that the recovery rates of alpine and polar vegetation species from such damage is generally extremely slow and repeated foot traffic may mean recovery may not happen at all.

The NZAI (2001) report on the Ross Sea Region, in noting that visitor landings in ice-free areas can result in disturbance to ground surfaces and vegetation, observes that (2001, p. 3.29) “The age and slow weathering rates of cold desert Antarctic soils renders them fragile and highly vulnerable to permanent damage by humans, particularly at inland sites such as the McMurdo Dry Valleys.” The report goes on to note that specifically susceptible moss and lichens communities occur at a number of the Ross Sea Region landing sites, specifically Cape Bird, Cape Hallett and Terra Nova Bay.

Tourist groups can also introduce litter and waste to landing sites, and cause impacts by collecting souvenirs such as rocks and artefacts (Hoffman & Jatko, 2000). Fortunately it would appear from the literature that this problem has largely disappeared with the development of the IAATO behavioural guidelines.

Not all of the regularly-used tourist landing sites are vulnerable to physical impacts of tour parties. For example, observations by the author indicate that both Cape Adare and Hut Point in the Ross Sea Region are effectively immune to physical impact, the former on account of the flat guano-cemented gravel nature of the surface, and Hut Point because it has been heavily modified in the past (by the building of a road to the door of the hut) through the development of the adjacent McMurdo Station. Similarly in the Peninsula Region it would appear from the Naveen 2003 site inventory that the Almirante Brown Station, Neko Harbour and Petermann Island landing sites are all examples of tourist landing sites where the nature of the ground conditions means that the potential for physical impacts would be very low.

5.14.4 *Direct Interference with Wildlife*

Of all of the areas of actual and potential impact associated with tourism in Antarctica this is probably the one that has received the greatest attention from researchers and the tourism industry. This is possibly not surprising given the large numbers of wildlife usually found at the tourist landing sites. Indeed, it would seem that the concentrations of wildlife at many of the sites, for example penguin colonies, skua gull and great petrel rookeries and sea elephant and fur seal haul-out areas, are one of the main attractant features of the sites and the Antarctic region itself. Giese (2000, p. 9) notes, in a discussion on the volume of tourism to Antarctica, that “most of these visitors will seek direct interactions with the unique wildlife of Antarctica, particularly the penguins and seals.”

Hoffmann & Jatko (2000) document a number of actual and potential effects of tourism on wildlife, including trampling of eggs and nests, disturbance of animals causing a number of reactions ranging from abandonment of nests and young animals, disturbance to breeding behaviour and success, exposure of animals to increased predation, and stress from interactions that can lead to increased susceptibility to disease and parasites. A number of studies on the interaction between humans including tourists, and penguins have been undertaken over the last decade or so. Generally there have been two approaches to this area of research;

- one involving direct measurement of the heart rates of bird species during interaction with humans, as an indicator of stress and disturbance levels, and
- the other approach studying the breeding success of colonies exposed to human interaction, as compared to colonies not exposed.

NZAI (2001) discuss the potential for tourist activities to impact on resident and visiting wildlife, noting that, in the Ross Sea Region, tourism activity is concentrated in the major breeding and moulting season for sea birds. The report also comments on the potential for helicopter landings and overflights to cause impacts. Melissa Giese of the Australian Antarctic Program seems to be one of the more active researchers in this area. Giese has published over twenty-five articles or conference papers on the

issue of human interaction with Antarctic wildlife, in particular bird species. Other studies that she has been involved in have researched the effects of helicopter operations on Antarctic wildlife (Giese & Riddle, 1998, 1999), and produced guidelines for small-boat use around Petrels (Holmes, Giese & Achurch, 2003).

Giese (1996) studied breeding success of penguins in the Vestfold Hills by way of observations of direct nest intervention (checking) and replicated 'recreational visits'. She found that hatching success and chick survival was highest at the undisturbed control colonies, and lowest at the colonies subjected to the replicated recreational visits. A further conclusion was that there was no statistically significant difference between the effects of nest intervention and recreational activity.

Patterson, Holm, Carney & Fraser (1996) studied the effects of tourism activity on the reproductive success of Adelie penguins on Torgersen Island near Palmer Station in the Peninsula region. This site receives a moderate level of use (between 500 and 1000 tourists per annum in the mid-1990s), and has been the site of some long-term studies on the resident Adelie penguin colonies for many years. A three-year study of the relationship between the breeding success at various colonies (visited and unvisited) and the levels and patterns of tourist use of the site indicated that tourism at the site did not affect Adelie penguin reproductive success. The authors suggested that wider environmental factors such as snow deposition patterns, colony aspects and predation levels may be more influential in determining breeding success than tourism effects.

Cobley & Shears (1999) looked at the effect of visitation on Gentoo populations at Goudier Island, Port Lockroy, one of the most commonly visited tourist sites in the Antarctic. Using 'treatment' colonies that were visited by thirty-five to fifty-five tourists every one to two days during the 1996/97 summer, and comparing the breeding success of these colonies to control unvisited colonies, these researchers concluded that there were no differences between the two groups in terms of proportion of birds that laid eggs, or in the hatching success of the colonies. Their view was that disturbance from tourist visits was unlikely to be a major determinant of any changes in the Gentoo penguin population at this site.

One of the most quoted and famous studies into the effect of human activity on penguin colony breeding success and population dynamics is Thompson's (1977) paper on the impact of science-programme related activity on the Adelie penguin colony at Cape Royds in the Ross Sea Region. Thompson documents a significant decline in the colony population from about 1956 to the mid -1960s, followed by a slow recovery in the population after about 1963. He attributes the decline to the establishment of McMurdo Station nearby (in 1956), which in turn, due to the attractions of the colony and the adjacent Shackleton's Hut and the reasonably close proximity to McMurdo Station and Scott Base, resulted in frequent 'sightseeing' visits by scientists, base staff and visiting dignitaries, usually involving helicopter transport. Thompson illustrates the relationship between the decline in breeding and the increase in uncontrolled visitor activity at the site, followed by the introduction of visitor controls at the site and a decline in visitation which is correlated to a period of population increase.

Other researchers have studied the direct disturbance and stress effects of human activity on penguins and other birds. Giese, Van Polanen Petel, Holmes, Bunce & De Villiers (2003) are currently undertaking comprehensive research to attempt to empirically assess the impacts of human activity on seabirds and seals, using indicators such as heart rate, eggshell surface temperature and vocal behaviour. Culik, Adelung & Woakes (1990) have looked at the effects of disturbance on Adelie penguins. Like Giese (1996) this study was carried out at a research station site and not a tourist landing site, but the conclusions are still considered valid. Their findings were that these penguins did react strongly to human interaction during the breeding season, and that this may result in reduced fledging and breeding success.

Tracey (2001) reports on studies by Nimon, Schroter & Stonehouse (1995) relating to Gentoo penguins, and Wilson et al. (1991) on Adelie penguins, both measuring heart rate fluctuations in response to human approaches, and both studies showing increased stress levels from human interaction. Pfeiffer & Peter (2004) carried out similar research on Southern Giant Petrels on Penguin Island, a tourist site in the Peninsula Region, and surmised that human approaches did result in heart rate indicator fluctuations, but that stress levels dropped quickly if appropriate behaviour was shown by tourist parties. They concluded that current levels and types of tourist

use of the site could be sustained in terms of disturbance to the petrels, but that the minimum approach distance at that site should be increased to fifty metres (the IAATO tourist guidelines current at the time were twenty-five metres to fifty metres).

The author's own observations (Maher, 2005) of the interaction between tourists and wildlife at tourist landing sites would suggest that there is the potential for impact at least. The guides associated with that expedition were vigilant in their observations of the clients and in the adherence to the IAATO guidelines. The majority of the clients deliberately adhered to the guidelines, but occasional lapses occurred and approach distances in particular were breached. While no discernable immediate impact was observed, actual disturbance could have happened.

In summary then, it would appear from an overview of the research conducted to date that two main conclusions can be reached regarding the effects of human and tourist interaction on penguin and bird species.

- Breeding success of penguin colonies regularly visited by tourists and other humans can be seriously affected by inappropriate use, as demonstrated by Thompson's (1997) conclusions regarding Cape Royds. However, more recent studies indicate that at current levels of tourism anyway, such detrimental effects are not resulting from the interaction between tourists and penguins at the tourist sites visited. Hoffman & Jatko (2000) suggest that the level of impact may in turn be related to the location of the site in relation to the distribution of the species (species at the limits of their distribution may be more vulnerable to stress than species near the centre of their range), and the timing of the visits in relation to breeding and moulting cycles.
- Close approaches by humans to both penguin and petrel species can produce increases in heart rate, which may be an indicator of stress. This stress can lead to behavioural impacts such as nest or chick abandonment, susceptibility to disease or parasites, or increased predation. The level of impact induced appears to be directly related to approach distance and human behaviour. It can be inferred that mitigation of this impact could be achieved by maintaining distance separations and maintaining certain behaviours.

Interestingly, there appears to be little current or historical research currently published on the impacts of tourism and other human activities on Antarctic mammal species such as seals and sea elephants. IAATO (2005b, p. 1) note:

“Studies assessing visitor disturbance to the Antarctic environment have concentrated primarily on seabird species, with little work having been completed on other wildlife species. This is because many of the human activities occur in the vicinity of seabird breeding locations (far more than is the case with marine mammals), and because seabird species are readily apparent and therefore relatively easy to study.”

Giese is currently undertaking, in collaboration with others, several studies into the interaction between humans (including tourists) and Weddell Seals. For example, Van Polanen Petel, Giese, & Bryden (2001) report on specific studies into the behavioural and physiological effects of human and vehicular approach to Weddell Seals. Some impact is noted, and research is continuing.

5.14.5 *Introduction of weeds and disease*

One of the significant potential, but fortunately not yet actual, impacts of tourism in Antarctica is the matter of possible introduction of weeds and diseases borne by visiting tourists. For example pathogens could be transported by tourists from the sub-Antarctic penguin colonies to the Antarctic during the course of a voyage. This potential risk to the Antarctic environment is by no means limited to just tourism activities. Personnel associated with science programmes are just as likely to introduce alien species and diseases to specific sites as tourist are. However a potential risk does exist associated with tourism visits, and needs to be factored in to any discussion on the management of effects of tourism.

Currently there is only a limited body of research into this particular type of impact in Antarctica. NZAI (2001) briefly raises the issue in relation to the Ross Sea Region. Hoffman & Jatko (2000) note that tourists may introduce non-indigenous flora and

fauna to tourist land sites, and they include micro-organisms in this description. These introduced species are speculated to be able to displace or harm indigenous species. Hall & Wouters (1995) also speculate that tourists could introduce bird or plant diseases and introduce non-endemic organisms.

In response to the perception of risk from the introduction of weeds and foreign organisms, in particular the potential for the introduction of pathogens that could impact on avian species at the tourist sites, a small number of research papers have been published on the issue of disinfecting the footwear of visiting tourists. An example of this is the Curry, McCarthy, Darragh, Wake, Churchill, Robins & Lowen paper of 2004 on suitable disinfectants for tourist footwear in the Antarctic. Tourists visiting the Antarctic tourist sites bring their own footwear from their home countries, and in many cases these boots may have been worn on hiking trips and on farms before the travel to the Antarctic (Curry et al, 2004). Tourists visiting Antarctica on cruise ships usually visit between four and ten different sites, and often land at sub-Antarctic islands on the voyage south. The potential for diseases to be transferred from the home country or the staging-points in the common embarkation ports of South America, Australia or New Zealand, or from site to site during the voyage, is highlighted. Also noted is the potential for introduced diseases to cause significant damage to indigenous avian species, and the example of the extinction of several bird species in the Hawaiian Islands related to avian pox and malaria is referred to. The study tested the effectiveness of a disinfectant chemical (Virkon) for neutralising any bacteria on tourist boots, and concluded that the chemical was effective and that tourist footwear should be disinfected prior to landings commencing, and between each landing.

Other researchers are continuing to look at this issue, and on the author's voyage to the Ross Sea Region in February 2005 a researcher from the University of New South Wales spent the voyage conducted tests on swabs of boots before and after disinfection and landings to test the potential for the transfer by tourist footwear of microbial pathogens between penguin colonies in the region.

5.14.6 *Marine Pollution and Introduction of Non-Endemic Marine Organisms*

This area of tourism impact has received an increasing degree of attention in recent years (Kennicutt & Sweet, 1992; Eppley, 1992; Hoffman & Jatko, 2000; ASOC, 2003; Lewis, Hewitt, Riddle & McMinn, 2003; Tavares & de Melo, 2003). Possibly this increase in awareness of possible impacts from the operation of tourist cruise ships has been accelerated by the sinking of the *Bahia Paraiso* in 1989, which occurred whilst the ship was engaged in a combined tourist voyage/science programme re-supply run. Most of the contemporary researchers who discuss tourism impacts touch on this subject in one form or another, although for many it is only a superficial commentary on the possibility of impact. Hoffmann & Jatko (2000) provide a good general discussion on the topic and note potential impacts from shipping may include:

- Damage to marine substrate and benthic communities from repeated anchoring at the same anchor points
- Fuel and oil leaks
- Illegal dumping of sewage and other shipboard waste
- Noise from ship and small-boat activities
- Shipborne interference to wildlife
- Pollutions caused by ship engine emissions

Among the more comprehensive discussions relating to marine pollution from tourist cruise ships are Kennicutt & Sweet (1992), Eppley (1992), and Lewis, Hewitt, Riddle & McMinn (2003).

Kennicutt & Sweet (1992) and Eppley (1992) both provide specific examinations of the impacts caused by the sinking of the *Bahia Paraiso* off Palmer Station in the Peninsula Region in 1989. Eppley studied the impact of the accident on the reproductive success of South Polar Skua chicks in the vicinity. He reports that all of the chicks alive at the time of the spill died within a three-week period of the oil

release. Also reported is a wide-ranging controversy at the time amongst researchers as to whether or not the complete failure of reproduction in this particular population was directly or indirectly associated with the accident, or whether or not it was a coincidental natural phenomenon. A positive causal relationship between the spill and the chick deaths was not established, but Eppley did indicate that there were significant increases in incidence of parental neglect and corresponding increases in predation as a result of the spill. It seems reasonable to assume that an oil spill of any magnitude in this environment would have some at least temporary impact on local wildlife.

Kennicutt & Sweet (1992) studied the effect of the oil spill on intertidal limpets, beach sediments and subtidal sediments. Their conclusion was that, two years on from the accident, very little contamination could be found in the limpets and subtidal sediments, but that the beaches were still contaminated, possibly due to ongoing periodic releases from the remaining wreck of the ship.

A brief commentary on this issue is also provided by ASOC in an Information Paper to ATCM XXVI (ASOC, 2003). This short paper reports on the analysis of benthic sediments at the normal tourist cruise anchorage at Port Foster in Deception Island (Antarctic Peninsula) after collection in 2001/2002. The paper states that hydrocarbon concentrations at the popular tourist ship anchoring sites were in excess of ten times higher than the 'background' or control levels of other sediment sampling areas, and that this increase in pollutants could be related to the frequent use of this bay by tourist cruise ships.

Even less studied than direct pollution is the matter of the introduction of non-indigenous marine organisms. Lewis et al (2003) investigated the potential for ships embarking from Australian ports and used in the support of Antarctic science programs, and transporting tourists to and from the continent, to introduce foreign marine organisms by way of ballast water and hull fouling. Noting that most of the ships involved in these voyages also regularly visit a variety of other ports and oceans in both the Northern and Southern hemispheres in any one year, the authors took samples from the hulls of ships and from ballast water. After examining the species present, and looking at the ability of different species to survive in the cold waters of

Antarctica, the authors concluded that the passage of ships south to Antarctica, from Australia anyway, “has the potential to introduce non-indigenous species into a marine environment that is known to have high levels of endemism (Lewis et al 2003, p. 220).

The issue is also discussed in an Information Paper presented to the 2005 ATCM XXVIII by IAATO and COMNAP (2005), in the form of a discussion about the potential for invasive marine species to be introduced to Antarctic waters by way of ballast water. The paper recognises the potential for quite significant impacts from ballast water exchanges, and discusses a variety of potential mitigation measures. The Australian government also raised the issue at the 2004 ATME (Australia, 2004), discussing quarantine risks and the need for mitigation measures to be developed. Both CEP and the IUCN put up brief papers to the 2005 XXVIII ATCM on the subject (CEP, 2005; IUCN, 2005), seeking to increase discussion and debate on the issue.

Tavares & De Melo (2004) have published an article on the actual introduction of a non-endemic species into Antarctic waters. They document the discovery in 1986 of the North American spider crab (*Hyas araneus*) for the first time in Antarctic waters, in the Peninsula region. They claim that Antarctic waters were, prior to this discovery, the only marine ecosystem not colonised by exotic species, and, whilst they make no attempt to draw any conclusions as to the origin of these specimens, they do highlight the ongoing potential for alien species invasion.

5.14.7 *Impacts on Historic Artefacts*

The main concentration of historic sites and artefacts associated with tourist landing sites is in the Ross Sea Region. Among the primary tourist attractions for cruise itineraries to this part of Antarctica are the historic hut remnants at the various ice-free capes that occur along the fringe of the Ross Sea. Approximately 400 tourists visit each of the huts each summer season (IAATO, 2005a). The Ross Sea Region State of the Environment Report (NZAI, 2001) observes, in a discussion relating to the historic huts and related historic artefacts at Cape Adare, Cape Royds, Cape Evans

and Hut Point, that visitors (tourists and programme personnel) have the potential to cause damage either intentionally or inadvertently, mainly through handling or rearranging of artefacts that are lying on the ground around the sites.

Janet Hughes is probably the only researcher that has made a number of dedicated studies of the specific issue of tourism and historic sites in Antarctica (Hughes, 1994; Hughes & Davis, 1995), particularly the historic sites in the Ross Sea Region. Hughes puts forward the view “that visitors *do* cause damage at historic sites” (1994, p. 286), but tempers this statement with a proviso that compared to natural processes such as corrosion, meltwater and wind damage, the impacts from visitors “appears slight”. Hughes & Davis (1995, p. 247) conclude that “There is little current evidence linking deterioration or damage to specific tourist numbers, but a monitoring programme, including periodic photographic assessment, may yield some information”.

Despite some apparently conflicting viewpoints, Hughes (1994) does note a variety of potential impacts at historic sites including:

- Direct damage, mainly to hut floor surfaces, through scouring from scoria and rock material carried on boot soles
- Handling of historic objects
- Humidity changes due to opening and shutting of doors

And in Hughes & Davis (1995):

- Souveniring or theft of artefacts
- Trampling and contamination of scientific specimens at the historic sites

The authors own observations of tourist visits to all the historic hut sites in the Ross Sea Region support many of these comments (personal observations, Maher 2005). Apart from souveniring, which has now almost certainly ceased on tourist visits (Hughes & Davis, 1995), at least the potential for the other impacts to occur was observed. All the huts in the Ross Sea Region have boot scrubbing apparatus at the doors, and all tourists are compelled to clean their footwear before entering. Whilst no direct handling of artefacts was noticed, at least one item was inadvertently knocked

off a shelf, and at Hut Point a small number of tourists inadvertently trampled on the mummified seal blubber stack near the doorway.

5.14.8 *Interference with ATCP Science Programmes*

This issue refers to the impact that the pre-arranged visits of tourists to the bases of the ATCP nations has on the operation of those bases and the science programmes conducted from those bases. Most if not all of the current cruise itineraries attempt to include at least one visit to a research base on the continent. Voyages to the Ross Sea Region often attempt to visit all three of the readily accessible bases in the Region (Terra Nova Base, McMurdo Station and Scott Base). In the Antarctic Peninsula Region the remaining base facilities at Almirante Brown Station are consistently amongst the ten most-visited tourist sites in the whole of Antarctica. The potential for these tourist visits, often with several hundred visitors in a short period of time, to produce some form of impact of the operation of the bases and the research programmes operated from them, has been identified by a number of researchers and commentators. This includes Hall (1992), Hall & Wouters (1995), Mason & Legg (1999), Bauer (2001), and Hoffmann & Jatko (2001). A reasonably common thread of argument put forward in this context is evidenced by Hall (1992, p. 6), when he argues that the activity of tourism at scientific bases, or even in the general environs, can lead to disruption of the activities of the bases themselves, and also to impacts related to the diversion of resources to search & rescue operations, supporting medical emergencies and environmental clean-up. The British Antarctic Survey (the British Antarctic national programme operator) has recognised the potential for impact, producing a 2002 policy (United Kingdom, 2002) placing certain conditions and restrictions on tourist visits to the bases in the peninsula region. Obviously one has to take a somewhat objective view of these types of comments given the well-documented detrimental impacts on the environment of the research stations themselves.

Interestingly in the face of this potential impact on the activities of scientific bases, all of the research stations visited by tourists in the Ross Rea Region (Terra Nova Base, McMurdo Station and Scott Base), have constructed or developed specific retail

facilities to sell branded items to tourists from the cruise ships that visit the sites (personal observations, author 2005). Naturally enough the ATCP nations that operate research bases in Antarctica, and that are subject to interest from tourism operators, have devoted some discussion within the ATCM framework to the issue of impacts on scientific programmes. In particular the Council of Managers of National Antarctic Programmes (COMNAP) has devoted some attention to this issue. In 1996, 2002, and again in 2003 COMNAP has put to ATCM meetings papers on the subject of the interaction between national programmes and tourism operations. The 2002 paper to the XXV ATCM in Poland noted, with respect to the 2001/02 tourist season:

- Twenty-two of the national science programmes had some contact with tourist operations during the summer. This included visits to stations, shared transport arrangements and radio communication for weather reports etc.
- Thirteen nations had their research stations visited at least once during the season. The total number of stations visited by tourists was twenty-one (some nations operate more than one station).
- Three of the stations had more than twenty visits during the summer, and all of these were in the Peninsula Region.
- Approximately 9,300 tourists visited research stations in the 2001/02 season.
- The average number of tourists per visit was sixty-seven.
- The length of a typical visit was three hours.
- Sixteen out of the twenty-two nations involved in tourist contact used tourist transport (ships or planes) to bring in passengers and/or goods to support their national programmes.

5.14.9 *Safety Issues*

One of the more ‘endemic’ tourism issues for researchers looking at Antarctic tourism is the matter of safety. For most tourism management frameworks this issue is of somewhat lesser importance to issues of physical site degradation, pollution etc. In the Antarctic context the matter seems to have attained a higher than normal profile, albeit primarily from the ATCP signatory parties rather than from tourism operators or researchers themselves. A significant number of Information and Working Papers

to various ATCM have raised issues relating to safety of tourism operations and liability issues (e.g. COMNAP, 2004; Italy, 2004; Australia, 2004). In part this may be due to the military and logistics background of most of the science programme managers from the ATCP nations, and also in part due to the consequences of Search & Rescue (SAR) operations for the national programmes who operate in the vicinity of the tourism sites.

5.14.10 Impacts from Minor or Developing Tourism Activities

In addition to the more documented impacts as discussed above, which are almost all associated with shipborne tourism in Antarctica, there may be some impacts associated with the other less common forms of tourism. For some, such as yacht-based tourism, the impacts could justifiably be expected to be similar to those associated with ship-borne tourism, albeit at a much lower level of intensity. Impacts associated with the current land based tourism infrastructure, which is essentially restricted to the ANI operations in the Antarctic interior, could be expected to be similar to impacts from science programme camps, for example fuel spills, sewage management and rubbish.

In terms of potential future land-based tourism infrastructure (e.g. hotel facilities), impacts may be similar to those seen at the larger ATCP bases around the continent, including sewage, physical damage and fuel management. Hall (1992) and Kriwoken (2000) both provide reasonably detailed commentary on what possible impacts might accrue if this type of tourism became well established.

The other area of tourism impacts that has been discussed from time to time is impacts from tourism overflights. This type of tourism is growing in popularity again after the Air New Zealand Erebus disaster, and there have been suggestions that such overflights may have the potential to cause pollution for engine emissions, and noise pollution. It would appear to be safe to say that, of all the different types of potential impact from tourism in Antarctic, impact from overflights would have to be the impact of least concern.

5.14.11 *Personal Observations – Tourism Impacts in Antarctica*

It is possibly not until one observes first hand the landing of tourists from a cruise ship onto a landing site in Antarctica that the practical issues relating to impacts on site values become clear. Most of the tourist cruise ships carry more than 50 passengers, and some carry several hundred. Tourists are usually landed from the water by zodiac onto a convenient beach, as close to the attractions of the site as possible. Once on shore they walk to the attractions, often along routes picked out, and sometimes marked out, by the guides that accompany them.

The observations of the author of the landing of 112 passengers from the I/B Kapitan Khlebnikov at the Ross Sea Region sites supports the literature written on this subject. With one exception the activities of the tourists and their guides produce no significant discernable impact. This does not mean that cumulative impact is not occurring, or that non-discernable impact such as disturbance to wildlife populations is not occurring, just that in most cases impact is not obvious. Obvious impact does occur in the form of foot tracking. This was directly observed by the author at more than one Ross Sea tourist site. While many sites (e.g. Cape Adare, Hut Point) are sufficiently hard to resist any impact from foot traffic, others such as the Canada Glacier site in the McMurdo Dry Valleys are more fragile, and the creation of foot paths and the effects of foot tracking are obvious after a day's visit by 100-plus people. Tracking was also observed at the Cape Royds and Cape Evans sites. While it is possible that much of the impact is 'repaired' between seasons by natural processes (wind and snow), it is equally possible that these impacts remain from year-to-year. Unfortunately to date no photo-point monitoring has occurred to verify this.

5.15 *Summary*

It is clear from the literature, and the author's own observations, that tourism activity in Antarctica can have an impact on the environment at the sites involved. A number of researchers have highlighted the potential for the range of impact types that one would normally expect for the types of activities involved (e.g. use of ships, guided walks, use of aircraft) in close proximity to large concentrations of wildlife and in

physically sensitive areas. Creation of footpaths, trampling of flora, disturbance of birds and mammals and pollution of introduction of foreign species are all mentioned.

Some authors, and Bauer (2001) is prominent amongst them, claim that after several decades of tourism no detrimental impact is apparent. This view is challengeable on both the facts (e.g. footpath creation at Canada Glacier in the McMurdo Dry Valleys), and on the theory of tourism impacts. It also ignores the clear potential for largely unseen cumulative impact and ignores the seemingly rudimentary nature of inventory and monitoring to date, as highlighted by Stonehouse & Crosbie (1995), Tracey (2001) and Hoffmann & Jatko (2002). The issue is not whether tourism has an impact, but how to manage that impact, whether that impact be actual or potential.

Clearly any system of management of tourism, be it self-regulatory or legislative or both, needs to specifically address the potential impacts as discussed above.

Moreover, any tourism management system needs to factor in the nature of the sites involved in that tourism. For example, a hard rocky site with low natural values such as Petermann Island will require far fewer restrictions on tourism management than a site rich in flora and fauna and with restricted walking opportunities such as Hannah Point. Historic sites need their own special attention, and the use of ships to transport tourists from site to site brings its own issues in to play.

Chapter 6. Discussion

Previous chapters of this thesis have examined a number of issues relating to the research question of this thesis. The discussion has examined:

- theories relating to the management of tourism in protected areas;
- the current regulatory system that applies to tourism on the continent;
- the historic and contemporary context of tourism in Antarctica;
- the particular values and nature of the sites where it takes place, and
- the impacts that tourism has the potential to incur on the environment in general and the Antarctic tourism sites in particular.

What these preceding discussions indicate is that, in the face of a expanding visitor numbers with largely unknown effects on what appear to be generally fragile sites (Hoffman & Jatko, 2000), and in a legal and regulatory context that does not necessarily provide comprehensive or even adequate management control (Joyner, 1998), there are strong indications that improved and additional tourism management components to the current system are almost certainly required (Tracey, 2001).

The discussions in Chapter Three regarding international theories relating to management of tourism in protected areas suggest that certain key elements of the tourism system are linked, viz. activities, site attributes, impacts and management responses (e.g. Hammitt & Cole, 1998), and that certain key components of a management system should be in place, viz. legislation, planning and management response (Eagles & McCool, 2002). Chapter Four contributes a description of the current regulatory framework within which tourism in Antarctica operates. Chapter Five profiles the Antarctic tourism industry and describes the sites where it occurs. The impacts of tourism at those sites is described and analysed.

The objective of this chapter is to discuss what those improved and additional tourism management components might be in the light of the foregoing discussions relating to Antarctic tourism. To do this it is intended to compare the theoretical protected area management approaches, as examined in Chapter Three, with the current ATS framework and its tourism management components. This chapter will highlight those elements that are either missing altogether or are inadequately developed. A critique of the current system will be provided in the initial section to this chapter, as well as a discussion on the constraints that the unique legal environment of the Antarctic brings to this issue. Alternative models for an improved system, including those put forward in recent years by researchers and ATCP countries, will be examined against these constraints and tourism management theory/practice. A comprehensive system to address the current shortcomings and omissions will then be described for managing tourism in Antarctica.

To recap, in Chapter Three it was concluded that an effective and efficient management system for protected areas would have three basic components (Eagles, McCool & Haynes, 2002):

1. a clear and enforceable legislative system that provides strategic purpose,
2. a system of policies, strategies and plans that provide general and site-specific objectives and goals for management,
3. a series of management tools and interventions that, when applied, enable the purposes of the legislation, and the objectives of the policies and strategies/plans, to be achieved regionally and at specific sites.

The linkages between the basic elements of the tourist system (activities, sites, impacts and management responses) as discussed in the relevant literature (Mathieson & Wall, 1982; Hammitt & Cole, 1998; Eagles & McCool, 2002; Eagles, McCool & Haynes, 2002; Pedersen, 2002 and Newsome, Moore & Dowling, 2002) was highlighted, and several types of visitor management approaches were described, along with the theory relating to management actions required to achieve planned objectives.

Chapter Four described the tourism management aspects of the Antarctic Treaty System. The overall ATS framework for developing regulations and interventions was discussed, as was the specific measures taken with respect to managing tourism. The current system appears technically and detail oriented with limited strategic overview (ASOC, 2004), heavily reliant on tourism industry self-regulation, and with ongoing questions regarding the enforceability of many of the fundamental aspects of the system (Stokke & Vidas, 1996).

Chapter Five examined the nature of the tourism industry in Antarctica and the nature and values of the sites where it occurs. The impact of tourism in general, and tourism at the Antarctic visitor sites in particular, was discussed in order to deliver an appreciation of the impacts that a regulatory system must endeavour to address.

This chapter will now look in more detail at the adequacy of the current system, in order that the effectiveness of alternatives can be properly assessed and presented. The performance of the current regulatory system is examined first, in particular looking at the adequacy of the system with respect to the fundamental elements of a management system as described in Chapter Three (e.g. legal foundation, planning systems). The inherent constraints on designing an improved system are then discussed, immediately prior to a discussion of possible alternative management systems. The key response to the research question of the thesis, namely the improved management system of Antarctic tourism, is then described in detail before the chapter is concluded. The intention is that the chapter will take readers from the theoretical concepts through constraints and alternatives to the presentation of the proposed improvements and additions, in a logical flow of text.

6.1 Performance of the Current Regulatory System

The literature discussing the shortcomings of the current ATS tourism management system is extensive. Enzenbacher (1995), Johnston & Hall (1995), Vidas (1996), Davis (1999), Tracey (2001) and Molenaar (2005) all provide comprehensive overviews of the system and its flaws and gaps. Of the ATCM papers on this matter probably the most comprehensive is the United Kingdom Working Paper #23 to the

2003 XXVI ATCM. Indeed it seems difficult to find a commentator that believes the system to be anything better than adequate. Johnston & Hall possibly sum up the sentiment best with the following; "...there is no systematic and comprehensive legal regime in place to manage Antarctic tourism." (1995, p. 302).

Assessment of the adequacy of the system is made difficult by the lack of any clear objectives or performance standards in the ATS against which the performance of the system can be judged (Tracey, 2001). The purpose of the elements of the current ATS system (with respect to tourism management, or even with respect to the management of the sites in general) is not clear or well understood. Having said this, there appears to be a series of commonly held views regarding the adequacy of the system.

The shortcomings of the current regulatory framework can be summarised under a series of specific headings.

6.1.1 Lack of Strategic Overview

The lack of a clear strategic overview of, and clear strategic purpose for, tourism management in Antarctica has been cited by several researchers as a shortcoming of the current system (IUCN, 1991; Vidas, 1996; Davis, 1999; and Molenaar, 2005). Strategic overview is analogous to the policy level instruments as discussed in Chapter Three. Tracey (2001) makes much of this point, arguing that there is no discernable statement of purpose or mission for Antarctica. Indeed, on examination in detail it would seem that, apart from the general provisions providing that the continent shall be used for 'peaceful purposes only' (Article I, Antarctic Treaty, 1959), and the provisions of the Madrid Protocol deeming Antarctica to be a 'natural reserve, devoted to peace and science' (Article 2, 1991), there is little in the ATS suite of formal instruments that give an indication of the strategic purpose for the management of the sites involved in tourism, and within which tourism is to be managed. Davis (1999) makes a similar point to Tracey, noting that the selection of appropriate management actions and regulations is difficult in the context of a lack of strategic purpose or overview. IUCN (1991), Vidas (1996), Davis (1999) and

Molenaar (2005) provide support for this view. Davis (1999, p. 518) makes the point very well, noting:

“There is no management philosophy save to avoid more than a ‘transitory impact’ on Antarctica as it is a natural reserve, devoted to peace and science. Yet the history of nature parks or designated wilderness areas discloses the necessity of a management philosophy to guide specific tourism policies.”

The IUCN in 1991 called for a ‘conservation strategy’, which in their view should provide, *inter alia*, “a comprehensive framework for the development of policies, controls and management institutions..” (1991, p. 24). As noted earlier in this thesis (Chapter Four), fundamental issues such as whether or not the ATS should concern itself with the quality of tourist experience are affected by this lack of strategic purpose. It is suggested by some researchers (Kriwoken & Rootes, 2000; Hemmings & Roura, 2003) that flaws in some of the key elements of the ATS regulatory system (for example the EIA system), can in part be attributed to this lack of strategic overview. The matter of protection of wilderness values also is affected by this issue, as it becomes problematic to protect a set of values that are not specifically recognised in the legal framework for the management of Antarctica.

Naturally enough the calls for the development of such a strategic framework are widespread and persuasive. The solutions range from a ‘broad policy framework’ (IUCN, 1991); a ‘philosophy of use’ and ‘set of goals and objectives’ (Davis, 1999); a ‘more strategic approach’ (Bastmeijer & Roura, 2004); a ‘mechanism to determine the acceptability of certain activities’ (Hemmings & Roura, 2003); a ‘strategic plan’ (Tracey 2001); and a more fundamental discussion factoring in wilderness and aesthetic values (Molenaar, 2005).

6.1.2 Uncertain Legal Foundation

In Chapter Four the legal foundations to the tourism management system were examined and found to be under question from a number of researchers, particularly

in the area of international law. Problems relating to jurisdiction, enforceability and the appropriateness of different legal mechanisms were discussed. Francioni (1993), Enzenbacher (1995), Stokke & Vidas (1996), Joyner (1998), Polk (1998), Richardson (1999), ASOC (2005) and Molenaar (2005) all provide detailed analysis of a number of areas of concern or debate, and it seems obvious that a series of improvements to this fundamental part of the system are necessary. While some commentators (e.g. Tracey, 2001) believe these issues to be largely minor and easily surmountable, it is probable that they represent a far more difficult obstacle to the effective management of tourism in Antarctica. Richardson, echoing the words of Nicholson of some fifteen years earlier, has highlighted the complexities of the issue (1999, p. 10):

“Tour companies may be registered in one country, operating from another, and marketing widely internationally whilst also sub-contracting to a third-party company based elsewhere. The vessels they own may be owned, chartered or sub-chartered. They may be flagged either with Treaty or non-Treaty Parties whilst the tourists themselves may be a wide spectrum of nationalities. Set against this international kaleidoscope it is difficult to envisage any wholly effective regulatory regime reliant on the normal jurisdictions over flag vessels, nationals or territory.”

Particular areas of the legal framework where there are jurisdictional issues that may effect the implementation of an ‘ideal’ tourism management system include:

- The enforceability of ATCM Recommendations and Measures. Most authors comment on this aspect, and note the potential difficulties in preventing tourism operators ignoring generally accepted practices (and industry regulation) and the possibility of land-based facilities being built in contravention of the wishes of the ATCPs (ASOC, 2005),
- The establishment of potential claims of private property rights or ‘use’ rights from non-ATCP parties related to tourism use of the continent, either through actual occupation or through persistent or continuous use (New Zealand, 2004),

- Liability issues relating to disaster recovery, search & rescue and environmental damage associated with tourism activities,
- Inability to place limits on tourism activity, either spatially or in terms of quantum or type of use (ASOC, 2005),
- Gaps and inconsistencies in the national domestic legislation that enshrines the ATCM recommended measures (Joyner, 1998; United Kingdom, 2003),
- Differences between ATCP countries in interpretation of the ATS system and ambiguity in implementation (Richardson, 1999)

A number of solutions and improvements to the legal foundation with respect to tourism have been suggested over the years. Chief amongst them have been repeated calls for a specific ATS 'instrument' for tourism along the lines of CCAMLR. Some ATCP countries and other parties (e.g. France 2004; ASOC, 2004) have called for a specific Tourism Annex to the Madrid Protocol. Discussions relating to peripheral legal mechanisms such as port-state/flag-state jurisdiction as a means to enforce aspects of the ATS regime are also apparent from the literature (Richardson, 1999; ASOC, 2002 & 2003; United Kingdom, 2003).

6.1.3 *Lack of Management Planning/Comprehensive Protected Area Network*

In most protected area networks the concepts of protected area status and coverage by management plans coincide (Eagles & McCool, 2002). The United States national parks network, New Zealand's national parks, and the Australian national park system are all examples of situations where protected areas have been established and management plans written to guide the management of those areas

A comprehensive management planning system appears consistently to be one of the key elements of an effective tourism management system. As identified in Chapter Three, international studies such as the IUCN (1991) exercise identify the need for a planned approach to Antarctic tourism management, with the 1991 IUCN 'Strategy for Antarctic Conservation' suggesting that:

“Management planning is vital for successful attainment of protection goals. Without adequate plans there is a danger of incomplete policy formulation, inconsistent application of regulations, insufficient success in resolving conflicts, and inadequate completion of management objectives. To date, management planning for protected areas in Antarctica has been inadequate...” (1991, p. 52).

The ATS currently has a management planning system associated with the ASPA/ASMA system of protected areas, as previously referred to in Chapter Four. Prior to 1991 the Recommendation VII-4 called for ‘areas of interest’ to be created, and Recommendation VIII-9 (Annex B) established the concept of ‘Areas of Special Tourist Interest (ASTIs)’ (Vidas, 1996). No ASTIs were ever created. Annex V of the Madrid Protocol was intended to reorganise the protected areas system for Antarctica, and the ASPA/ASMA system was created. This system of protected area status includes a requirement to develop management plans for the ASPA/ASMA sites.

This protected area system, certainly with respect to sites where tourist activity occurs, appears to be under-utilised and not particularly comprehensive or representative (Tracey, 2001). Most of the ASPA/ASMA associated with tourist visitation are in the Ross Sea Region, and few of the most popular tourist landing sites in the Peninsula Region feature protected area status, and therefore any management planning coverage.

Where management plans do exist they appear to be of significant value to managers and tourist operators alike. The author’s experience as a government representative for the Quark Expeditions voyage to the Ross Sea (March, 2005) included observing the linkage created by the New Zealand government permit system between the management plans for the tourist landing sites, and the permit conditions placed on the tourist company. The permit conditions in the Quark permit essentially mirrored the site visitation restrictions that are encapsulated in the management plans.

Most contemporary researchers recognise the need to establish protected area status and management plans for the tourist landing sites. The support for this is extensive. Hughes (1994) and Hughes & Davis (1995) argue the case for historic sites to be

protected and have management plans; Acero & Aguirre (1994) see management planning as an essential framework for research/monitoring at tourist sites; Kriwoken & Rootes (2000) see it as an integral part of the EIA process; Stonehouse & Crosbie (1995) suggest that management planning is an obligatory component of managing polar tourism; and Davis (1999) argues for the use of planning tools such as LAC in a management planning framework. Among the ATCPs the United Kingdom (2003) has possibly the most direct in their calls for increased use of the existing ASPA/ASMA system to protect sites from tourism impacts.

Some progress towards a comprehensive management planning system has been made, albeit slowly and without apparent strategic or even regional intent. Management plans have been written for the ASPA and ASMA sites subject to tourism in the Ross Sea Region. Hoffman & Jatko (2000), along with a number of ATCM papers and IAATO initiatives, have started to develop the concept of 'site-specific guidelines' for tourist landing sites, mainly in the Peninsula Region. Some of these guidelines call for limits on total landings at certain sites, and most of the guidelines suggest specific restrictions on tourist behaviour. These are sound initiatives and it can be argued that these 'site-specific guidelines' are an important step towards the establishment of management plans. Their effectiveness is however constrained by a lack of context of strategy, policy, aims and objectives.

It is suggested that it is only through the vehicles of site-specific management plans that the proper relationship between tourist activity, site values and attributes, management aims and objectives, potential and actual impacts and management responses can be set out and iterated in a proper context.

6.1.4 *Flaws in the EIA System*

One of the fundamental environmental protection mechanisms of the ATS system is the EIA system of the Madrid Protocol. This system is described in detail in Chapter Four of this thesis.

A number of researchers, particularly those working in the areas of International Law and EIA, have begun to raise significant questions with respect to the adequacy of the EIA system to achieve its objectives. Kriwoken & Rootes (2000), Rothwell (2000) and Hemmings & Roura (2003) have all looked specifically at the EIA issue, and collectively point out a number of flaws in both the design and implementation of the system as it relates to tourism.

Hemmings & Roura (2003) argue that the EIA system was actually designed to deal with Antarctic national science programme activities, not tourism per se, and that the system is not ideally suited to application to tourism. They note that EIA has been “left as the sole gatekeeper for Antarctic tourism. This is not a role that EIA plays in other parts of the world” (2003, p. 21). The primary problem is perceived as being the lack of a strategic planning context for the preparation of EIAs by tourism operators. In particular Hemmings & Roura note the lack of a broader management planning framework in which the EIA can be placed. This view supports the argument raised earlier in this chapter with reference to the lack of management planning applied to tourism in Antarctica. As a final point Hemmings & Roura (2003) comment that the tourist industry view EIA as a process that will not result in any significant change to current levels and types of activity, calling into question the value of the mechanism in the first place.

Kriwoken & Rootes (2000) take a similar line to Hemmings & Roura, suggesting strongly that the EIA mechanism suffers from a lack of strategic and regional planning with respect to the tourism activities and sites. Additionally they note significant inconsistencies within and between the enabling legislation of the various signatory nations. This appears largely related to inconsistencies in interpretation of the content of the Madrid Protocol as it relates to EIA, particularly as it pertains to classification of activities/impacts into less than or more than transitory or minor. The authors believe this creates significant obstacles for the EIA system to provide adequate protection. Clearly the potential exists for one operator acting under one piece of domestic legislation to declare a certain activity to be less than minor or transitory, while another piece of domestic legislation may trigger a different operator to cross the ‘minor & transitory’ threshold and trigger an IEE or an even fuller

assessment of impacts. Rothwell (2000) echoes these sentiments, particular noting the inconsistent interpretation of key elements of the Protocol regime.

A number of authors also criticise the ability of the EIA provisions of the Madrid Protocol to deal with cumulative impact issues. Dalziell & De Porter (1997), Kriwoken & Rootes (2000) and Tracey (2001) are amongst those who make this point. Tracey (2001) points out that because the EIA system is predicated on individual operator/individual activity assessment, and because there is no realistic co-ordination of either consideration of EIAs or monitoring of activities, it is not possible for the EIA system to effectively deal with cumulative effects. Dalziell & de Porter comment "...the system works on a project-by-project basis, and does not immediately and obviously provide mechanisms for assessing cumulative impacts" (1997, p. 18). Tracey's solution, like that of Hemmings & Roura and others, is management planning, both regionally and strategically.

Finally, the effectiveness of the EIA system as an impact management tool is heavily reliant on the implementation of monitoring to report on the actual impacts of the assessed activities (Kriwoken & Rootes, 2000). In the Antarctic context, as will be discussed in the next section, that monitoring regime appears to be inadequate to support the EIA process.

The author's experience with the New Zealand government observer scheme supports much of this commentary. The IEE for the Quark Expeditions Ross Sea Region cruise program (Quark Expeditions, 2002) is arguably little more than a compendium of IAATO guidelines and excerpts from the ASMA/ASPA management plans. Some rudimentary analysis of potential effects, and ways to avoid, remedy or mitigate those effects, is undertaken but it is not comprehensive. The IEE seems predicated on maintaining or increasing the levels of activity and discussions of mitigation measures is in large part restricted to reference to existing guidelines (as opposed to specifically applying those guidelines to specific sites and their values). Apart from the 'observer' scheme no monitoring of the effectiveness or adequacy of the IEE occurs.

6.1.5 *Lack of Monitoring*

Protected area management theory indicates that management systems should include a component of monitoring. Newsome et al (2002) describe monitoring as an essential part of natural area management. Hammitt & Cole (1998) and Eagles & McCool (2002) both devote whole chapters to the need for, and techniques of, monitoring of the impacts of tourism. Kriwoken & Rootes (2000) note the role of monitoring in the EIA theoretical framework. With specific reference to Antarctic tourism Champ, Flemer, Landers, Ribic & DeLaca (1992); Acero & Aguirre (1994); Walton (1997); Hoffman & Jatko (2000) and United Kingdom (2003) have all called for the establishment of comprehensive monitoring programmes for tourism activities.

In the ATS monitoring does feature, but only to a limited extent. Recommendation XVIII-1 and Annex 1 of the Madrid Protocol both discuss monitoring. Articles 2 and 5 of the Protocol call for monitoring to occur after the approval of both IEEs and CEEs. Tracey (2001) argues, with good reason, that no ATS co-ordinated monitoring of tourism impacts is occurring, either in response to the obligations of the Protocol or otherwise. Kriwoken & Rootes (2000) make a similar point. The Oceanites Inventory programme on the Antarctic Peninsula is not a monitoring programme. Rather it is an inventory programme and does not include measures of impact, cumulative impact monitoring etc.

Some limited co-ordinated monitoring has been commenced by Antarctica New Zealand for the tourist landing sites in the Ross Sea Region (the VISTA scheme), but this exercise is in a very early stage. The author has experienced the New Zealand government 'observer' scheme first hand, and while these observers are on site during all the tourist visits to the Ross Sea Region sites, the role does not include monitoring in the real sense at present.

6.1.6 *Lack of a Regulatory Institution for Tourism Management*

A small number of researchers, Tracey (2001) being prominent amongst them, have advocated for the establishment of some form of regulatory institution or management

body within the ATS to manage the creation, implementation and maintenance of the components of any new or improved system. This concept has obvious merit and equally obvious difficulties. The recently created Antarctic Treaty Secretariat apparently took some decades to be formed on account of tensions between ATCPs regarding where it should be based. It appears the Secretariat is in reality a service unit of the ATCM, being responsible for the documents and reports of the annual meetings and maintaining the records of the ATCM. Given the difficulties in establishing a relatively low-level entity such as this it would seem unhelpful to invest large amounts of effort into repeating the exercise for a body which would inevitably need to have a much more prominent role in the ATS.

Tracey (2001) suggests that CEP could take responsibility for the creation and management of a new system, and this concept seems to have more merit. The Committee is already involved in EIA and other components of the current system, and it may be the most effective option to empower the Committee to take on the wider role of system development and improvement.

6.2 Constraints on the Design of a Tourism Management System

The ability to design and implement an improved tourism management system for Antarctic tourism is constrained to a large extent by the unique legal framework that any such system must be designed within. The ongoing questions over the coverage and enforceability of ATS regulatory instruments present challenges to the implementation of an 'ideal' theoretical system. These are not necessarily insurmountable challenges but are matters that need to be factored into any system design. For specifically important issues such as fragile site management for example, finding regulatory instruments that 'bind' the maximum number of participants as possible would require careful navigation through the ATS system, and it would be expected that the final solution will never probably deal with all possible participants.

Likewise the establishment of a regional and local impact monitoring programme for tourist sites would require a high level of co-operation between ATCPs, the tourism

industry and NGOs. It is not clear that such a high degree of co-operation has been seen to date in the ATS and non-ATS systems.

6.3 Alternative Tourism Management Systems for Antarctica

Those researchers and commentators who have gone so far as to discuss substantive improvements or alternatives to the current tourism regulatory system appear generally have concentrated on either individual or small groups of components of an ideal management system. IUCN (1991) called for controls over tourism activities and the introduction of site management planning. Davis (1999) argued for the use of LAC planning, Tracey (2001) argued for the use of management planning to address the current shortcomings. Examination of the ATCM Working and Information Papers over a number of years appears to indicate a preference for technical adjustments (e.g. liability issues). Splettstoesser (2000) believes that industry self-regulation is an adequate approach to tourism management. ASOC (2002, 2004) have made calls for specific tourism policies and conventions.

What these various alternative models have in common is a relatively narrow view of the aspects of the current system that need to be developed or improved. There is a tendency to address individual components of a theoretical tourism management model without properly addressing the totality of such approaches. For example the use of LAC as a planning tool (Davis, 1999) without the context of management plans and some level of strategic intent would be ineffective. Likewise concentrating on industry self-regulation (Splettstoesser, 2000) without any corresponding development of monitoring and binding rules for the most critical issues presents significant risks of failure. Overall the 'problem' with the research to date seems to be a lack of the presentation of a truly comprehensive alternative to the status quo. Tracey (2001) presents probably the most robust and coherent description of a comprehensive management system to date.

An examination in this chapter of the theoretical models for tourism management in protected areas compared to the current Antarctic regulatory system reveals a number of omissions and under-developed items. From this analysis a comprehensive set of

improvements and developments can be described. This description is undertaken in the next section of this chapter.

6.4 An improved Tourism Management System for Antarctic Tourism

6.4.1 General

It can be seen from the review of the relevant literature on theoretical tourism management systems that these systems actually consist of a number of separate but related components, rather than one or two regulatory elements. Examples of the components referred to by researchers include legislation, strategic and regional management planning, EIA assessment tools, industry self-regulation, voluntary guidelines, and research and monitoring. These components can be viewed as a ‘portfolio’ of regulatory and non-regulatory elements, which, working together, provide the management system itself. It would appear from the literature review undertaken in this thesis that all, or at least a large number, of the components of the ‘portfolio’ are required to be present for an efficient and effective regulatory regime for Antarctica.

The components will be both mandatory and voluntary, regulatory and non-regulatory. Necessarily they should reflect the cause/effect link between the tourism activities, the sites where those activities occur, the impacts of those activities at those sites and the required management response. The basic foundation components of an effective system are a sound legal framework, a comprehensive management planning system, and a set of management ‘interventions’ or responses that can deliver on the aims and objectives stated in the management planning (Eagles & McCool, 2002). These will be supplemented by other components such as monitoring, industry self-regulation etc. Ideally both the management planning and the management responses should be directed at protecting the values of the specific sites where the tourism occurs, assessing impacts and activities in terms of desired outcomes at those sites.

6.4.2 *Components of an Improved Tourism Management System*

6.4.2.1 Legal Framework

As much as is possible in the unique context of the ATS legal framework, the key legal elements of the ATS relating to tourism need to be made as binding or 'hard' as possible to ensure the maximum effectiveness of the regulatory components. It is recommended that the ATCP nations agree to the use of Measures (which when enacted would be legally binding) as the 'default' mechanism to establish general regulation of tourism. These Measures should 'capture' as much of the currently voluntary agreements as possible. Certainly there seems little justification at present for a specific Tourism Annex to the Protocol, although this should not be completely discounted.

Due to the ongoing uncertainties of the reach and legality of the formal ATS instruments such as Measures and Recommendations, it is further recommended that the ATCPs adopt a greater and more consistent use of port state/flag state jurisdiction as another mechanism to support the ATS tourism management system. The problem arises because some non-IAATO tourism operators utilise vessels flagged in states that have no involvement at all in the ATS. This means the activities of these ships are outside the coverage of the ATS and the IAATO self-regulation system (although they are covered by the non-ATS instruments). ASOC (2002, 2003, 2004) and the United Kingdom (2003) have suggested strongly that the ATCP states that control the normal departure ports for tourist ships travelling to Antarctica (Australia, New Zealand, Chile and Argentina) should invoke strong, consistent and comprehensive Port State controls on departing ships (which can be imposed irrespective of their involvement in the ATS) that complement and support the formal ATS and industry self-regulation instruments. It is recommended that port states not only check for compliance with international non-ATS regulations and laws, but also that such port states formally impose on non-ATS/non-IAATO vessel owners all of the requirements of the ATS and industry self-regulation systems e.g. prior notification, EIA.

Aligning and making consistent domestic legislation that enacts key provisions of the ATS is also recommended, to ensure consistent standards are met in such matters as EIA. This is a matter for the ATCPs to enforce through the ATS system.

6.4.2.2 Strategic Overview

A number of researchers and commentators on Antarctic tourism have identified a lack of strategic overview as a major flaw in the current system (IUCN, 1991; Vidas, 1996; Davis, 1999; Tracey, 2001). Obviously this will mean many things to many people, but it is clear that to remedy this problem at the very least the ATCPs should look to define the purposes and objectives of the ATS with respect to the management of the sites where tourism occurs. It is recommended that the ATCPs work together to develop statements of ‘purpose’ as utilised in legislation and management plans governing protected areas in other jurisdictions. The National Parks Act 1980 of New Zealand is an example. The ‘principles’ to be applied to the management of national parks in New Zealand are stated as:

“... preserving in perpetuity as national parks, for their intrinsic worth and for the benefit, use and enjoyment of the public, areas of New Zealand that contain scenery of such distinctive quality, ecological systems or natural features so beautiful, unique, or scientifically important that their preservation is in the national interest”.

Similar principles should be developed by the ATCPs for Antarctica in terms of tourism use. Expression of this should be by way of variation or addition to the fundamental Articles of the Treaty.

It is debatable whether the ATS system would lend itself to the development of a comprehensive and in-depth instrument such as the ‘conservation strategy’ suggested by IUCN (1991), or the ‘strategic plan’ advocated by Tracey (2001). Obviously such a development would be desirable, but the likely timeframes of its development would possibly render it of little value. At least in the interim it is recommended that a

further elucidation of the existing statements (in Article 1 of the Treaty, and Article 2 of the Protocol) would go a long way to providing guidance and context for the development of more localised management plans of objectives.

6.4.2.3 Management Planning/Protected Area Framework for Tourism Sites

The need for the application of strategic and specific management planning is one of the more persuasive and repeated suggestions arising from the literature review (IUCN, 1991; Hughes, 1994; Acero & Aguirre, 1994; Hughes & Davis, 1995; Stonehouse & Crosbie, 1995; Davis, 1999; Kriwoken & Rootes, 2000; Tracey, 2001). Such a planning framework should be based around the ATS protected area network system (as it is currently), but needs to be extended to all the sites subject to tourism visitation.

It is recommended that the ATCPs institute a review of the ASMA/ASPA system with respect to tourist landing sites. Sites under pressure or exhibiting particularly fragile or unique values should be made priorities. Sites should be classified as ASMA or ASPA where appropriate. With approximately 150 such sites in the Peninsula Region alone this obviously involves significant effort, so it is recommended that the exercise start with the most popular sites and the most sensitive but relatively unvisited sites. Use of contemporary planning tools such as LAC (as suggested by Davis, 1999) should be part of the planning process. As a result of this planning some sites may need to have access significantly restricted or even curtailed altogether. Zoning of parts of Antarctica with respect to management approaches may be a result. The tourism industry should be closely involved. Plans should be specific as to the desired outcomes for the sites, and should outline the site attributes, values and management objectives, acceptable levels of activity and types of use, and what management responses will be utilised to achieve the management objectives and site outcomes. Issues such as land-based developments would be dealt with on a site-by-site basis, within a broader policy framework.

The existing 'site-specific guidelines' could form the basis of these management planning statements. A regional planning approach could be appropriate in some cases

(e.g. Ross Sea Region and parts of the Peninsula Region) but should not be put forward as a pre-requisite for the development of individual site management plans.

6.4.2.4 Regulatory/Management Responses

In terms of management responses, it is recommended that sufficient tools should be made available in the regulatory regime to enable managers (in this case the ATCPs) to be able to choose a response to a particular impact at a particular site, from a range of responses along a 'soft-hard' continuum. These responses may be 'direct' or 'indirect' (see reference to Hammitt & Cole (1998), Chapter Three). This approach is analogous to the 'site criteria' approach suggested by Davis (1998) and currently being developed by IAATO (2005c).

Interventions would be made by way of the site management plans (for ASPA/ASMA sites), permit systems currently used to permit access to tourist operators to landing sites, or for those operators not subject to permit systems, by way of port state/flag state country jurisdiction. It may be that Measures could be passed to encapsulate some interventions.

The choice of response or intervention which is made will then be specific to the activity/site/impact/response matrix, and will therefore be more effective than a generic response that assumes the industry and sites to be homogenous, as seems to be the case at present. Management responses would include:

TABLE 6.1 – Potential Site Management Interventions

| Soft | Medium | Hard |
|----------------------------|---|--|
| Industry self-regulation | Generic activity/behavioural guidelines | Limits on activities at sites |
| Education and information | EIA | 'no-go' sites or zones at sites |
| Insurance and liability | Boot-washing | Site-specific guidelines |
| Prior notification systems | Pollution avoidance | Site-hardening |
| Reporting | | 'resting' of sites for certain periods |
| Observers | | |
| Accreditation | | |

Source : Author

Clearly some situations will require a different management response to others, and in the main part this choice will depend on the management objectives for that place and the nature of the activities/site values/impacts relationship. As an example of this, with reference to the individual tourism sites in the Peninsula Region, it is safe to conclude that the management objectives and subsequent responses (e.g. number limitations, site hardening, behavioural guidelines) will be quite different for Almirante Brown Station, where there is a very low level of biodiversity values and the physical environment is robust, compared to the Aitcho Islands site where there are extensive moss beds adjacent to the landing site as well as Gentoo and Chinstrap penguin colonies vulnerable to disturbance. Likewise from the author's own observations the interventions at the McMurdo Dry Valleys relating to management of impacts from foot traffic may be quite different from the interventions used at say Hut Point.

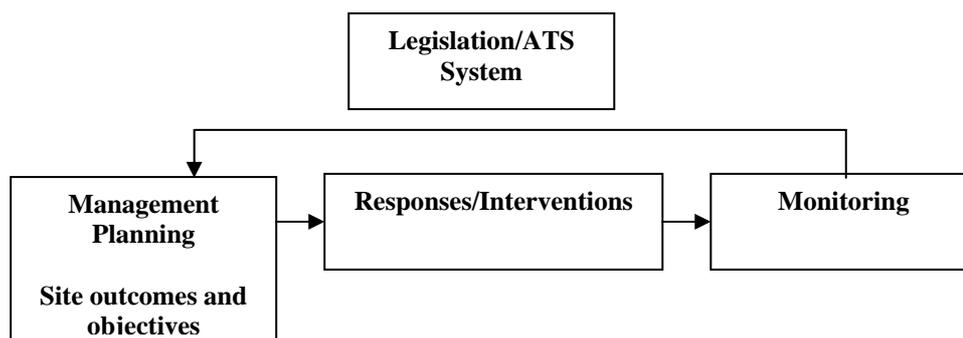
Specific management responses for specific sites would, where appropriate, be listed in the management plans for those sites. Generic management responses (e.g. pollution avoidance, codes of conduct) could be enshrined through Measures.

6.4.2.5 Monitoring

Sitting alongside and informing this system of management responses should be a regime of comprehensive impact monitoring. Clearly it is necessary for the ATCPs to be in a position to assess the immediate and cumulative impact of tourism activities at sites so that the appropriate management responses can be formulated, and the effectiveness of those management interventions in achieving the aims and objectives for the site can be assessed. Monitoring is also required to assess the quality and accuracy of operator-generated EIAs.

This monitoring would be specifically for the purpose of re-informing the management planning and management response system:

FIGURE 6.1 – Management Planning/Response/Monitoring System



Source : Author

It is recommended that the ATCPs and the tourism industry identify the key tourist sites (in terms of levels of activity and impact and site vulnerability) where monitoring needs to occur, and establish at those sites consistent and robust

monitoring programmes to detect both immediate and cumulative impacts. For the Peninsula Region this monitoring programme could be developed from the existing inventory programme, the Antarctic Site Inventory project. For the Ross Sea Region, the ANZ VISTA site inventory scheme could be developed into an equivalent monitoring programme.

It is recommended that standardised methodologies be developed so that comparisons between monitoring projects can be made. Methodologies such as those developed by Acero & Aguirre (1994) for Halfmoon Island in the South Shetlands, and Davis (1998) at Hannah Point, could be templates for these methodologies. Key impact indicators (e.g. indicator species) would need to be developed. Continuation and further refinement of the data collection from IAATO and non-IAATO tourism operators will be required to support the monitoring.

Monitoring at the tourist landing sites should be co-ordinated with other general biophysical monitoring being carried out by ATCP science programmes in Antarctica so that any trends in impacts related to tourism or at the tourism sites (e.g. fluctuations in wildlife populations) can be set in the context of wider environmental changes.

It is recommended that the co-ordination of the establishment of this monitoring be led by CEP or SCAR, possibly by way of a sub-committee that includes industry representatives and representatives of the Antarctic Site Inventory project.

As a complementary element to this effects monitoring it is recommended that the existing ANZ and NSF on-ship observer programme should be extended to all cruise ships visiting Antarctica. The scheme holds significant value on terms of information collection and compliance monitoring, as well as education and information on behalf of the ATS.

6.4.2.6 Data and Information Management

Aligned to the issue of monitoring as discussed above is the matter of data and information management relating to tourism at sites in Antarctica. At present it is by no means clear that there is a robust and coherent database of the many numerical

parameters relating to tourist use of the sites. Repositories of data and information do exist, primarily at the NSF and IAATO, but it is not clear that this data and information is in a form that will produce the analysis needed for monitoring and management planning (and management responses). It is suggested that the integration of this data into an integrated GIS spatial mapping context is essential for efficient and effective co-relation with other Antarctic data and information.

It is recommended that CEP or SCAR should investigate, on behalf of the ATCPs, the design and architecture of, and public access to, the existing databases to ensure that they are in a form and with sufficient content to service the planning, management and monitoring of the sites involved in tourist activities. Once an overall architecture and system is identified, this should be implemented by way of the Antarctic Treaty Secretariat, who should additionally be charged with maintaining the database.

6.4.2.7 Environmental Impact Assessment

EIA, as set out in Annex V of the Protocol, should remain a feature of the management framework. Several improvements to it are necessary however. Firstly, and possibly most importantly, the assessment process needs to be linked back to the creation of management objectives for the sites where the proposed activities are to occur. Whilst some researchers (e.g. Kriwoken & Rootes, 2000) argue this should be by way of some form of 'strategic environmental assessment', practicably these objectives are most likely to be developed by way of site-specific management plans. Interpretation of the provisions of the Protocol with respect to EIA needs to be improved, and CEP (and possibly SCAR) has a role in providing written guidance to ATCP countries and tourism operators to this effect. Greater consistency between the enabling domestic legislation of ATCP countries is required, and some form of audit of current legislation, and encouragement to amend to achieve consistency may be needed.

It is recommended that some form of independent audit of the quality of EIA take place, as well as monitoring of the activities carried out subject to the EIAs. The monitoring will ostensibly be covered by the formalised monitoring programmes

recommended previously in this section, and it is recommended that the audit of the EIAs prior to activity commencing should probably the role of either CEP or SCAR on behalf of the ATCPs.

6.4.2.8 Industry Self-Regulation

Industry self-regulation will remain an integral part of the Antarctic tourism regulatory system. Self-regulation has proved thus far to be a successful component of the management approach. IAATO has in many ways led the ATCPs in terms of such tourism management initiatives as data collection, development of behavioural guidelines, and the development of 'site criteria'. Further encouragement and support to IAATO is desirable, for example as suggested by the United Kingdom (2004) by way of positive discrimination in favour of IAATO members for visits to ATCP stations.

Despite the success to date in avoiding impacts, and despite the sentiments of some researchers (e.g. Splettstoesser, 2000), self-regulation cannot be relied upon to provide an all-encompassing protection for the site values. It is limited by a lack of total coverage of the tourism industry (particularly at the large cruise-ship end of the sector) and a tendency over time to shift compliance standards when faced with difficult issues (e.g. ship size limits for membership). It is important to ensure that self-regulation as a tool for management of the tourist sites is kept in context and the limitations of it recognised. Additional management responses from the ATS will be required in order to ensure environmental protection.

It is recommended that the ATCPs continue to encourage the ongoing development of the self-regulation system, with a focus on limitation of the size of the industry at certain sites, at least until more information becomes available (from formal monitoring programmes) relating to the cumulative impact of tourism at those specific sites.

6.4.2.9 Specific Research Needs

Improvements to the ATS tourism management system need to be supported by research into specific areas where current knowledge is insufficient. The interaction between humans and marine mammals in the Antarctic terrestrial environment is one area of needed research. The issue of cumulative environmental impacts at fragile sites is another area where specific research is required. It is recommended that SCAR reviews the current research agenda, and reports back to the ATCM on an improved and more comprehensive agenda which can be implemented by ATCPs and academics alike.

6.4.2.10 An Entity to Oversee System Development, Improvement and Maintenance

The development, ongoing improvement and maintenance of the system described here in reality require the oversight and efforts of a dedicated formal entity within the ATS. The current CEP committee is probably best placed to undertake this role, involved as is with parts of the current system (e.g. EIA). The Committee may need significant resourcing to undertake this role, as well as a re-definition of its place in the ATS, but it is recommended that CEP drive the development of specific components and oversee the interactions between the system elements.

6.4.2.11 Miscellaneous

There are a number of ‘support’ components to the new system that also need to be in place. Whilst these are not part of the central ‘foundations’ to the system as discussed previously, they are none-the-less an integral part of developing a truly comprehensive management system. Many of these components are either in place in one form or another, or have been mooted for development. To provide a system that exhibits all of the required components it is recommended that the ATCPs and the industry (via IAATO) ensure that a number of additional items are present:

- Mitigation measures to prevent the introduction of marine pollution from ballast water and hull fouling need to be researched further and introduced for all tourist vessels where appropriate. This should include restrictions on the release of ballast water and requirements for ship and hull inspections at Australian, New Zealand and South American ports of departure to Antarctica.
- Boot cleaning of tourist footwear (and clothing) before arriving at Antarctic tourism sites, and between sites, should be made mandatory. IAATO currently requires this and the approach should be extended to non-IAATO operators if possible. Consistent use of substances such as 'Virkon' (an anti-bacterial washing detergent) should be implemented and training in the techniques delivered by tourism operators.
- The tourism operators conducting their activities in Antarctica represent a large and potentially valuable resource for achieving conservation and protection outcomes at the places that they visit. The ATCPs should investigate with the industry the potential for tourism operators to make positive contributions to site management and site outcomes through such activities as on-site inventory & monitoring and direct site interventions (e.g. hardening of certain parts of heavily-used sites if this was identified in site management plans). Financial contributions from the tourism industry to research and data/information gathering is also another potential positive effect from tourism in Antarctica.

6.5 A New Regulatory Framework

The new regulatory framework will consist of a comprehensive set of inter-related components that together address all of the specific areas of management importance. The key elements of the framework are the improved legal foundation, the strategic overview, and the management planning system that operates in the legal/strategic context. The additional components such as EIA and monitoring would act as support components to the key framework elements.

This model is differentiated from the current system in a number of ways. In particular it features a strategic element that is currently missing, and at the same time it applies regulatory attention to tourist activities at specific sites, address localised impact issues, by way of the management planning approach.

A number of these improvements have been suggested by other authors (e.g. Tracey, 2001). This thesis endorses and complements that work, but extends the previous findings in a number of ways. The direct relationship between the tourist industry activities, the values of the host sites in Antarctica, and the potential impacts of that activity at those sites is described and used to underpin the design of an improved system. Previous research has tended to ignore the tourist sites themselves and the relationship between those sites and the necessary management responses. The findings of this thesis also contribute to this area of research by placing the various recommended changes and improvements into the context of a dynamic and systemic framework and identifying the interactions between the various components of the system. The framework described in this thesis is more comprehensive than previous alternative regulatory systems described, and this comprehensiveness is critical to the success of an improved regulatory system.

6.5 Summary

This chapter has provided a discussion on the adequacy and shortcomings of the current ATS regulatory system and a description of an improved tourism management system for Antarctic tourism. This discussion is central to the answering of the thesis research question; ‘Is the current regulatory system for managing tourism in Antarctica adequate to protect the Antarctic environment?’ A critique of the current system, and a re-examination of the components of tourism management systems in other protected areas, along with a contextual discussion regarding application of such theory to the Antarctic situation has enabled an comprehensive tourism management system to be identified and described. In the most part this system consists of components that are currently present in the ATS in one form or another, but are either poorly developed or are operating in isolation of other components of the

system. Retaining the status quo is not considered a viable option. It is probable, given the significant increases in visitation numbers at some sites that cumulative impacts may be already occurring. A comprehensive and internationally credible tourism management system, such as that described in this Chapter, is required.

The conclusions reached reflect and complement the conclusions of some other researchers, most notably Tracey (2001), but take those concepts further by introducing additional elements and more importantly describing the system interactions and the relationships between the various components of the system. The relationship between tourist activities, site values, impacts and management responses underpin the system design and the recommendations. Previous examinations of this matter seem often to have either addressed individual components of the system, or presented new systems without a clear understanding of the linkages between all the components of the system.

The research question has been answered in this discussion. Clearly the current regulatory system is not adequate to protect the Antarctic environment from the impacts of tourism. To a large extent the current ATS approach to tourism provides neither a clear picture of the potential impacts on the values of the environment, nor a coherent and understandable series of actions to address the issue. The improved system as described in this chapter would, over time, provide adequate protection for the Antarctic environment, as long as all of the components of the system were properly designed in detail and implemented in a planned fashion.

Implementation of a system as described above should not be overly problematic. The timeframes involved may be much longer than would be experienced in other situations due to the unique (and very slow) decision-making processes of the ATS. None of the components are considered impossible to create and implement.

Chapter 7. Conclusions

This thesis has progressively examined a series of key matters in order to address the research question; ‘Is the current regulatory system for managing tourism in Antarctica adequate to protect the Antarctic environment?’

The methodology has involved examining the international theory and practice relating to managing tourism in protected areas. Direct observations of the activities of tourists at Antarctic tourism sites have contributed to the thesis. Certain key attributes of the management systems used in protected areas have been identified, principally a sound legal foundation, a system of management planning, and the use of impact-specific management interventions to achieve stated outcomes. The current ATS system has been studied, and conclusions reached that it appears fragmented and detail-oriented with uncertain legal foundations and a lack of strategic overview. Some of the primary management mechanisms upon which the system is based, such as EIA, are not supported by the usually present additional components such as monitoring. The adequacy of such mechanisms is questionable.

The attributes of the Antarctic tourism industry and the sites where that tourism occurs were examined. The industry is growing at a significant rate concentrated at a small number of often fragile sites over a short period of time. Little is currently understood about the potential impacts of this activity, especially with respect to cumulative impacts.

A critique of the current system against international theory, and in the context of the nature of the tourism industry and the tourist landing sites concluded that the current system is indeed inadequate to manage current and future tourism in Antarctica. Recommendations are made that a number of system elements need to be developed or improved by the ATCPs in order to transform the ATS tourism management framework into a system that is adequate to protect the values of the tourism sites in Antarctica. The basic elements of the new system are a sound & binding legal foundation, an agreed strategic overview for tourism and for the sites where tourism

occurs, the creation of site-specific management plans for the tourist landing sites, and the use of specific and tailored management interventions at those sites to achieve the management planning objectives. The key contribution of this thesis to this research area is the description of the relationships between the various elements of the regulatory system, and the comprehensive nature of the whole set of recommended components.

The status quo is concluded as not being a viable option. Neither is a series of ad hoc and disconnected initiatives without strategic purpose. Continued reliance on industry self-regulation is likewise considered not adequate for the medium to longer term.

What is required is a comprehensive management system that exhibits and implements the basic principles of managing tourism in protected areas. Such a system is described in general terms. It is concluded that only once all the various components are in place that the management system could be said to be adequate.

The ATCP participants and the tourism industry, working through the current ATCM system, have the processes and means for the creation and implementation of such a system.

References

- Acero, J., and Aguirre, C., 1994, 'A Monitoring Research Plan for Tourism in Antarctica', *Annals of Tourism Research*, Vol. 21, No. 2, pp. 295-302.
- Adventure Network International website, www.adventure-network.com, accessed 21 April 2005.
- Antarctic and Southern Ocean Coalition (ASOC), 2004, "*The Case for Concern about Antarctic Tourism*", ASOC, Washington.
- Antarctica New Zealand, 2003, "*Information Sheet – History of the Antarctic Treaty*", Antarctica New Zealand, Christchurch.
- Antarctica New Zealand, 2004, "*Ross Sea Region Antarctic Specially Protected Area Management Plans 04/05*", Antarctica New Zealand, Christchurch.
- Antarctica New Zealand, 2004, "*McMurdo Dry Valleys ASMA Manual*", Antarctica New Zealand, Christchurch.
- Australia and New Zealand Environmental and Conservation Council, 1999, "*Commercial Management – Processes in the Delivery of Park Services*" Parks and Wildlife Commission of the Northern Territory, Canberra.
- Bastmeijer, K., and Roura, R., 2004, 'Regulating Antarctic Tourism and the Precautionary Principle', *The American Journal of International Law*, Academic Research Library, Vol. 98, No. 4, pp. 763-781.
- Bauer, T., 2001, "*Tourism in the Antarctic: Opportunities, Constraints and Future Prospects*", Haworth Press, New York.

- Cessford, G., 1997, "Antarctic Tourism – A frontier for wilderness management", *International Journal of Wilderness*, Vol. 3, No. 3, pp 23-30.
- Champ, M., Flemer, D., Landers, D., Ribic, C., and DeLaca, T., 1992, "The Roles of Monitoring and Research in Polar Environments", *Marine Pollution Bulletin*, Vol. 25, 9-12, pp. 220-226.
- Cobley, N., and Shears, J., 1999, "Breeding performance of Gentoo penguins at a colony exposed to high levels of human disturbance", *Polar Biology*, Vol. 21, No. 6, pp. 355-360.
- Codling, R., 1995, 'The Precursors of Tourism in the Antarctic', pp. 167-177 in Hall, C.M., & Johnston, M., (eds) 1995, *Polar Tourism-Tourism in the Arctic and Antarctic Regions*, Wiley, Brisbane.
- Culik, B., Adelung, D., and Woakes, A., 1990, 'The effect of disturbance on the heart rate and behaviour of Adelie penguins during the breeding season', pp. 177-182 in Kerry, K., and Hempel, G. (eds) 1990, *Antarctic Ecosystems: Ecological Change and Conservation*, Springer-Verlag, Berlin.
- Curry, C., McCarthy, J., Darragh, H., Wake, R., Churchill, S., Robins, A., and Lowen, R., 2004, "Identification of an agent suitable for disinfecting boots of visitors to the Antarctic", *Polar Record*, Vol. 00, 1-7.
- Dalziell, J., and de Poorter, M., 1997, 'Managing cumulative environmental impacts: Antarctica's challenge for the 21st century', *International Journal of Wilderness*, Vol. 3, No. 3.
- Davis, P., 1999, 'Beyond Guidelines: a Model for Antarctic Tourism', *Annals of Tourism Research* Vol. 26, No. 3 pp. 516-533.
- Department of Conservation, 1996, 'Visitor Strategy', DoC, Wellington.
- Department of Conservation, 2005, 'Conservation General Policy', DoC, Wellington.

- Dingwall, P., 1997, 'Environmental management for Antarctic wilderness', *International Journal of Wilderness*, Vol. 3, No. 3, pp 1-8.
- Eagles, P., and McCool, S., 2002, *Tourism in National Parks and Protected Areas – Planning and Management*, CABI Publishing, Oxon.
- Eagles, P., McCool, S., and Haynes, C., 2002, "Sustainable Tourism in Protected Areas", IUCN, Cambridge.
- Ensminger, J., and McCold, L., 1999, "Environmental Impact Assessment under the National Environmental Policy Act and the Protocol on Environmental Protection to the Antarctic Treaty", *Environmental Management*, Vol. 24, No. 1, pp. 13-23.
- Enzenbacher, D., 1992, "Antarctic Tourism and environmental concerns", *Marine Pollution Bulletin*, Vol. 25 (9-12), pp. 258-265.
- Enzenbacher, D., 1993, "Tourists in Antarctica: Numbers and Trends", *Tourism Management*, Vol. 14, No. 2, pp. 142-146.
- Erize, F., 1987, 'The impact of tourism ion the Antarctic Environment', *Environment International*, Vol 13, pp. 133-136.
- Eppley, Z., 1992, 'Assessing Indirect Effects of Oil in the Presence of Natural Variation – The Problem of Reproductive Failure in South Polar Skuas during the Bahia Paraiso Oil Spill', *Marine Pollution Bulletin*, Vol. 25, 9-12, pp. 307-312.
- Francioni, F., 1993, "The Madrid Protocol on the Protection of the Antarctic Environment", *Texas International Law Journal*, Vol. 28, pp. 47-72.
- Giese, M., 1996, "Effects of human activity on Adelie penguin *Pygoscelis adeliae* breeding success", *Biological Conservation*, Vol 75, Issue 2, pp. 157-164.
- Giese, M., 2000, "Antarctic Tourism - Polar Wandering", *Wingspan*, Vol 10, pp. 9-14

Giese, M., Van Polanen Petel, T., Holmes, N., Bunce, A., & De Villiers, M. (2003), "Experimental studies to measure the effects of human activity on seabirds and seals", *3rd International Wildlife Management Congress*, 1-5 December 2003, Christchurch, New Zealand.

Giese, M., Riddle, M., 1999, "*Disturbance of Emperor penguins by helicopters*", in Hempel (ed), *Polar Biology*, Vol. 22, pp 366-371.

Giese, M., Riddle, M., 1998, *Quantifying the effects of helicopter operations on Antarctic wildlife*, in Hassan (ed), *New Zealand Natural Science*, Vol 23, pp. 66–73.

Hall, C.M., 1992, "Tourism in Antarctica: Activities, Impacts and Management", *Journal of Travel Research*, Vol. 30, Issue 4, pp 2-9.

Hall, C.M. and Wouters, M., 1995, "Issues in Antarctic Tourism", in *Polar Tourism: Tourism in the Arctic and Antarctic Regions*, Hall, C.M. and Johnston, M (eds), John Wiley & Sons, Chichester.

Hammit, W., and Cole, D., 1998, *Wildland Recreation – Ecology and Management*, (2nd Edition), J. Wiley & Sons, New York.

Harris, C., 1991, 'Effects of Human Activities on King George Island', *Polar Record*, Vol. 27 (162), pp. 193-204.

Headland, R., 1994, 'Historical Development of Antarctic Tourism', *Annals of Tourism Research*, Vol. 21, No. 2, pp. 269-280.

Hemmings, A., and Roura, 2003, 'A Square Peg in a round hole: fitting impact assessment under the Antarctic Environmental Protocol to Antarctic tourism', *Impact Assessment and Project Appraisal*, Vol. 21, No. 1, pp. 13-24.

Hoffman, R., & Jatko, J., 2000, '*Assessment of the possible cumulative environmental impacts of commercial ship-based tourism in the Antarctic Peninsula Area*',

Proceedings of a workshop held in La Jolla, June 2000, National Science Foundation, Washington.

Holmes, N., Giese, M., & Achurch, H., 2003, *Conservative management required for pedestrians and small boating near Giant Petrels*, Australasian Ornithological Conference, ANU, Canberra, ACT, 10-13 December 2003.

Honey, M., 1999, *Ecotourism and Sustainable Development: Who Owns Paradise?*, Island Press, Washington D.C.

Hughes, J., 1994, 'Antarctic historic sites: the tourist implications', *Annals of Tourism Research*, Vol 21(2), pp. 281-294.

Hughes, J. and Davis, B., 1995, "The Management of Tourism at Historic Sites and Monuments", pp. 235-255, in Hall, C.M., & Johnston, M., (eds) 1995, *Polar Tourism-Tourism in the Arctic and Antarctic Regions*, Wiley, Brisbane.

IAATO, 2005, "May 2005 Newsletter – Tourism Industry Conserves Antarctica", <http://www.iaato.org/info.html>, accessed 18 July 2005.

IUCN, 1991, *A Strategy for Antarctic Conservation*, IUCN, Gland, Switzerland.

Johnston, M. and Hall, C.M., 1995, "Visitor Management and the Future of tourism in Polar Regions", pp. 297-311, in Hall, C.M., & Johnston, M., (eds) 1995, *Polar Tourism-Tourism in the Arctic and Antarctic Regions*, Wiley, Brisbane.

Joyner, C., 1998, "Recommended Measures under the Antarctic Treaty: Hardening Compliance with Soft International Law", *Michigan Journal of International Law*, Vol 19, pp.401-427.

Kennicutt, M., and Sweet, S., 1992, "Hydrocarbon Contamination on the Antarctic Peninsula: III. The *Bahia Paraiso* – Two Years after the Spill", *Marine Pollution Bulletin*, Vol. 25, 9-12, pp. 303-306.

Kriwoken, L., & Rootes, D., 2000, 'Tourism on Ice: Environmental Assessment of Antarctic Tourism', *Impact Assessment and Project Appraisal*, Vol. 18, No. 2, pp 138-150.

Lewis, P., Hewitt, C., Riddle, M., and McMinn, A., 2003, 'Marine Introductions in the Southern Ocean: an unrecognised hazard to biodiversity', *Marine Pollution Bulletin*, Vol. 46, pp. 213-223.

Maher, H., 2004, "*The Management of Tourism Operations on Public Conservation Lands through Concessions*", unpublished dissertation, University of Otago.

Mason, P., and Legg, S., 1999, 'Antarctic tourism: activities, impacts, management issues and a proposed research agenda', *Pacific Tourism Review*, Vol. 3, pp. 71-84.

Molenaar, E. 2005, 'Sea-Borne Tourism in Antarctica: Avenues for Further Intergovernmental Regulation', *The International Journal of Marine and Coastal Law*, Vol 20, No. 2, pp 1-49.

Money, R., 1993, "The Protocol on Environmental Protection to the Antarctic Treaty: Maintaining a Legal Regime", *Emory International Law Review*, Vol 7, pp. 163-195.

Naveen, R., 1997, "The Oceanites Site Guide to the Antarctic Peninsula", Oceanites Inc., Chevy Chase, Maryland.

Naveen, R., 2003, "Compendium of Antarctic Peninsula Visitor Sites; 2nd Edition – A report to the United States Environmental Protection Agency", Oceanites Inc., Chevy Chase, Maryland.

Newsome, D., Moore, S., & Dowling, R., 2002, *Natural Area Tourism – Ecology, Impacts and Management*, Channel View Publications, Clevedon.

New Zealand Antarctic Institute, (2001), 'A state of the environment report for the Ross Sea Region of Antarctica', New Zealand Antarctic Institute, Christchurch.

New Zealand Conservation Authority, 2005, 'General Policy for National Parks', NZCA, Wellington.

Patterson, D., Holm, E., Carney K., and Fraser W., 1996, 'Effects of tourism on the reproductive success of Adelie penguins at Palmer Station', *National Science Foundation*, <http://www.nsf.gov/od/opp/antarct/ajus/nsf9828/9828html>, accessed 2 June 2005.

Pedersen, A., 2002, '*World Heritage Manual – Managing Tourism at World Heritage Sites: a Practical Manual for World Heritage Managers*', UNESCO, Paris.

Pfeiffer, S., and Peter, H-U., 2004, 'Ecological Studies toward Management of an Antarctic tourist landing site (Penguin Island, South Shetland Islands)', *Polar Record*, Vol. 40 (215), pp. 345-353.

Pineschi, L., 1992, "Tourist activities and the protection of the Antarctic Environment: current obligations and possible future developments", in *International Environmental Law for Antarctica*, ed. F. Franconi, Guiffre, Milan.

Polk, W., 1998, "Hotel Antarctica", *Emory International Law Review*, Vol 12, pp. 1395-1442.

Quark Expeditions, 2002, *Initial Environmental Evaluation – Antarctic Cruise Program : Kapitan Khlebnikov*, Darien, USA.

Richardson, M., 1999, "Regulating Tourism in the Antarctic: Issues of Environment and Jurisdiction", *Fridtjof Nansen Institute – Antarctic Project Report*, 2/99, pp. 1-19.

Rothwell, D., 2000, "Polar Environmental Protection and International Law: the 1991 Antarctic Protocol", *European Journal of International Law*, Vol. 11, No. 3, pp. 591-614.

Scientific Committee on Antarctic Research, 2005, "*Antarctic Statistics*", <http://www.scar.org/information/statistics>, accessed 3 May 2005.

Scott, K., 2003, "Institutional Developments within the Antarctic Treaty System". *The International and Comparative Law Quarterly*, Vol 52 No. 2, p. 473.

Smith, V., 1994, "A Sustainable Antarctic – Science and Tourism", *Annals of Tourism Research*, Vol. 21, No. 2, pp 221-230.

Spletstoeser, J., 2000, "IAATO's Stewardship of the Antarctic Environment: a History of Tour Operator's Concern for a Vulnerable Part of the World", *International Journal of Tourism Research*, Vol. 2, pp. 47-55.

Spletstoeser, J., and Folks, M., 1994, "Environmental Guidelines for Tourism in Antarctica", *Annals of Tourism Research*, Vol. 21, No. 2, pp. 231-244.

Stankey, G., Cole, D., Lucas, R., Petersen M., and Frissell, S., 1985, *The Limits of Acceptable Change (LAC) System for Wilderness Planning*, USDA Forest Service Intermountain Research Station, Utah.

Stokke, O., and Vidas, D., 1996, (eds), *Governing the Antarctic: The Effectiveness and Legitimacy of the Antarctic Treaty System*, Cambridge University Press, Cambridge.

Stonehouse, B., 1992, 'Monitoring shipborne visitors in Antarctica: A preliminary Field Study', *Polar Record*, Vol. 28 (166), pp. 213-218.

Stonehouse, B., & Crosbie, K., 1995, "Tourist Impacts and Management in the Antarctic Peninsula Area", pp. 217-233, in Hall, C.M., & Johnston, M., (eds) 1995, *Polar Tourism-Tourism in the Arctic and Antarctic Regions*, Wiley, Brisbane.

Szabo, M., and Dalziell, J., 1994, "*State of the Ice: an overview of human impacts in Antarctica*", Greenpeace International, Amsterdam.

Tavares, M., & de Melo, G., 2004, "Discovery of the first known benthic invasive species in the Southern Ocean: the North Atlantic spider crab *Hyas araneus* found in the Antarctic Peninsula", *Antarctic Science*, Vol. 16, Issue 2, pp. 129-131.

Thompson, R., 1977, 'Effects of human disturbance on a Adelie penguin rookery and measures of control', pp. 1177 – 1180 in "*Adaptations within Antarctic Ecosystems: Proceedings of the Third SCAR Symposium on Antarctic Biology, 26-30 August 1974*", Smithsonian Institute, Washington.

Tracey, P., 2001, 'Managing Antarctic Tourism', unpublished thesis for Degree of Doctor of Philosophy, Institute of Antarctic and Southern Ocean Studies, University of Tasmania, Hobart.

US Department of the Interior, 1997, '*VERP - The Visitor Experience and Resource Protection (VERP) Framework: a Handbook for Planners and Managers*', National Park Service, Denver.

Van Polanen Petel, T., Giese, M., & Bryden, M., (2001), "Measuring the effect of human activity on Weddell Seals in Antarctica", *VIII SCAR Biology Symposium*, August 27 – September 1, 2001.

Walton, D., 1997, "Environmental monitoring in Antarctica – Measuring the Damage", *International Journal of Wilderness*, Vol. 3, No. 3.

Antarctic Treaty Consultative Meeting documents referenced:

IP = Information Paper

WP = Working Paper

ASOC (2002) IP083 ATCM XXV, 'Regulating Antarctic Tourism'.

ASOC (2002) IP063 ATCM XXV, 'Port State Jurisdiction: An Appropriate International Law Mechanism to regulate Vessels Engaged in Antarctic Tourism'.

ASOC (2003) IP044 ATCM XXVI, 'Port State Control: An Update on International Law Approaches to regulate Vessels Engaged in Antarctic Non-Governmental Activities'.

ASOC (2003) IP117 ATCM XXVI, "Coastal sediment pollution at sites frequently visited by tourism operations".

ASOC (2004) WP003 ATCM XXVII, 'Tourism: Guidelines Related to Shipping. Provisions for Non-Treaty Flagged Vessels'.

ASOC (2004) IP Agenda Item 11 ATCM XXVII, 'The Regulation of Antarctic Tourism: State of Play after the ATME (Norway, March 22-25, 2004)

ASOC (2004) ATME Paper #22 ATME 2004, 'Mechanisms for Regulating Commercial Tourism'.

ASOC (2005) IP71 ATCM XXVIII, 'Some Legal Issues Posed by Antarctic Tourism'.

Australia (2004) ATME Paper #14 ATME 2004, 'Establishment of effective Antarctic quarantine controls for tourism and non-governmental activities'.

Australia (2004) ATME Paper #17 ATME 2004, 'An analysis of potential threats and opportunities offered by Antarctic tourism'.

CEP (2005) WP28 ATCM XXVIII, 'Measures to address the unintentional introduction and spread of non-native biota and disease to the Antarctic Treaty Area'.

COMNAP (2002) IP27 ATCM XXV, "Information Paper on the Interaction between National Operators, Tourists and Tourism Operators".

COMNAP and IAATO (2005) IP121 ATCM XXVIII, "Information Paper on the Use of Ballast Water in Antarctica".

France (2004) ATME Paper #23 ATME 2004, 'Tourism and Non-Governmental Activities in Antarctica: Deficiencies in the current legal framework'.

IAATO (2001) Agenda Item 4C ATCM XXIV (CEP), 'Issues relating to cumulative environmental impacts of tourist activities'.

IAATO (2002) IP72 ATCM XXV, 'Guidelines for Tourist Operations in Antarctica'.

IAATO (2002) IP85 ATCM XXV, 'Regulatory Mechanisms that Address Antarctic Tourism'.

IAATO (2005a) IP82 ATCM XXVIII, "IAATO Overview of Antarctic Tourism 2004-2005 Antarctic Season".

IAATO (2005b) IP81 ATCM XXVIII, "Site Guidelines Analysis".

IAATO (2005c) IP90 ATCM XXVIII, "IAATO Site Specific Guidelines in the Antarctic Peninsula".

IUCN (2005) IP63 ATCM XXVIII, "Introduction of Non-Native Species, Parasites and Diseases".

New Zealand (2004) ATME Paper #7 ATME 2004, 'An Analysis of the Existing Legal Framework for the Management of Tourism and Non-Governmental Activities in Antarctica: Issues, Some Proposals and Comments.'

United Kingdom (2002) IP21 ATCM XXV, "UK policy regarding visits by tourists to British stations and historic sites in Antarctica".

United Kingdom (2003) WP23 ATCM XXVI, "Proposals to Improve the Management and Regulation of Antarctic Tourism".

Appendix One Components of the Antarctic Treaty System

The ATS System

Antarctic Treaties, Laws and Regulations, Resolutions etc.

- Antarctic Treaty of 1959
- Convention for the Conservation of Antarctic Seals (CCAS 1972)
- Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR 1980)
- Protocol on Environmental Protection to the Antarctic Treaty (1991)
 - Annex I-Environmental Impact Assessment
 - Annex II-Conservation of Antarctic Fauna and Flora
 - Annex III-Waste Disposal and Waste Management
 - Annex IV-Prevention of Marine Pollution
 - Annex V-Area Protection and Management
 - Annex VI – Liability (yet to be ratified)
- Recommendation XVIII-1 (1994)
 - Guidance for Visitors to the Antarctic (including all available languages)
 - Guidance for Those Organising and Conducting Tourism and Non-Governmental Activities in the Antarctic
- Resolution 5 (1995) Antarctic Treaty Inspection Checklist for Tourist Ships
- ATCP nations have also enacted over 60 separate legislative instruments to support the regulatory framework, as well as a number of additional policies and guidelines.

Station Visit Guidelines

- Palmer and McMurdo Station Guidelines and Station Visits
- Procedures for Tourist or Non-Governmental Expeditions Requesting a Visit to a British Antarctic Survey Research Station

- South Pole Operating Procedure for visits to Amundsen–Scott Station

Non-ATS components

Air Regulations (for landings and overflights)

- *Convention on International Civil Aviation* (Chicago Convention), 1944, came into force 1947, and subsequent Annexes and Protocols
- Annex 16 (Environmental Protection) to the *Convention on International Civil Aviation*. Volume I, Aircraft Noise; Volume II, Aircraft Engine Emissions
- Resolution A33-7: *Consolidated statement of continuing ICAO policies and practices related to environmental protection* – Adopted October 2001. The statement is revised every three years by ICAO Council’s Committee on Aviation Environmental Protection (CAEP)
- The *Chicago Convention* is the international agreement that regulates civil aviation. It is regularly and frequently improved by the adoption of Annexes, Protocols and additional Conventions. In this way ICAO operates in a similar manner to the IMO; the CAEP is a direct equivalent to MEPC

Marine Regulations

- SOLAS, International Convention for Safety of Life at Sea, 1974 and its Protocol of 1988
- ISM Code (International Management Code for the Safe Operation of Ships)
- IACS (International Association of Class Societies)
- International Convention on Loadlines, 1966 (LoadLines 66)
- Protocol of 1988 relating to the International Convention on Load Lines, 1966 IL PROT 88
- STCW-95 International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended in 1995 (STCW Convention)
- Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREG 72)

- International Convention on Tonnage Measurements of Ships, 1969 (Tonnage 69)
- Arctic Shipping Pollution Prevention Regime (ASPPR) Certificate
- U.K.: Sailing vessels operating from a commercial basis are part of the Small Boat Registry and are subject to the control of Marine Coastguard Agency (MCA)
- Marine pollution is regulated by the International Convention for the Prevention of Pollution of Ships, adopted by the International Maritime Organisation (IMO) in 1973. The convention was subsequently modified by a Protocol passed in 1978 and is known as MARPOL 73/78. IMO's Marine Environmental Protection Committee (MPEC) regularly reviews the provisions of the convention
- Resolution MEPC.42(30) (entered into force 1992): Designation of the Antarctic area as a "Special Area" under Annex I (Regulations for the Prevention of Pollution by Oil) and Annex V (Regulations for the Prevention of Pollution by Garbage)
- Resolution MEPC.57(33) (entered into force 1994): Designation of the Antarctic area as a "Special Area" under Annex II (Regulations for the Prevention of Pollution by Noxious Liquid Substances)

Industry Self-Regulation

IAATO Guidelines and Operating Procedures

- IAATO Bylaws
- Zodiac Guidelines for Passengers and Staff
- IAATO Marine Wildlife Watching Guidelines
- IAATO Slide Show/Guidelines and Briefing Presentation
- IAATO Expedition Leader and Ship's Officers Seasonal Instructions
- IAATO Pre-Season Checklist
- IAATO Vessel Call Data
- IAATO Ships Schedules
- IAATO Expedition Leader Schedules

- IAATO Emergency Medical Evaluation Response Plan (EMER)
- Special Activity Guidelines: Helicopter, Scuba, Camping, Mountaineering, Kayaking, Remotely Operated Vehicle
- Expedition Leader and Staff Resource Notebook

Appendix Two The Antarctic Treaty

Appendix Three The Protocol on Environmental Protection to the Antarctic Treaty