Influence of varying intensities of natural area on-site interpretation on attitudes and knowledge

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Influence of varying intensities of natural area on-site interpretation on attitudes and knowledge.

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A Thesis Presented for the degree of
Doctor of Philosophy

College of Science and Technology
University of Notre Dame, Australia

Environmental Science
Murdoch University

2004
I declare that this thesis is my own account of my research and contains as its main content work that has not previously been submitted for a degree at any tertiary education institution.

Michael Phillip Hughes
April 2004
Sections of this thesis have already been published as journal papers and/or presented at conferences as follows:


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ABSTRACT

Using interpretation as a means of influencing attitudes and knowledge is a core component of natural area management practice. However, this aspect of on-site interpretation is rarely assessed when evaluating natural area management success. This thesis examined the immediate influence of different intensities of on-site interpretation on attitudes and knowledge of visitors to natural areas. Measuring the immediate (short term) influence of a site experience enables clearer links to be made between survey responses and interpretation used at a specific site, something long term surveys are less able to achieve.

Two sites from Western Australia (the Tree Top Walk and Penguin Island) were selected to compare the influence of high and low intensity use of interpretation on visitors. Both sites were similar in being relatively small and environmentally fragile with controlled visitor access in combination with an entrance fee, and managed by the same agency. One site adopted a low intensity on-site interpretation strategy with limited visitor activities, while the other had a high intensity use of interpretation with a range of visitor activities.

The visitor survey methodology centred on immediate influences on attitudes and knowledge in the specific context of the selected sites. The survey instrument was based on the New Environmental Paradigm scale, which was modified to better reflect the specific environmental context of the respective natural area site experiences. Variables measured were as follows:

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Dependent Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Knowledge</td>
</tr>
<tr>
<td>Place of residence</td>
<td>Environmental attitude</td>
</tr>
<tr>
<td>Age group</td>
<td>Attitude to site experience</td>
</tr>
<tr>
<td>Social group visiting with</td>
<td></td>
</tr>
<tr>
<td>Natural area visitation frequency</td>
<td></td>
</tr>
<tr>
<td>Reason for visit</td>
<td></td>
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<tr>
<td>Activities undertaken</td>
<td></td>
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<tr>
<td>Repeat/first time visitation</td>
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</tbody>
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Maximising data quality within a short survey completion time was essential to minimise disruption of visitors. This differs from common approaches of surveying using lengthy mail back or telephone surveys. A paired written survey format was adopted; completed by randomly selected visitors immediately before and after their experience of the site.

Both sites influenced respondents in different ways. The limited activity site experience at the Tree Top Walk combined with low intensity interpretive media appeared equally effective in knowledge transferal as diverse experiential opportunities combined with high intensity interpretive media at Penguin Island. At the low intensity site, respondents commonly requested more information be provided (eg. using trail-side signs). Addition of trail-side signs at this site did not influence knowledge but decreased complaints about inadequate information provision, suggesting sign positioning and quantity was a function of visitor satisfaction.
The magnitude of environmental attitudinal change was inversely related to the extent of past experience in natural areas. Interactive recreational experiences appeared to foster an anthropocentric conservation attitude while a passive observational experience seemed to promote an ecocentric conservation attitude. Attitude to the sites as natural area experiences appeared to be more related to visitor variables than interpretation. This research identified important natural area management issues regarding the experiential context of the site including design elements, use of interpretive media and the meaning subsequently conveyed to visitors. Recommendations for natural area managers and for further research are provided.
# Table of Contents

1 Introduction ................................................................................................................. 1

1.1 Research Objectives ................................................................................................. 2

1.2 Nature and Extent of this Study .................................................................................. 4

1.3 Research Limitations ................................................................................................. 7

1.4 Definition of Terms .................................................................................................... 7

1.4.1 Natural area ............................................................................................................. 8

1.4.2 Attitude .................................................................................................................. 8

1.4.3 Knowledge ............................................................................................................. 9

1.4.4 Interpretation .......................................................................................................... 10

1.5 Organisation of Thesis .............................................................................................. 11

2 Natural Area Sites and Interpretation ........................................................................... 13

2.1 Interpretation and the Visitor Experience .................................................................. 16

2.2 Environmental Attitude ............................................................................................ 18

2.2.1 Anthropocentric and ecocentric attitudes ............................................................... 18

2.2.2 Quantification of environmental attitude ............................................................... 21

2.2.3 Influencing environmental attitude ....................................................................... 22

2.3 Knowledge ............................................................................................................... 27

2.4 Attitude Toward Site Experience .............................................................................. 30

2.5 Visitor Variables and Interpretation ......................................................................... 34

2.6 Interpretive Media .................................................................................................... 41

2.6.1 Text based interpretation ...................................................................................... 43

2.6.2 Interactive interpretation ...................................................................................... 47

2.6.3 Interpersonal interpretation ................................................................................. 48

2.6.4 Short term and long term influences ................................................................... 50

2.6.5 Interpretation and novel arguments ................................................................... 53

2.7 Intensity of Interpretation ......................................................................................... 53

2.8 Conclusion ............................................................................................................... 56

3 Methodology ............................................................................................................. 59

3.1 Site Descriptions ..................................................................................................... 59

3.1.1 Tree Top Walk ..................................................................................................... 60

3.1.2 Penguin Island .................................................................................................... 65

3.2 Tree Top Walk Preliminary Survey .......................................................................... 72

3.2.1 TTW preliminary survey design ........................................................................ 72

3.2.2 Preliminary survey application ........................................................................... 74

3.2.3 Preliminary survey analysis ............................................................................... 75

3.3 Principal Survey .................................................................................................... 75

3.3.1 Principal survey design ....................................................................................... 76

3.3.2 Measurement of environmental attitude ............................................................. 86

3.3.3 Measurement of knowledge ............................................................................... 91

3.3.4 Measurement of attitude to site experience ....................................................... 93
3.4 Principal Survey Application ................................................................. 97
  3.4.1 TTW principal survey application.................................................... 97
  3.4.2 Penguin Island principal survey application.................................... 99
3.5 TTW Trail-side Sign Trial ..................................................................... 101
3.6 Data Analysis ....................................................................................... 105
  3.6.1 Environmental attitude analysis..................................................... 106
  3.6.2 Knowledge analysis........................................................................ 108
  3.6.3 Attitude to site experience............................................................. 108
3.7 Limitations ........................................................................................... 109
  3.7.1 Representativeness of sample.......................................................... 109
  3.7.2 Data collection method.................................................................. 111
4 TTW Survey Results ................................................................................ 114
  4.1 TTW Preliminary Survey Results........................................................ 114
    4.1.1 Summary of respondent characteristics....................................... 114
    4.1.2 Main reason for visitation............................................................. 116
    4.1.3 Most remembered aspect of site experience............................... 118
    4.1.4 Suggested improvements to TTW site.......................................... 120
    4.1.5 Preliminary survey conclusion..................................................... 123
  4.2 Principal Survey .................................................................................. 124
    4.2.1 Reactivity bias ............................................................................. 125
    4.2.2 Descriptive statistics.................................................................... 129
    4.2.3 Reason for visitation..................................................................... 132
    4.2.4 Interpretive media used by TTW respondents............................... 133
    4.2.5 Walk trail participation............................................................... 134
  4.3 Influence of Low Intensity Interpretation on Attitudes and Knowledge .................................................................................. 135
    4.3.1 Environmental attitude................................................................. 136
    4.3.2 Knowledge.................................................................................... 147
    4.3.3 Attitude to the TTW site as a natural area experience.................... 150
  4.4 Use of Low intensity Media ................................................................ 160
    4.4.1 Walk trail participation............................................................... 161
    4.4.2 Interpretation media and visitor influence.................................... 168
    4.4.3 Exploratory trail side interpretive sign trial................................... 168
  4.5 Conclusion ........................................................................................... 172
5 Penguin Island Survey Results ............................................................... 173
  5.1 Reactivity bias...................................................................................... 173
  5.2 Descriptive Statistics .......................................................................... 177
    5.2.1 Reason for visitation..................................................................... 180
    5.2.2 Interpretive media used by Penguin Island respondents.............. 181
    5.2.3 Activity participation................................................................... 184
  5.3 Influence of Higher Intensity Interpretation on Attitudes and Knowledge .................................................................................. 185
    5.3.1 Environmental attitude................................................................. 185
    5.3.2 Knowledge.................................................................................... 195
    5.3.3 Attitude toward Penguin Island as a natural area experience ........ 201
5.4 Influence of Activities Undertaken at Penguin Island ............................206
  5.4.1 Activities and environmental attitude............................................207
  5.4.2 Activities and attitude toward Penguin Island experience.............212
5.5 Conclusion ..........................................................................................216

6 Comparative Influence of High and Low Intensity On-site Interpretation ........................................218
  6.1 Survey Respondent Demographics ....................................................218
  6.2 Environmental Attitude .................................................................221
    6.2.1 Environmental attitude and frequency of natural area visitation ....224
  6.3 Knowledge .....................................................................................226
  6.4 Attitude to Site Experience .............................................................231
  6.5 Diversity of Media and Visitor Influence ...........................................234
  6.6 Site Design and Influence ...............................................................235
  6.7 Conclusion ......................................................................................237
    6.7.1 Recommendations for natural area managers .........................239
    6.7.2 Further research ......................................................................240

7 References ............................................................................................242
List of Figures

Figure 2.1: Diagrammatic summary of variables relating to influence of a natural area site on visitor attitudes and knowledge. ........................................58
Figure 3.1: Location and layout of Tree Top Walk site. ........................................61
Figure 3.2: TTW Site images ...........................................................................62
Figure 3.3: Location of Penguin Island relative to Perth. .................................65
Figure 3.4: Penguin Island location and layout .................................................66
Figure 3.5: Penguin Island as viewed from the mainland jetty ............................67
Figure 3.6: Penguin Island images ..................................................................71
Figure 3.7: TTW layout showing positioning of experimental signs .................101
Figure 3.8: Experimental TTW trail-side sign installed at platform 1 .................103
Figure 3.9: Experimental TTW trail-side sign installed at platform 2 ..................103
Figure 3.10: Experimental TTW trail-side sign installed at platform 5 .................104
Figure 4.1: Mean environmental attitude scores as compared between the post-visit only and paired surveys after experiencing the TTW site. ....126
Figure 4.2: Comparison of rating of attitude to site experience between paired survey and post-visit only groups at the TTW site .................................128
Figure 4.3: Mean paired survey response to environmental attitude statements before experiencing the TTW site ........................................137
Figure 4.4: Mean response to environmental attitude statements after experiencing the TTW site ................................................................137
Figure 4.5: Mean individually calculated change in response to attitude statements at the TTW site .................................................................138
Figure 4.6: Mean paired survey response to environmental attitude statements before experiencing the TTW site according to gender ....141
Figure 4.7: Mean paired survey response to environmental attitude statements after the site experience according to gender ................................142
Figure 4.8: Change in response to environmental attitude statements according to gender .................................................................143
Figure 4.9: Response to environmental attitude statements before experiencing the TTW site according to natural area visitation frequency ....144
Figure 4.10: Post visit response to environmental attitude statements according to frequency of natural area visitation .................................145
Figure 4.11: Change in response to TTW survey environmental attitude statements according to natural area visitation frequency ...............146
Figure 4.12: Mean knowledge scores of TTW survey respondents before experiencing the site .................................................................147
Figure 4.13: Mean knowledge scores of TTW survey respondents after experiencing the site .................................................................148
Figure 4.14: Mean change in knowledge scores after experiencing the TTW site ......148
Figure 4.15: Mean attitude response to the TTW site before experiencing the site according to gender .................................................................155
Figure 4.16: Mean attitude response to the TTW site after experiencing the site according to gender .................................................................155
Figure 4.17: Change in attitude to TTW site according to gender .......................156
Figure 4.18: Mean attitude response to the TTW site before experiencing the site according to frequency of natural area visitation .........157
Figure 4.19: Attitude response to the TTW site after the experience according to frequency of natural area visitation .................................159
Figure 4.20: Change in attitude response to the TTW site according to frequency of natural area visitation .........................................................160
Figure 4.21: Mean change in correct knowledge responses according to walk trail participation at the TTW site.

Figure 4.22: Mean attitude response to the TTW site before experiencing the site according to walk trail participation.

Figure 4.23: Mean attitude response to the TTW site after experiencing the site according to walk trail participation.

Figure 4.24: Change attitude response to the TTW site according to walk trail participation.

Figure 4.25: Mean change in knowledge scores before and after additional trail side signs installed at the TTW site.

Figure 5.1: Mean knowledge scores as compared between the post-visit only and paired survey groups after experiencing Penguin Island.

Figure 5.2: Mean environmental attitude responses of post-visit only and paired survey groups after experiencing Penguin Island.

Figure 5.3: Mean attitude responses to Penguin Island experience as compared between post-visit only and paired survey groups after experiencing the site.

Figure 5.4: Mean paired survey response to environmental attitude statements before experiencing Penguin Island.

Figure 5.5: Mean paired survey environmental attitude response after experiencing Penguin Island.

Figure 5.6: Mean paired change in response to environmental attitude statements after experiencing Penguin Island.

Figure 5.7: Mean environmental attitude response immediately after experiencing Penguin Island according to gender.

Figure 5.8: Mean environmental attitude response immediately after experiencing Penguin Island according to gender.

Figure 5.9: Mean change in response to environmental attitude statements at Penguin Island according to gender.

Figure 5.10: Mean environmental attitude score before experiencing Penguin Island according to frequency of natural area visitation.

Figure 5.11: Mean environmental attitude response after experiencing Penguin Island according to frequency of natural area visitation.

Figure 5.12: Mean change in response to environmental attitude statements at Penguin Island according to frequency of natural area visitation.

Figure 5.13: Mean knowledge score of paired survey respondents before experiencing Penguin Island.

Figure 5.14: Mean knowledge scores of survey respondents after experiencing Penguin Island.

Figure 5.15: Mean change in knowledge scores after experiencing Penguin Island.

Figure 5.16: Mean knowledge scores before experiencing Penguin Island according to main reason for visitation.

Figure 5.17: Mean knowledge scores after experiencing Penguin Island according to main reason for visitation.

Figure 5.18: Mean change in knowledge scores after experiencing Penguin Island according to main reason for visitation.

Figure 5.19: Mean attitude response to Penguin Island before experiencing the site according to natural area visitation.

Figure 5.20: Mean attitude response to Penguin Island experience after experiencing the site according to frequency of natural area visitation.

Figure 5.21: Change in attitude toward Penguin Island experience according to frequency of natural area visitation.
Figure 5.22: Mean environmental attitude response according to activity participation before experiencing Penguin Island............................207
Figure 5.23: Mean environmental attitude response after experiencing Penguin Island according to activity participation on Penguin Island.................210
Figure 5.24: Mean environmental attitude response of Penguin Island respondents according to activity participation..........................................................211
Figure 5.25: Mean attitude response to Penguin Island before the experience according to activity participation. .................................................................212
Figure 5.26: Mean attitude response to Penguin Island after experiencing the site according to activity participation.......................................................214
Figure 5.27: Mean change in attitude response to Penguin Island experience according to activity participation .................................................................215

Figure 6.1: Mean individual change in rating of environmental attitude statements categorised by site. .................................................................222
Figure 6.2: Mean change in response to human use attitude statements based on individually paired changes at each site.............................................225
Figure 6.3: Mean change in individual knowledge scores compared between the TTW site and Penguin Island.................................................................227
Figure 6.4: Mean individually calculated change in paired survey ratings of attitude to experience of TTW and Penguin Island.............................................233

List of Tables

Table 3.1: Summary of main interpretive media at the TTW site .........................64
Table 3.2: Summary of main interpretive media on Penguin Island.......................69
Table 3.3: Summary of TTW preliminary survey questions....................................73
Table 3.4: Summary of paired survey questions completed immediately before experiencing the TTW site........................................................................78
Table 3.5: Summary of paired survey questions completed immediately after experiencing the TTW site........................................................................81
Table 3.6: Summary of paired survey questions completed immediately before experiencing the Penguin Island site.........................................................84
Table 3.7: Summary of paired survey questions completed immediately after experiencing the Penguin Island site.........................................................85
Table 3.8: NEP scale statements as used by Dunlap and van Liere (1978) and Jurkowski et al (1995).....................................................................................87
Table 3.9: Environmental attitude scale adapted for use at the TTW site..................89
Table 3.10: Environmental attitude scale adapted for use at the Penguin Island site....90
Table 3.11: Knowledge quiz designed for TTW respondents..................................92
Table 3.12: Knowledge quiz designed for Penguin Island respondents..................93
Table 3.13: Attitude to TTW site experience instrument designed for completion immediately before experiencing the site.................................................94
Table 3.14: Attitude to TTW site experience instrument designed for completion immediately after experiencing the site.................................................95
Table 3.15: Attitude to Penguin Island site experience instrument designed for completion immediately before experiencing the site...............................95
Table 3.16: Attitude to Penguin Island site experience instrument designed for completion immediately after experiencing the site...............................96
Table 3.17: TTW survey environmental attitude scale statements grouped into Human use and intrinsic ecological value themes........................................107
Table 3.18: Summary of respondent variables from preliminary TTW survey data.....115
Table 4.2: Preliminary survey categorised reasons given for visiting the TTW site.  
Table 4.3: Preliminary survey most remembered aspect of TTW site experience.  
Table 4.4: Preliminary survey suggested improvements to TTW site.  
Table 4.5: Media types mentioned by respondents suggesting the need for more information in the preliminary TTW survey (n=92).  
Table 4.6: Test statistics resulting from comparison of knowledge scores between post-visit only and paired surveys at the TTW site.  
Table 4.7: Mann-Whitney test statistics resulting from comparison of post-visit only and paired survey environmental attitude scores after experiencing TTW site.  
Table 4.8: Mann-Whitney U test z-scores and p values of site attitude responses at the α =0.05 level.  
Table 4.9: Summary of demographic variables of the TTW paired survey group.  
Table 4.10: Main reasons indicated for visit to TTW Site by principal survey participants.  
Table 4.11: Principal survey interpretive media types used by respondents at the TTW site.  
Table 4.12: Activities undertaken by respondents while at the TTW site.  
Table 4.13: Results of K-S test for normal distribution and a 1 sample T-test of change in environmental attitude response after experiencing the TTW site.  
Table 5.1: Test statistics resulting from comparison of knowledge scores of the paired survey and post-visit only groups at Penguin Island.  
Table 5.2: Test statistics and p values for comparison of environmental attitude responses between post-visit only and paired survey groups at Penguin Island.  
Table 5.3: Mann-Whitney test statistics from comparative analysis of post-visit only and paired survey group responses to attitudes to Penguin Island.  
Table 5.4: Summary of demographic variables of the Penguin Island paired survey group.  
Table 5.5: Reasons indicated for visiting Penguin Island.  
Table 5.6: Frequency of interpretation sources used by respondents on Penguin Island.  
Table 5.7: Combinations of media types used by survey respondents at Penguin Island.  
Table 5.8: Activities undertaken while on Penguin Island as indicated by respondents.  
Table 5.9: Results of K-S test for normal distribution and a 1 sample T-test of change in environmental attitude response after experiencing Penguin Island.  
Table 5.10: Categorisation of activity participation at Penguin Island.  
Table 6.1: Comparison of change in response to human use statements categorised by natural area visitation frequency.
1 Introduction

In recent decades, recognition of natural areas as distinct and important destinations for tourist visitation has grown. In conjunction with this recognition, the need to manage natural areas has increasingly included the factor of human visitation and interaction with natural areas as part of the conservation equation. On-site interpretation is an important tool used to mediate between human visitors and the natural area of visitation. On-site interpretation, in part, intends to add meaning to the visitors’ experience of the natural area; encouraging the visitor to view the natural area in personally significant terms or to perceive the natural area in a new light. This suggests an immediate influence on the visitor as a result of experiencing a natural area site. In order to achieve this, on-site interpretation requires an understanding of who visits particular places and how they relate to such places. Subsequently, natural area visitation has become an important focus for research to understand the character of such experiences and how they influence the type of people who undertake them (Boo, 1990; Markwell & Weiler, 1998; Newsome et al, 2002).

Visitor interaction with natural areas represents a two-way relationship with one affecting the other to varying degrees (Shafer, 1969; Dunlap & Heffernan, 1975; Evison, 1981; Perdue & Warder, 1981). For example, visitors whose attitudes are dominated by the perceived utility of natural areas to humans may prefer visiting places with significant human built modifications to enhance comfort. Those seeking to experience natural areas as intrinsically significant or pristine places may prefer no evidence of human modification at all (Jurowski et al, 1995). In turn, the appearance and experiential character of a natural area may foster particular attitudes and knowledge in the visitor (Evison, 1981). Along similar lines, those seeking active recreational activities are less interested in learning about the natural area compared with those seeking to explore their natural surroundings (Hendee et al, 1971; Ballantyne et al, 1998). In this way, the types of attitudes and knowledge held by a visitor might determine the manner of natural area experience they choose, which in turn may determine how on-site interpretation is incorporated into and influences their experience.

While significant resources are spent on developing on-site interpretation of varying types and intensities, there appears to be gaps in assessing the effectiveness of such
communicative techniques in terms of influencing attitudes and knowledge of visitors. For example, the ANZECC Working Group Report (1999) commented on the apparent lack of adequate assessment of interpretation programs in encouraging positive interactions between visitors and natural area sites. The report noted that few management agencies had documented procedures in place to assess the effectiveness of communication services. It was recommended that future development of success factors and performance indicators were required together with research into visitor perceptions of interpretation programs.

Brookes (2000a) commented that the focus of examination of natural area experiences lay primarily in the context of practical economic and environmental management issues. That is, on-site interpretation is primarily assessed in terms of its effectiveness as a marketing and regulatory tool rather than the extent of influence on the visitor. This is due mainly to the perceived difficulties involved in assessment of the influence of on-site communication on visitor attitudes (ANZECC, 1999; Sharpley, 2000). In addition, Brookes (2000a, p126) observed that more consideration is required in terms of finding ways to understand and evaluate the relationship between visitors and how their knowledge and attitudes are influenced by interaction with natural areas. Investigation of this will enable on-site interpretation to become more efficient and effective due to a better understanding of the underlying principles involved (McArthur, 1994; Cole et al, 1997; Floyd, 1997; ANZECC, 1999; Sharpley, 2000).

1.1 Research Objectives

Natural area management agencies in Australia generally have site management objectives relating to the visitors being influenced/educated and made knowledgeable about the site. This is reflected in the status of interpretation as a core component of natural area site management (ANZECC, 1999). Despite the perceived importance of on-site interpretation by natural area management agencies, very little systematic evaluation of its effectiveness has been undertaken. This is especially the case with regard to the intent of interpretation to influence visitor attitudes. Coupled with this is some debate relating to the intensities and types of on-site interpretation that are most appropriate and effective in influencing visitor attitudes.
Part of the issue behind the lack of investigation of the relationship between interpretation and visitor attitudes lies in the difficulties of measurement of cause and effect. While some authors condone extensive workshop style sessions using narratives to gain a detailed picture of attitudes held by individuals, other methods using rating responses (from disagree to agree) to key statements, such as the New Environmental Paradigm scale developed in 1975 have been cited as legitimate (Dunlap & Heffernan, 1975; Jurowski et al, 1995; Manning et al, 1999; Shanahan et al, 1999). There appears to be a trade-off between the depth of attitudinal understanding and detail provided by time consuming narrative methods as compared with the relatively rapid assessment offered by methods such as the NEP scale. It would seem that lengthy attitude assessment techniques would lend themselves to formal interpretative situations in which individuals take part in structured activities of which an in-depth attitude assessment could be a natural extension. Alternately, for circumstances in which individuals are not part of a formal activity but choose to experience interpretation in a casual manner, rapid assessment of attitudes may prove less intrusive and time consuming. The advantage of this is that individuals in casual situations who are not expecting to take part in a survey style assessment may be more likely to take part if the process is time efficient.

This thesis examined whether different intensities of on-site interpretation in natural areas were significantly associated with immediate influences on attitudes and knowledge of visitors as measured by a survey instrument based on the New Environmental Paradigm attitude scale. Measuring the immediate influence of on-site interpretation enables attitudes to be more accurately assessed in the context of a particular natural area site. This was addressed through the following research questions:

1. Is there a measurable influence on attitudes and knowledge of visitors immediately after experiencing on-site interpretation at natural area sites?
2. Is there a relationship between different intensities of on-site interpretation and the influence on attitudes and knowledge?

Two variations of the NEP attitude scales were used to gather attitude data. The first focussed on visitor attitudes toward the human relationship with natural areas. The second focussed on visitor attitudes toward natural areas as a personal experience. The
intent was to measure the influence of on-site interpretation on visitor attitudes toward
the relationship between natural areas and humans; and the attitudes of visitors toward
the specific study sites as a natural area experience. Influence on knowledge was
measured in the context of the site management objectives and factual content of on-site
interpretation.

1.2 Nature and Extent of this Study

As part of a research arrangement in co-operation with local universities, the
Department of Conservation and Land Management (CALM) provided funding for a
social research oriented PhD project in 1998. CALM is a Western Australian State
Government agency responsible for the management of the public natural area estate
and particularly protected natural areas (such as national parks) within Western
Australia. The intent of this project was to determine the influence of CALM’s on-site
interpretation in natural areas on visitors, comparing different intensities and methods of
communication. CALM states in both its corporate objectives as well as in strategic
planning documents for use at the individual site level that they aim to positively
influence visitor attitudes, knowledge and experiences in natural areas (for example
CALM, 1996a; CALM, 2000). While CALM staff have considerable experience in the
design of on-site interpretation in natural areas, the success or failure of various
techniques has relied on past experience and subjective assessment. Consequently,
there was no systematic or consistently accessible resource to provide information on
the effectiveness of communication techniques in influencing visitor attitudes and
knowledge as stated in agency objectives.

This research aimed to address the research questions outlined previously using self
administered written paired surveys. Two forms were completed by respondents, one
immediately before the experience of the site and one immediately after. Written
surveys were determined to be the most appropriate method of data collection owing to
the quantifiable nature of the information and the relative short length of time required
per visitor to collect such information.

The literature dealing with long term changes in attitude response to communicated
messages also suggested immediate or short term influences are apparent. Pratkanis
and Greenwald (1985) provided an overview of previous research into what has been
termed the “sleeper effect”, a documented phenomenon whereby an immediate attitude response may alter over time depending on the relationship between the receiver and source of the message. While the authors were primarily concerned with the varying theories as to why the “sleeper effect” occurs, the common underlying focus was based on an immediate attitude response followed by a decay or a strengthening of the immediate response in the long term (Pratkanis & Greenwald, 1985). Lariscy and Tinkham (1999) also document various literature sources that found significant immediate influences were evident in people exposed to persuasive messages. In addition, their study of persuasive messages, in the form of negative political advertising, identified a significant immediate effect in terms of influencing the attitudes of the audience such that they aligned with the intent of the message being communicated (Lariscy & Tinkham, 1999).

This research was concerned with the immediate response of visitors after experiencing a given natural area site. The measurement of immediate response enables associations to be made with the on-site interpretation. Surveying visitors immediately before and after their site experience minimises influences external to the site that may alter attitudes. Long term studies may provide insight into the ultimate influence of natural area experiences on attitudes but specific effects of particular sites are difficult to attribute to any changes measured.

The issue of external influences occurring when investigating the long term changes in attitude as a result of a particular event was discussed by Hovland et al (1953). They commented that, “subsequent experiences affect the retention of communications, but subsequent experiences are also differentially perceived as a result of prior communications” (Hovland et al, 1953, p261). That is, long term attitude studies are complicated by experiences outside the confines of the intended experimental variables. In addition, the influencing factor at the centre of investigation may itself influence how subjects perceive those external experiences. Thus, attitude responses in the long term are difficult to link directly to the original source of influence. Further discussion is provided in the review of the literature in Chapter 2 and methodology Chapter 3. The limitations of this study are addressed in section 1.3.

Two CALM managed sites in Western Australia were used as case studies: the Tree Top Walk site (TTW) and Penguin Island. These sites were selected owing to some
fundamental similarities in character (i.e. small size, entry fees, delicate ecology, short walk trails) while having distinct differences in on-site interpretation techniques. Both sites are relatively small and have been established to protect ecologically unique phenomena. Penguin Island and TTW both incorporate a controlled method of visitor access coupled with an entry fee. Finally, both Penguin Island and the TTW sites are centred on a specific icon that attracts visitors. Penguin Island affords a visitor centre with an enclosure containing Fairy Penguins. The TTW offers a unique canopy level walk trail through stands of giant Tingle and Karri trees. More detailed site descriptions and location maps are provided in Chapter 3.

Both the visitors accessing the TTW and those using the ferry to access Penguin Island were required to pay an entry fee. This represents an important similarity in the visitor samples taken at each site. Paying for site access may be closely associated with how a visitor experiences a site and their attitudes toward it. A visitor willing to pay for admission may view the site in terms of a user-pays facility, in other words, the site simply becomes a commodity for use by visitors as a source of entertainment or place of recreation. This may affect the meaning the site has and may also distance visitors from the site (metaphorically) as a natural area experience, a situation in contrast to the intent of interpretation discussed in section 1.4.4 (Schwer & Daneshvary, 1997). In addition, the expectations of paying visitors may be higher than non-paying visitors in terms of the quality and type of experience (Morgan & Lok, 2000). On the other hand, non-paying visitors may view the site in terms of social heritage to which the community should have free access (Schwer & Daneshvary, 1997). Morrison et al (1994) included readiness to pay for an experience in a list of possible significant visitor categorisation that represent distinct visitors groups with differing attitudes and expectations. Thus sampling paying visitors at each site creates a common link between the two samples.

The main difference between the sites relate to the intensity of interpretation used and the range and type of visitor experiences offered. The TTW uses a low intensity of interpretation, mainly text based signs, and offers a low intensity (and passive) level of interaction with the site, namely two walk trails. Penguin Island uses relatively more intense on-site interpretation including signs, ranger talks, volunteer information staff and touch tables as well as a walk trail loop around the island. Visitors may also undertake a diverse range of mainly aquatic based activities (swimming, fishing, bird watching, snorkelling and boating), representing a more physically interactive, higher
intensity of experience. These similarities and differences enable comparisons to be made regarding the influence of the differing site communication designs on visitor attitude and knowledge change.

1.3 Research Limitations

This thesis is intended as a study of the measurement of immediate influences on attitudes and knowledge and its relationship with the intensity of on-site interpretation. This enabled influences of site specific interpretation to be better related to influences on attitude not afforded by long term studies. Consequently, a cross sectional, largely quantitative research approach was used as advocated by Neuman (2000). That is, data was collected over relatively short periods of time using primarily numerically based techniques of data collection. The data were not intended as an assessment of the influence of the site on the general visitor population. Ultimately, the thesis provides a foundation for understanding the relationship between intensity of use of on-site interpretation and the influence on attitudes and knowledge.

The nature of this research precludes any assessment of the long term influences on visitors after their experience of the respective sites. In addition, the effects of media or interpretation relating to the sites encountered by visitors outside the locales was not assessed. It was assumed that respondents were equally likely to have access to such interpretation.

The data used within this thesis was taken from two sites within Western Australia and therefore may have limitations in terms of direct transferral of results to natural area sites in other locations. However, the exploration of the relationship between the visitors and the communication methods provide useful indications of how varying degrees and types of interpretation influence attitudes and knowledge in the short term. Further discussion of limitations are presented in section 3.6.

1.4 Definition of Terms

Following are a list of key terms used throughout this manuscript defined in relation to the context of the research carried out. While the terms listed may have a wide variety of definitions and interpretations, the definitions used below have been sourced from the literature to represent the meaning of the respective terms as intended in this thesis.
1.4.1 Natural area

Natural areas may be simplistically defined as places comprised of non-human made elements. This is a fairly restrictive definition as it envisages a dichotomy between human made and natural environments that does not reflect the reality of the contemporary environment (Heimstra & McFarling, 1974). A more comprehensive definition of natural areas by Heimstra and McFarling (1974) delineated three categories of natural area: human made (built), natural areas, and a blending of natural and built environments. Blended environments may include parks within urban areas that provide the components of a natural setting artificially constructed for temporary ‘escape’ from the surrounding built environment. To better represent the blending of environmental types, Newsome et al (2002) described a spectrum that ranged from natural to built environments. At one end of the scale, natural areas were defined as those places that retained their essential endemic ecological processes. At the other end of the scale, built environments were characterised by significant human modification with little or no evidence of the original self-sustaining ecological processes. The concept of the spectrum emphasises a continuum from built to natural areas rather than definitive boundaries between what constitutes a built environment and what is a natural area. The simulated natural environments described by Heimstra and McFarling (1974) occur as a recognised environment type (semi-natural areas) along the spectrum between natural and built areas.

1.4.2 Attitude

Attitudes are based on negative or positive assessments (e.g. agree/disagree, like/dislike) directed toward a specific object or situation. Attitudes are a manifestation of applying a set of values to an individual’s experience at a particular moment in time (Manning et al, 1999). Values, in the context of natural settings, relate to enduring conceptions of the natural environment or human interaction with the natural environment (Manning et al, 1999). Values are deeply held and are based on a social and cultural history of belief. Consequently, values tend to be widely shared by members of a given society or culture (Vaske & Donnelly, 1999). Although values are enduring and widely shared within a community, they are also arranged in a flexible hierarchy with a complex array of interactions specific to the individual. This values
hierarchy changes according to the situational context of the individual such that emphasis on particular values may alter with changing circumstances (Crick-Furman & Prentice, 2000). While a group of individuals may possess a common set of values, the variations in the values hierarchy result in a wide variation of expression resulting in the numerous attitudes evident within a given population (Vaske & Donnelly, 1999).

Shanahan et al (1999) commented that individuals might express entirely different attitudes according to the context of their situation. While values represent a transcendent basis that is difficult to change, how those values are interpreted and applied to a given situation in the form of attitudes may be influenced by external factors (Born & Wieters, 1978; Vaske & Donnelly, 1999). Environmental attitudes may be categorised in terms of levels of satisfaction with a particular environment; preferences for particular features within an environment or attitudes toward conservation of natural resources (Holahan, 1982). Environmental attitudes may also be characterised by an ecological focus and conceptions of human interaction with natural ecological systems (Cone & Hayes, 1980). Sections 2.2 and 2.4 provide further discussion of attitude and its measurement.

1.4.3 Knowledge

CALM as a natural area management agency states that part of their mission in regards to both the TTW site and Penguin Island, is to provide knowledge about the natural area being experienced (CALM, 1996a; CALM, 2000). The Oxford Dictionary defines knowledge as the possession of information or facts as a result of an experience (Turner, 1987). Thus, knowledge in the context of this thesis pertains to the ability of an individual to identify facts regarding the natural area being experienced as determined by site management and communicated by on-site media. While knowledge transferral is not the primary function of interpretation, it forms an important foundation from which to create meaning for the visitor. Factual information is an important basis upon which to build themes (a key component of interpretative design) that create meaning and influence visitor attitudes. This was suggested by Rolston (1998) who commented that while an individual may gain meaning from a natural area through experiencing it, this is difficult to achieve by simply looking long and hard at it in the absence of any knowledge base. Knowledge is discussed further in section 2.3.
1.4.4 Interpretation

Interpretation was initially conceptualised by Tilden (1957) as:

“An educational activity which aims to reveal meanings and relationships through the use of original objects, by first hand experience, and by illustrative media, rather than simply to communicate factual information.”

In this sense, he defined interpretation as a way of providing a natural area with a personal significance that the visitor relates to through the use of a variety of communication techniques (Tilden, 1957). Edwards (1969) later described interpretation as a method of positively influencing people’s knowledge, attitudes and interest in natural areas. He stated that interpretation utilises methods that attract people to a particular subject then inspires them with a new understanding of the environment. This may be best achieved through stimulation of multiple senses (sight, touch, hearing, smell and so on). Ashbaugh (1970) reworded Edwards’ (1969) definition by stating that interpretation also encouraged a connection between visitors and the natural environment. A ‘connection’ relates to the concept of realisation that humans are a component of the greater ecological whole, influenced by, and being able to influence the structure and functions of natural areas (Ashbaugh, 1970). Similarly, Mahaffey (1970) viewed interpretation as a means for creating a sense of empathy and emotional attachment between the visitor and natural areas; a form of connection. Field and Wagar (1973) suggested that interpretation also helps people enjoy the natural area they are visiting. This may be achieved through a development of an understanding of the personal relevance of the natural area of visitation. All the above authors relate interpretation to the fostering of a connection between visitors and natural areas through influencing attitudes toward such places and how they are experienced.

Interpretation has also been identified as a means toward economic sustainability through ensuring a consistent or growing rate of visitation to natural areas. Bramwell and Lane (1993) identified interpretive facilities as important tools for attracting visitors to natural areas and encouraging them to stay longer. The subsequent revenue generated can then theoretically be used for further economic development. This was based on the premise that natural area tourism is a market driven activity. McKercher
(1993) expressed the view that tourism, including visitation of natural areas, is a market driven activity based on the flux of supply and demand. He stated that tourism is a form of entertainment, meaning natural area experiences need to cater to visitor wants, needs and demands in order to be economically viable. In this context, interpretation may provide for the entertainment aspect of natural area visitation while packaging the experience in an easily accessible manner (McKercher, 1993). Moscardo (1998) and Moscardo and Woods (1998) highlighted the beneficial relationship between use of interpretation and encouraging visitation to particular a natural area. Not only does interpretation operate to attract new visitors but it may also ensure the return of visitors at regular intervals.

The concept of interpretation originally grew out of the intent to positively influence visitor attitudes toward natural areas in order to create a sense of connection or personal responsibility. Interpretation is also seen to afford economic benefits through marketing and providing unique and desirable experiences to attract visitors to particular places. Interpretation thus is a process of communicating the significance of a natural area site to visitors. This in turn aims to positively influence their enjoyment of the site, become knowledgeable about the natural environment and encourage attitudes of caring toward conservation of nature (Moscardo, 1996; Kuo, 2002).

1.5 Organisation of Thesis

This chapter has sought to outline the key issues concerning interpretation and the relationship with natural area visitor attitudes and knowledge. The remainder of the thesis examines these issues in detail and presents the findings of surveys carried out at two natural area sites.

Chapter 2 examines the concept of on-site interpretation in terms of the various types used. There was no intent to discuss interpretive design in terms of an analysis of what might be considered to be ‘best practice’, but rather, to examine on-site interpretation as part of the natural area experience and the varying ways in which it may be used. This leads to a discussion of attitudes and knowledge in the context of natural area experiences and the influence interpretation may have.
Chapter 3 outlines the development and implementation of the survey methodology, derived from the New Environmental Paradigm Scale, used for gathering information relating to the influence on-site interpretation has on attitudes and knowledge. Site descriptions for the Tree Top Walk and Penguin Island Sites are provided along with detailed explanations of survey design, implementation and data analysis.

Chapter 4 provides a discussion of the significant results obtained from the Tree Top Walk surveys, relating material back to the relevant theory discussed in Chapter 2 and the original research questions outlined previously. The primary focus of this chapter is on the influence of the TTW visitor experience and how this relates to the interpretation used at the site.

Chapter 5 parallels the layout of Chapter 4 and discusses the results obtained from the Penguin Island survey. The data collected is analysed and placed into the theoretical context set out in the literature review and related back to the research questions.

Chapter 6 compares and contrasts the results from the Tree Top Walk and Penguin Island surveys in order to understand the influence of different intensities of on-site interpretation on visitor attitudes and knowledge. As this is the concluding chapter, it also provides an overarching view in relation to the influence of varying intensities of on-site interpretation, its measurement and the significance for natural area management.

The final component of this thesis comprises a list of references cited throughout the text of the thesis.
2 Natural Area Sites and Interpretation

Natural area management agencies have increasingly recognised nature based tourism as a significant aspect of their management responsibility (CALM, 1996a; ANZECC, 1999; Sharpley, 2000). The principal aim of natural area management agencies usually relates to the requirement that the area continue to exist without significant degradation of the ecological, economic or social components while maintaining a quality visitor experience (Hendee et al, 1990; Buhalis & Fletcher, 1995). Hendee et al (1990) stated that the general objectives of natural area management should centre on maintaining the natural setting as well as the visitor experience without diminishing the character of an area. Vorkinn (1998) reiterates this sentiment when commenting that natural area management objectives need to function in terms of promotion of sustainable recreational use by visitors, presumably rather than a sole focus on ecological conservation. Tian-Cole et al (2003) stated that a primary goal of natural area managers was to provide for visitor satisfaction through provision of appropriate opportunities in the form of services and facilities that may include on-site interpretation as well as other aspects. Ultimately, site management must find a balance between minimising visitor impact and maximising the quality of the recreational experience of the visitor through the use of a combination of management techniques including on-site interpretation (Hendee et al, 1990; Vorkinn, 1998).

Jubenville (1974) provided a broad view of the potential conflicts between natural area visitors and the need for minimisation of degradation of such areas. He considered the increasing numbers of visitors to natural areas to be adverse to the need for conservation of such areas. Jubenville (1974) highlighted issues such as the apparent paradox between the demand for ‘authentic’ natural area experiences and the requirement that such experiences include modern comforts (with associated heavy equipment) that increased visitor impact both in terms of ecological and social aspects. Usher et al (1974) argued that natural area visitation and conservation were compatible given appropriate management of the area. Their study examined the issue of large scale visitation to coastal areas of Yorkshire, England. The limited area of coastline was deemed important to both recreation, science and education and was threatened by increased popularity as a natural area destination. Usher et al (1974) suggested management regimes that balanced continued visitation with actions aimed at minimising impacts on the area. These actions largely involved control of visitor
movements by restricting access to sensitive areas while installing hardened pathways and built facilities (such as toilets) to minimise impacts.

More recently, Andersen (1993) emphasised the need for effective physical site design as a key feature to minimise human impacts in ecologically sensitive sites by containment of visitors to defined areas. That is, physical prevention of use of key areas within a natural site may be the most efficient method of ensuring minimisation of ecological degradation. McArthur & Hall (1993b) commented that while site hardening is commonly used, “[it] …is a fairly drastic method of altering behaviour” owing to the cost of constructing built facilities and the diminished quality of the natural area visitor experience. While allowing unabated use of a natural area is not a feasible option due to sustainability issues, severe restrictions on freedoms of visitors are perhaps equally unacceptable owing to the resulting social impacts.

McArthur & Hall (1993b) cited the Gordon River Cruise scenario in Tasmania as a prime example of the costs and benefits of site hardening. The cruise consisted of large groups of 50 or more visitors (for economic reasons) who are constrained to key stops along the riverbank where boardwalks have been constructed through the surrounding rainforest. While the large tour groups have had a minimal impact on the rainforest ecology, this has come at the expense of the visitor experience. Visitors are pressed for time and space as they move around the boardwalk amongst crowds of other tourists (McArthur & Hall, 1993b). In this environment, there seems to be little opportunity to savour the beauty and isolation of the rainforest given the dominating physical barriers and significant numbers of other visitors in close proximity.

The apparent ecological benefits of physically restricting visitors to a given area may be counter balanced by a degradation of the visitor experience (McArthur & Hall, 1993b). While the parameters of personal space and subsequent feelings of crowding vary according to individual expectations and situational context, exceeding the given threshold leads to perceptions of invasion of: privacy; restriction of behavioural freedom; and feelings of threats to autonomy (McManus, 1998). Such negative feelings and perceptions manifest as stress. Visitors may feel rushed or unable to engage with the natural surroundings due to distractions caused by other visitors in close proximity. (McManus, 1998).
Many visitors often find that, after going to significant effort to visit a site, it is disappointingly crowded due to a combination of popularity and restricted access (Morgan & Lok, 2000). While it is preferable that visitors to an ecologically sensitive area are confined to predetermined pathways to minimise ecological impacts (Andersen, 1993), it is possible that this, in combination with increasing popularity, may lead to crowding. Crowding at natural area sites is a significant issue when considering that a common motivation for visitation to natural areas is to experience some level of relative solitude (Heimstra & McFarling, 1974; Hendee et al, 1990). Restricted dispersal of visitors is more likely to result in unwanted close proximity of others, and hence, the perceived invasion of personal space through crowding (McManus, 1998). Invasion of personal space, in turn is generally associated with negative emotions. With this in mind, the perception of what constitutes overcrowding in a natural area depends significantly on numerous variables such as:

- the context of interactions with others;
- ability to control interactions with others;
- how the site experience is promoted to the general public; and
- the socio-cultural background of the visitor (Heimstra & McFarling, 1974).

For example, while a hiker in the wilderness may perceive crowding as simply meeting another solitary hiker along a trail, visitors to an urban parkland may tolerate significantly larger numbers of others before the site is perceived as being crowded (McManus, 1998). The negative influence of crowding at a natural area site may counter the positive intent of on-site interpretation.

The visitor experience of a natural area site may be enhanced by the presence of on-site interpretation. This may operate through influencing the visitors’ relationship in terms of their knowledge and attitudes regarding the specific site as a natural area, natural areas in general and towards the site as a satisfying tourism destination. Interpretation may also be used to influence visitor decisions in relation to selection of activities and experiences while encouraging concern for relevant issues (Moscardo, 1992). In other words, interpretation may influence visitor movements in time and space, for reasons such as directing them away from ecologically sensitive areas, or for adding meaning to an experience of a site (Bramwell, 1993). This may be achieved through influencing visitor attitudes toward the natural environment while encouraging empathy with site management objectives. In this way, interpretation affords the opportunity to develop
a personal relationship with the site built on trust and an understanding of the significance of the experience undertaken (Bramwell, 1993).

2.1 Interpretation and the Visitor Experience

On-site interpretation has become a ubiquitous part of the experience at managed natural area sites to the extent that is has become a core management practice of Australian conservation agencies (ANZECC, 1999; Kuo, 2002). Hammit (1981) suggested successful interpretation should result in creating meaning for the natural area visitor through developing and influencing attitudes. Morfoot and Blake (1978) also defined the goals of interpretation with reference to enrichment of people’s understanding and enjoyment of natural areas. Likewise, Sharpe (1982) stated that one of the main benefits of interpretation was: “… enrichment of the visitor experience”. This was also in reference to developing meaning on the part of the visitor with regards to the place of visitation. van-Matre (1990, p228) referred to “enriched perception” when describing the process of increased visitor understanding of natural surroundings through interaction with that environment. He mentioned this might be brought about by carefully planned education programs and/or opportunistic interactions between people and natural areas. Fakeye and Crompton (1992, p162) included “physical self and intellectual enrichment” in their survey of repeat and first time visitor motivations for experiencing the Lower Rio Grande Valley in the U.S. This concept involved statements such as “to enrich myself intellectually” and “to explore and evaluate myself”. Fakeye and Crompton’s (1992) use of “enrichment” was in terms of visitor knowledge gain and influence on attitudes.

While on-site interpretation may seek to influence the visitor, it is not intended as a means of overtly changing visitor attitudes through imposing a certain point of view. Catton (1960) pointed out that overt attempts to change attitude rarely succeed. This is because visitors tend to selectively absorb desirable messages while ignoring those that counter existing attitudes. Ideally, interpretation does not attempt to prescribe attitudes toward a natural area. Rather, the aim is to help visitors think about their experience of the site and the natural area it presents. That is, rather than a propaganda exercise designed to change attitudes, interpretation aims to enhance the meaning of the experience for the individual.
Field and Gough (1998) described influencing visitor attitudes and knowledge of natural environments in a similar manner to the concepts of Hammit (1981) and Sharpe (1982). They commented that such changes may take place spontaneously given the right combination of physical setting and experience. Howard (1998, p66) summed up Tilden’s (1957) vision of environmental interpretation by stating that it, “… was for the enrichment of the human mind and spirit”, suggesting a range of influences including knowledge and attitude. Sharpe (1982) cited a definition of interpretation by Yorke Edwards (1965) that described interpretation as a means toward new insights, new interests and a new understanding. These ideas all point toward interpretation as a means of influencing of how the visitor experiences a site and the meaning they gain from their experience.

Orams (1997) stated that a goal of interpretation should be to provide a satisfying experience for the visitor. This relates to the importance of conveying information in a positive atmosphere to increase the likelihood of visitor receptivity. Moscardo (1998) and Moscardo and Woods (1998) also described interpretation as an effective means toward providing a satisfying experience for the visitor. Interpretation may function to ‘value add’ to the experience such that visitors have a greater sense of satisfaction afterward. Satisfaction is an important aspect of the visitor experience and is often the focus of management agency’s assessment of the success of a natural area site (McArthur, 1994; ANZECC, 1999). However, measurement of satisfaction does not equate with assessment of the influence of the site experience on the visitor. Influencing the visitor may well encompass satisfaction as a component but visitor satisfaction alone does not equate with influence on attitudes and knowledge.

Lee (1998) observed that visitors might demonstrate great satisfaction with an experience while experiencing little or no alteration in attitudes. His example of a British Nuclear Power Industry interpretive display indicated satisfaction was accompanied by reinforcement of negative attitudes, where an attempt to overtly encourage positive shifts in attitudes backfired. While the display was popular and visitors appeared to enjoy the experience, surveys revealed most visitors left with a more negative attitude toward the industry. This was owing to the distrust the visitors had in the nuclear industry as a reliable source of information. The distrust in the source created a strong discounting effect where-by visitors dismissed the content of the display as propaganda, a perception that reinforced the negative attitude toward the
industry. Thus, while visitor may have been satisfied with their experience to a certain extent, their existing negative attitudes were reinforced not positively influenced. Sharpley (2000) also made a distinction between the provision of an satisfying experience and positively influencing visitor attitudes. He commented that the proportion of visitor satisfied with an experience did not relate to the extent of change in attitude. Sharpley (2000) mentioned that many managers mistakenly equate satisfaction with effectively influencing attitudes and knowledge of visitors. This confuses face value with the underlying educational effectiveness of the experience. Satisfaction relates to the popularity and the level of enthusiasm at which visitors experience a site and is more a function of the entertainment value and demand for a given experience (McKercher, 1993; Sharpley, 2000). Thus, people may be satisfied without any alteration in their attitudes toward the site or focus of experience.

2.2 Environmental Attitude

On-site interpretation partly aims to influence, and is influenced by, the environmental attitude held by the visitor (Hammit, 1981). That is, the visitor brings an attitude toward the environment to the site experience. This attitude in turn may determine the effect the site has on the visitor and may also be influenced by the site experience. For this reason, in order for attitudes to be positively influenced, it is important to be aware of what attitudes are brought to the experience by visitors (Jurowski et al, 1995). That is, environmental attitude may function as both an independent variable brought to the experience and subsequently be influenced by that experience such that an alteration in attitude is evident. Managers are inevitably confronted with the diverse attitudes and underlying values of natural area visitors due to the diversity of socio-cultural backgrounds from which visitors come (Magill, 1995). These circumstances require an understanding of the diverse values and attitudes various visitors carry into a natural area experience in order to ensure effective communication between management and visitors.

2.2.1 Anthropocentric and ecocentric attitudes

The diversity of attitudes toward natural areas may be described as a spectrum ranging from anthropocentric to ecocentric. Anthropocentrism represents a human centred valuation of nature and ecocentrism an ecologically centred approach. In addition, anthropocentrism may take two forms, strong anthropocentrism and weak
anthropocentrism. The strong form only values nature that fulfils a practical function in satisfying basic, concrete human needs or desires (also labelled instrumentalism). This attitude translates into a ‘subdue and dominate’ approach. Weak anthropocentrism (non-instrumentalism) represents a more considered, but still human centred, approach where nature may be valued for less tangible reasons such as “enriching the human experience” (Armstrong & Botzler, 1993, p276). From this weak anthropocentrism basis, conservation takes on the mantle of stewardship of nature, or conservation for the good of humanity.

As anthropocentric attitudes are centred around action for the human good, alterations to natural areas are acceptable and in certain circumstances preferred. For example, Jurowski et al (1995) found that anthropocentric environmental attitudes were associated with visitor preference for modification of natural areas to better suit the purposes of human use. Conservation from an anthropocentric standpoint may also translate into selective conservation where natural areas are set aside as long as the recreational and/or tourism benefit is not outweighed by other resource based benefits such as timber harvesting, mineral extraction or agriculture. Such a conservation approach seeks natural areas that are perceived to offer attributes that may attract visitors, that is, areas that hold aesthetic beauty or unusual phenomena rather than ecologically significant characteristics. This leads to selective conservation that may potentially disregard the broader ecological context of a particular natural area attraction.

Ecocentric attitudes focus on maintenance of ecological processes and protecting ecologically significant areas. Ecocentrism thus is based on the premise that natural areas have an intrinsic value irrespective of any worth to humans (Armstrong & Botzler, 1993). Leopold (1949) and Naess (1973) both conceptualised the ecocentric paradigm in terms of viewing humans as part of, and reliant on, a natural ecological system rather than the reverse. Maintenance of natural areas for tourism or recreation purposes thus becomes a secondary function and is ideally framed within the philosophy of ecotourism. That is, any human interaction is conducted in a mutually beneficial manner such that both humans and the natural area visited gain from the experience.

As with anthropocentrism, ecocentrism has weak and strong components referred to as shallow and deep ecocentrism (Naess, 1973; Acott et al, 1998). Shallow ecocentrism
was used by Naess (1973) to describe what he saw as an inconsistent attitude that focused on conservation of fragments of natural areas that appealed to humans. Later comments by Acott et al (1998) reinforced this notion by suggesting that shallow ecocentrism was a blending of anthropocentric and ecocentric attitudes where nature was valued as long as it conformed to an aesthetic benchmark. This position appears similar to weak anthropocentrism. Shallow ecocentrism was seen by these authors to be ineffectual as a conservation approach as it fails to recognise that all aspects of natural areas are seen as contributing to the whole. Deep ecocentrism is an attitude based on the valuation of natural areas in terms of their intrinsic worth as part of a complex ecological process. Naess (1973) developed an ideal in which humans were viewed as citizens of a biotic community in which all members play an equally important role. Deep ecocentrism focuses on a mutually beneficial relationship between humans and natural areas (Armstrong & Botzler, 1993; Acott et al, 1998).

Authors such as Budianski (1995) and later, Cole (2000) criticised deep ecocentrism for being too idealistic in a world where impacts on natural areas are both unavoidable and necessary for the survival of humans and natural systems. Budianski (1995) had pointed to the ubiquity of human influence on natural areas that has created a reality whereby no natural area is ‘ecologically pure’. From this position, he argued that the deep ecocentrism concept of humans being equal members of a larger natural ecological process, exerting minimal or zero impact, was flawed. His argument primarily rested on the view that the ‘natural ecological processes’ are actually a product of human intervention. In addition to this, Budianski (1995) pointed out that natural areas are subject to constant changes through natural processes of ecological flux and human impacts such that there is no real balanced or pure state of nature. Cole (2000) later argued along the same lines, also referring to the ubiquity of human influence in natural areas. The conclusion was drawn that active management of natural areas is necessary in order to maintain natural characteristics or other foci of natural attractions as they are the product of past human intervention. Thus, in the absence of human impacts, the character of the natural areas would alter and the attraction may be lost.

Given that natural areas are subject to change through natural flux and human influence, if human influence is somehow withdrawn, Budianski (1995) in particular argued that ecological processes may become unbalanced. To this end, the deep ecocentrism concept of the purity of nature with humans playing a minor role does not ring true.
While natural areas may be a product of human influence and undergo constant change, conservation of such areas may translate as minimising negative influences and changes. This requires managerial intervention but not necessarily constant intervention. That is, while the concept of a pristine or pure natural area may be ideological and impractical, the line between desirable and undesirable human impacts must be drawn to maintain the integrity of the natural area as an attraction. Perceptions of acceptable levels of human intervention and impact in natural areas are strongly influenced by environmental attitude (Jurowski et al, 1995).

Where an individual or group is initially positioned along the environmental attitude spectrum is predominantly influenced by social and cultural background. This concept was discussed by Bowers (2000) who pointed to cultural differences and how they manifest as attitudes toward natural areas. She commented that the Western Capitalist culture of utilitarianism results in a view of natural areas based on an anthropocentric stance. On the other hand, Taoist culture approaches the human relationship with natural areas often from a more ecocentric standpoint. These differences have ramifications in terms of how different cultures experience natural areas. Similarly, many indigenous cultures, such as Native Americans and Aboriginal Australians perceived that all aspects of their natural environment are sentient in some way and humans function as part of that system rather than being the sole superior custodians of nature. This is an interesting concept given that such cultures still had significant influences on natural ecosystems and processes in their respective geographical locations. However, the relationship reflects an ecocentric attitude toward nature with a focus on the intrinsic worth rather than human centred benefits (Armstrong & Botzler, 1993).

2.2.2 Quantification of environmental attitude

The social and cultural changes that occurred during the 1960s and 1970s formed the basis from which Dunlap and van Leire (1978) hypothesised that attitudes of the general public had shifted toward an increased awareness of environmentally related issues. This was supposedly a product of the ‘green movement’ moving from a fringe group concern into the mainstream of social consciousness. In order to measure attitudes toward the environment they devised a scale referred to as the New Environmental Paradigm (NEP) scale. The NEP scale consisted of a series of pro conservation and pro
human domination statements to which respondents indicated their extent of agreement or disagreement on a numerical scale. Dunlap and van Leire’s (1978) study demonstrated a significant level of concern for the environment amongst those surveyed. This suggested a general movement away from the traditional human centred approach to interaction with nature commonly expressed up until the mid 20\textsuperscript{th} century. Samdahl and Robertson (1989) and Jurowski et al (1995) later described the NEP scale as an environmental attitude spectrum ranging from anthropocentric to ecocentric. When conducting studies using the scale, they identified clusters of responses that characterized either anthropocentric or ecocentric attitudes toward natural areas that related to certain behavioural characteristics. The NEP scale represents a rough tangible measure of the concepts raised and discussed by Leopold (1949) and Naess (1973) and may be used as a rapid assessment tool for environmental attitude. This method of attitude measurement and its limitations are discussed further in the Methodology Chapter 3.

2.2.3 Influencing environmental attitude

Leopold (1949) proposed that a new approach to morals and ethics was required in order to ensure a mutually beneficial relationship between human society and the environment. He observed that the history of ethical thinking fell into a pattern of increasing complexity as societies themselves became more complex. For example, advances in the extent to which technology is incorporated into lifestyle are directly proportional to the complexity of ethical issues. The invention of the printing press precipitated an ethical dilemma as to whether a vernacular Christian Bible should be printed for circulation in the general population. This raised concerns relating to maintaining the authority of the religious stewardship of the church in the presence of mass access to what was seen as the word of God (Schama, 2000). More recently, medical technology has given rise to an ethical dilemma revolving around the use of human embryos for curing disease. This relates to the sacrifice of one perceived potential human life to save another. This increasing complexity extends to all aspects of society and requires development of increasingly intricate ethical frameworks. Leopold (1949) suggested that the next logical step in complexity of ethical thinking was to extend moral values from purely social issues to the human relationship with the environment. This required a change in attitude away from anthropocentrism and toward ecocentrism.
A series of world environmental education conferences in the 1970s recognized the need for a general shift toward a more ecologically minded environmental attitude in contemporary society. The outcomes of the 1972 UNESCO-UNEP Stockholm conference and subsequent conferences in Belgrade (1975) and Tbilisi (1977) highlighted the need for environmental education strategies aimed at all sections of society with the intent of raising knowledge and awareness and influencing attitudes with regards to the natural environment. This educational approach appears to have filtered through both natural area management, in the form of on-site interpretation, and public thinking. This is evident in managers increasingly using educational strategies, on the form of interpretation, to influence visitor attitudes toward natural areas while visitors appear to expect some sort of educational interaction as part of their experience (Manfredo & Bright, 1991; Moscardo, 1998).

Planned interpretive activities, as part of an organised educational experience, generally form the focus of attitudinal change discussions in the literature owing to more immediate accountability and program effectiveness issues. van-Matre (1990), Attarian (1996) and Brookes (2000) all advocated various forms of formal interpretation approaches as a means toward increasing ecocentric attitudes. Their suggested approach revolves around education programs being conducted in the natural area of concern to enhance the impact on attitudes. These comments were built on earlier work that investigated the relationship between formal interpretation and environmental attitude change as summarised by Crompton and Sellar (1981). For example, Howell and Warmbrod (1974) examined the influence of an educational manual on environmental attitudes of students enrolled in varying science and agriculture courses. They found significant relationships between the provision of the manual and the types of courses taken by students. Those involved in environmentally based courses were more likely to be influenced by the manual.

Later studies of formal interpretation and attitude change have replicated results from earlier work. An investigation by Walker (1996) examined the influence of workplace environmental interpretation programs on environmental attitudes of employees. She found that attendance of these programs was positively related to ecocentric shifts in environmental attitudes. In addition, employees who were subjected to repeated environmental interpretation programs tended to have a greater ecocentric shift than those who took part in a one-off program. Emmons (1997) examined the effect of an
outdoor education program on environmental attitude of students in Belize. Emmons (1997) found that students who had started with very negative attitudes toward nature had undergone a positive shift as a result of the specifically tailored interpretation activities. She concluded that such educational activities in natural areas designed to promote positive attitude toward nature were successful.

Similarly, Metzger and McEwen (1999) found that participants in an adventure canoe trip, centred on an organised program of interpretation, demonstrated a significant positive shift in their attitude toward the environment. The results from this particular study are questionable, as biased questioning may have skewed the data. Participants were requested to write a daily response to the following questions during the canoe trip (Metzger & McEwen, 1999, p38):

“1. What did you learn in today’s activities?
2. What happened today that made you feel a connection with nature?
3. What activities or events gave you an appreciation of the environment?”

The results of the study by Metzger and McEwen (1999) are questionable as the survey approach appeared to encourage a desired response. The questions suggested to the participants that they should have learnt something, they should have felt a connection with nature as a result of the daily activities and they should feel an appreciation of the environment. Born and Wieters (1978) had earlier warned against survey methods and wording that convey what the researcher is attempting to measure as participants may oblige by providing expected responses. Such leading questions are likely to encourage responses that satisfy the insinuations communicated in order to avoid being seen to fail to meet expectations (Black & Champion, 1976; Fowler, 1995; Neuman, 2000). Thus, even if the visitor felt no change, or worse, experience negative feelings, responses would likely reflect learning, connection with nature and environmental appreciation anyway. Given the character of the survey questions, it is likely that participants in the survey of Metzger and McEwen (1999) were prompted to respond positively and demonstrate the success of the program.

The previously mentioned studies suggested that interpretation programs focusing on environmental issues have a strong connection to positively influencing environmental attitudes. They all involved carefully planned activities performed by willing volunteers.
who were supposedly aware of the intent of the program they were involved in. This situation differs from assessment of voluntary, casual interaction with interpretative media in natural areas as a means toward influencing the visitor. Apart from the presence of a defined agenda with set outcomes, participants in formal programs differ from casual natural area visitors in terms of their mind set. In essence, visitors to natural areas may be seen as consumer-oriented individuals taking part in entertainment activities in a natural setting (McKercher, 1993; Sharpley, 2000). In other words, unlike formal interpretation program participants, natural area visitors generally do not place intellectual enlightenment as a high priority. As a result of this, intensive use of interpretive media in an casual natural area setting may work to create negative responses and fail to positively influence visitors (Roggenbuck, 1992). Were such techniques used in formal educational settings, they may have a positive influence. Interpretation in an casual natural area setting operates on an opportunistic basis in which the visitor may decide on the sequence and intensity of information and related themes (Howard, 1998). This may raise questions as to the effectiveness of such experiences, not subject to educational control, as a means of influencing visitor attitudes and knowledge (Orams, 1997).

Orams (1997) stated that natural area experiences are unlikely to influence visitor attitudes without structured interpretation programs. In support of his hypothesis, he conducted a study of the impact of a dolphin feeding experience, in Southeast Queensland, Australia, on visitor attitudes, knowledge and enjoyment. The study was based on a long-term survey period with visitors completing a written survey on-site then participating in a telephone survey three months later. There was an emphasis on the importance of implementing carefully planned educational experiences the visitors’ were effectively made to experience in order to gain access to the dolphins. Orams (1997) demonstrated that the experience had long-term positive effects on environmental attitude with a shift toward ecocentrism.

Outside formal interpretation, discussion of natural area experiences and the relationship with environmental attitudes appears to fall mainly into two categories:

- assessment of existing environmental attitudes in relation to types of natural area experience selected by visitors; and
- influences on attitude resulting from natural area experiences.
Work by Dunlap and Heffernan (1975) tended toward the former category. They studied the relationship between environmental attitude and recreational use of environmental areas. Their study was based on a random mail out questionnaire to residents in Washington State. The mail out survey did not measure the influence of casual use of natural areas on attitudes but concentrated on the type of use preferred by respondents of a particular environmental attitude type. Dunlap and Heffernan (1975) differentiated between attitudes emphasising natural areas as a useful recreational resource versus attitudes reflecting non-human centred concerns. While positive relationships were found, it was unclear whether environmental attitudes influenced type of use or visa versa. Dunlap and van Leire (1978) subsequently formulated an attitude scale which they used to quantify the attitudes of Washington State residents in reference to the general perceptions of the human relationship with the environment. This study did not relate attitudes to natural area use preferences.

Later authors conducted similar research relating to the relationship between use of natural areas and environmental attitudes. For example, Jurowski et al (1995) examined the relationship between environmental attitudes and natural areas using the attitude measurement technique of Dunlap and van Leire (1978). As with the former studies, the focus was on categorising visitor attitudes and relating them to perceptions of the natural area experience, rather than how the experience influenced attitude. Hrezo and Hrezo (1984), Heberlein (1989) and Ballantyne et al (1998), among other authors, pointed out that knowledge of visitor attitudes was important in terms of management of natural areas and provision of appropriate experiences. This was concerned with shaping a natural area experience to suit visitor attitudes to maximize satisfaction and differs from assessment of how a natural area experience may influence attitudes.

Authors such as Edwards (1969) tended toward the latter category concerned with attitudinal influences resulting from natural area experiences. He pondered the importance of environmental interpretation, applied to casual natural area experiences, as a method of influencing visitor attitudes. Edwards (1969) described the potential for attitude shifts in connection with experiences in natural areas when supplemented by ranger talks, visitor centres and walk trails. While he viewed such activities as being highly effective in influencing attitudes toward the environment, his ideas were based on observations relating to popularity of the interpretive activities and visitor numbers. Similarly, a study by Lipman and Hodgson (1978) assessed the influence of cave tours
using different interpretation methods on the visitors’ interest in that particular environment. The measure used was the change in number of questions asked by visitors. This data was interpreted as representing interest in the environment that indirectly related to environmental attitude. Later authors, such as Lee (1998) and Sharpley (2000), warned against confusing popularity and enthusiasm with educational success.

2.3 Knowledge

Knowledge, as defined in section 1.4, provides an important basis from which influences on attitudes may occur. However, according to Tilden (1957), knowledge should not be an end in itself. Although knowledge of the fundamental functions or components of an environment are important, memorising facts and figures may not necessarily correlate with positively influencing visitor attitudes toward a natural area (Edwards, 1969; van-Matre, 1990; Lee, 1998). This was illustrated by a study examining the knowledge and environmental attitudes of participants in an environmental education youth camp in West Virginia by Burrus-Bammel (1978). He found there was no direct correlation between knowledge gained and environmental attitude. This was despite there having been a positive affect on both environmental knowledge and attitude as a result of attending the camp. A later study by Howard (2000) also found no link between knowledge gain and changes in attitudes. His study of visitors to a turtle-nesting site compared knowledge, enjoyment and conservation behaviour. While all three aspects were positively effected by the experience of the site, there was no relationship found between the extent of knowledge gain itself and stated intentions to take part in conservation activities or reported behavioural change.

While explaining the lack of relationship between attitude and knowledge gain, Howard (2000) suggested that knowledge gain was important because it stimulated thinking and was therefore an end in itself. Interestingly, van-Matre (1990) had earlier stated that provision of factual knowledge destroyed the sense of wonder and motive for exploration in the visitor. By way of example, he claimed that once a visitor is provided with the scientific name and/or an explanation of a natural point of interest, the mystery is removed and the visitor no longer ponders the significance or meaning of the focus of interest. This may be an effect similar to having solved a riddle which then needs no further thought. Rather than providing raw data or facts, van-Matre (1990) suggested
describing the ecological or environmental significance of a point of interest in a manner that directly relates to the visitor’s life experience. Along these lines, Bowers (2000) was of the opinion that an over emphasis on the importance of factual knowledge often resulted in experiences being packaged as a series of modular and mechanistic views based on a scientific approach. As with van-Matre’s (1990) comments, she viewed this as encouraging an objective distance between the visitor and the experience, effectively discouraging greater awareness and appreciation. If this point of view is placed in the context of Tilden’s (1957) and Hammit’s (1981) concepts of interpretation, knowledge itself is not a justifiable end but forms an important foundation for building positive experiences.

Bright and Manfredo (1995) found that the extent of acquisition and impact of knowledge depends on the existing attitude to the respective issue or area. If an individual considered the issues or area to be personally important, knowledge appeared to clarify and strengthen attitudes held by that individual. If the visitor deemed the issue or area unimportant, the knowledge-attitude effect was reversed. This concept was illustrated by the results of a study that found a positive relationship between knowledge and increases in minimal impact behaviour and quality of the visitor experience (O’Loughlin, 1996). The study detailed a campaign centred on encouraging minimal impact hiking in the Tasmanian wilderness areas in southeast Australia. The information was distributed by pamphlets, posters, a video presentation and a school educational kit. The information highlighted the link between certain attitudes and behaviours and the quality of the wilderness experience. This approach theoretically placed the knowledge contained within the package in direct relevance to the visitor experience of the natural area. The campaign was deemed a success owing to a significant decrease in illness (gastroenteritis caused by human faecal pollution of drinking water sources) amongst hikers coupled with an increase in minimal impact behaviour such as reduced littering and trampling (O’Loughlin, 1996). This apparently demonstrated a transferral of knowledge that influenced the visitors’ attitude toward the natural area, how they experienced it and enhanced satisfaction.

Similarly, Papageorgiou (2001) viewed knowledge transferral as an integral part of positively influencing attitudes amongst natural area visitors. He claimed that knowledge transferral was an important part of natural area management as it increased positive attitudes toward the site of visitation. This argument centred on the concept of
knowledge provision enabling visitors to make informed choices regarding attitudinal relationships with the natural area. Papageorgiou’s (2001) survey of visitors, to Vikos-Aoos National Park in Greece, found that a major factor in the effectiveness of knowledge acquisition related to their past experience in natural areas.

An accumulation of experience in natural areas was directly related to the level of interest taken in learning about issues related to the national park and the level of knowledge retained. Visitors who had accumulated experience in Greek natural areas in particular were significantly more interested and able to retain knowledge than were visitors with experiences elsewhere. This phenomenon was attributed to the greater ability of visitors with accumulated natural area experiences, particularly in Greek natural areas, to place the knowledge within a more developed and relevant context. There was a suggestion that the significantly greater interest of visitors frequenting Greek natural areas specifically was due to a greater sense of attachment to those particular types of environment. Papageorgiou (2001) concluded that knowledge provision was most effective when it formed an integral part of a broader experience directly related to the information being communicated. This finding supported comments by Bowers (2000) who emphasised the need for knowledge transferral within a broader context of meaning and experience rather than as an end in itself.

Given that the success of knowledge transferral relies on factors relating to the visitor and the experience, it appears to be of secondary importance to attitude influence. Rolston (1998) suggested that knowledge was peripheral to the enhancement of the visitor experience. He commented that it was not an essential component of appreciating the wonder and mystery of natural areas as these may be apparent despite the lack of factual knowledge. Similar to the views expressed by Howard (1998), he suggested that natural area experiences in themselves might bring about attitude changes simply through their intrinsic uniqueness or confrontational character. Interestingly, Rolston (1998, p161) went on to write that, “… a forest cannot be understood simply by looking long and hard at it...”. Perhaps the conclusion drawn may be that provision of knowledge is an augmentation of an experience, providing additional insight into the significance and meaning in relation to the visitor. This suggests that knowledge provision during an experience provides an added dimension to influencing visitors that is not essential but may act as a catalyst for reassessment of attitudes toward the site and the general environment. Thus, knowledge appears to
contribute toward the influence of visitor attitudes only when it is of direct relevance to the immediate natural area experience; and visitor attitudes, both brought to, and fostered by, the experience.

2.4 Attitude Toward Site Experience

A primary component of interpretation is the development of meaning for the visitor in terms of the natural area being experienced (Howard, 1998; Lee, 1998). This concept differs from environmental attitude, which refers to a general evaluation of the human/nature relationship at a more global level. Shafer (1969) mentioned a number of ways in which people may relate to and experience natural areas, that is, the meaning they derived from their experience. He described examples such as aesthetic appreciation of visual beauty or naturally occurring sounds, emotional connection and physical or recreational personal challenges. Visitors may place an emphasis on one or more of these and other aspects that reflect a type of attitude to the natural area as an experience. The variation in attitudes toward an experience of a natural area is directly related to the variation in environmental features and the types of activity undertaken in the given area (Shafer, 1969; Dunlap & Heffernan, 1975). Interpretation, in influencing the meaning of a place in the eyes of the visitor, may thus influence how the visitor experiences that place.

Shafer and Mietz (1969) discussed visitor attitudes to natural area experiences in the context of natural wilderness in the U.S. They identified several categories relating to how visitors interact with such places including: physical exercise; emotional experiences; aesthetic experiences; educational experience and social experiences. Shafer and Mietz (1969) defined physical exercise as interactions with natural areas that involved physical exertion that stimulates the body. This might include climbing or hiking and other activities involving physical exercise. Emotional experiences were described as physical reactions such as the thrill of new experiences and sensations, achievement and interacting with nature. For example, the feelings of wonder or spirituality invoked by experiencing isolation in a geologically dramatic landscape as alluded to by Collins (1995). Shafer and Mietz (1969) also identified visitors’ attitudes toward natural areas as places for education that revolved around learning and gaining new knowledge. Visitors may also place an emphasis on social experiences, which refer to bonding with others in a natural setting. Finally, Shafer and Mietz (1969)
identified aesthetic experiences that involved mental evaluation of scenery in terms of beauty, patterns of colour and variety. These categories represent types of awareness and appreciation, one or all of which may be experienced by a visitor in a natural area.

Hendee et al (1971) later identified five primary attitudes visitors may have toward experience of natural areas. These were: appreciative-symbolic; extractive-symbolic; passive-free play; social learning and active expressive. The appreciative-symbolic relationship relates to Shafer’s (1969) comments on aesthetic appreciation of scenic beauty. Hendee et al (1971) used this category to describe activities that centred on viewing natural scenery, such as hiking, photography and mountain climbing. The extractive-symbolic category involves activities such as fishing or hunting while passive free-play refers to performing everyday activities, such as cooking, drawing, drinking, reading or relaxation, in a natural setting. Sociable learning focuses on exploration and discovery of natural areas and actively seeking knowledge. Active-expressive interactions involve physical recreational exercise, such as swimming or football, in natural surroundings. All of these categories represent differing ways in which visitors are aware and appreciate natural areas in terms of their interactive experiences.

Categories of visitor interaction with natural areas do not necessarily represent separate and distinct types of experience of natural areas. For example, Heimstra and McFarling (1974) observed that emotional and aesthetic experiences in natural areas might be difficult to distinguish owing to similarities in personal response. That is, an aesthetically pleasing natural area may also invoke an emotional response. They suggested that the difference lies in aesthetic appreciation being a form of mental evaluation (e.g. admiring the impressive height of a waterfall) while emotional experiences are identified by physical reactions such as changes in physiology (e.g. changes in heart rate or breathing). This may be more clearly understood in terms of aesthetic appreciation being an attitude to a natural area as a separate and distant object (metaphorically). Emotional experiences involve a close interaction between the visitor and the place.

Hunt (1973) proposed that attitudes toward interaction with natural areas might correlate with the concepts of Maslow (1968). Maslow (1968) theorised that humans operate according to a hierarchy of needs that are founded on lower, narrow personal requirements and expand to higher, broader social interactions. In this hierarchy, lower
needs must be met before the higher needs can be addressed and fulfilled. The hierarchy starts with basic personal physiological and survival needs such as food and shelter then moves on to immediate egocentric social needs such as belonging, love and esteem. Once these have been satisfied, exploration of the wider environment may be undertaken in terms of the need to know and understand and aesthetic appreciation. Above these needs, the individual may work towards self-fulfilment in terms of emotional development and interactions while the top of the hierarchy involves helping others to achieve self-actualisation. This hierarchy may be viewed as an increasing level of complexity where physiological requirements represent simple needs while self-actualisation represents more complex needs.

Relating this concept back to visitor experience of natural areas, individuals may first view natural areas in a simplistic manner as a fundamental source of food and shelter. However, as most members of Western society have these base needs already met, visitation to natural areas tend to be in the context of the higher needs fulfilment. This includes viewing natural areas as a place for socialisation, exploration and learning and self-actualisation. Within this group of categories, viewing natural areas as a place for fulfilment of social, aesthetic needs may be construed as less complex than fulfilling self-actualisation needs. The categories identified by Shafer and Mietz (1969) represent higher needs where educational and aesthetic interactions represent a less complex form of fulfilment than the physical, emotional, and social needs. Thus, authors such as Shafer (1969), Shafer and Mietz (1969) and Hendee, 1971 #310] identified various attitudes toward interaction with natural areas that generally represent the higher order needs identified by Maslow (1968) that in themselves, represent a hierarchy of interactive complexity.

Recent authors such as Ballantyne et al (1998) also identified various categories of visitors in terms of their natural area experiences. In their study of visitors to Fraser Island in Australia, they found similar groups to those of Shafer and Mietz (1969) and Hendee et al (1971). Ballantyne et al (1998) identified five groups that included: socialisers, sightseers, escapers, four-wheel drive tourers and explorers. Socialisers were visitors who focused on interactions with friends and family in a natural setting. This equates with the social experiences category of Shafer and Mietz (1969) and is similar to the sociable learning grouping of Hendee et al (1971). Sightseers were mainly concerned with “seeing the scenery” (Ballantyne et al, 1998, p17) while
explorers appeared to combine sightseeing with learning. These may equate with the aesthetic experiences and emotional experiences categories highlighted by Shafer and Mietz (1969) and the sociable learning category of Hendee et al (1971). The remaining two Fraser Island visitor groups identified appeared very similar except for the mode of interaction with the natural area. Escapers were said to view the natural area as an escape from the pressures of urban living while four-wheel drivers had the same attitude as escapers but fulfilled their need using an off-road vehicle. These two groups appeared similar to the passive play group stated by Hendee et al (1971) and perhaps the emotional and aesthetic experience groups identified by Shafer and Mietz (1969). The similarities between these visitor groupings over time and space indicate there is a pattern of consistency in terms of visitor populations and experience of natural areas.

Manning et al (1999) conceptualised attitudes toward natural areas in terms of what visitors considered the place offered them as a positive experience. Apart from the categories of visitor previously mentioned, Manning et al (1999) included concepts relating to spirituality and therapeutic value. Therapeutic value was deemed to involve general feelings of physical and mental well-being (Manning et al, 1999), which may perhaps be closely associated with spirituality. Heimstra and McFarling (1974) had earlier suggested that visitation to natural areas was born from a need to escape from urban living and “re-connect” with nature. This suggested that urban living created an attitude of isolation from natural areas that creates a sense of imbalance in people. Along these lines, McArdle and Hall (1993a) noted that people need to experience natural heritage as a reference point to provide a sense of a greater meaning to their lives.

The need to re-connect with nature and add meaning to life hints at both well being and spiritual motives as postulated by Collins (1995) and Rolston (1998). Collins (1995) highlighted the importance of natural area experiences in developing personal spirituality in the context of connecting with the fundamental life force behind human existence. As a Catholic priest, he argued that experiencing natural areas provides the potential for personal spiritual fulfilment through contact with nature as a tangible manifestation of the divine entity. Townsend (1999) pointed to the importance of a spiritual connection with nature as fundamental to true awareness and appreciation of the significance of natural areas and the human place within them. According to Beringer (2000) spirituality through experience of natural areas relates to healing.
Spirituality in this sense may be both a distinct experience while also being closely associated with the therapeutic category of awareness and appreciation. These ideas reflect an attitude toward natural area experiences centred on the spiritual meaning and sense of rejuvenation of well-being through contact with such places. In Rolston’s (1998) view, the human attraction to natural areas appears to be an expression of a subliminal urge to connect with the primeval past. Presenting a somewhat more secular ideal, Rolston (1998) considered that the human experience of nature provided a connection with the elemental forces and incomprehensible time scales, forming a link to common prehistoric origins. This leads to a sense of well-being (possibly interpreted as spiritual fulfilment) as the stress and pressures of modern living are placed in the perspective of the greater natural processes.

Visitor attitude toward a site as an experience forms a significant aspect of interpretation (Eisenhauer et al, 2000). In developing or enhancing a positive experience of a particular natural area, visitors may develop a personal bond. The character and intensity of this appears to rely primarily on the type of activities visitors undertake in combination with the amount of accumulated experience in natural areas. Such a bond reinforces the value of ecological as well as socio-cultural aspects of the natural area, encouraging behaviour that reflects a conservation ethic (Townsend, 1999). Thus, interpretation may function as a catalyst for influencing how visitors experience a natural area site. Such influences may assist in providing a positive experience, building or reinforcing a bond between the visitor and place (Hendee, 1990; Roggenbuck, 1992; McArthur & Hall, 1993).

2.5 Visitor Variables and Interpretation

Effective use of interpretive media has become a challenge in terms of addressing the increasing social and cultural diversity of visitors to natural areas. This diversity is the product of a global increase in popularity of natural areas as tourism destinations, in turn, increasing the number of international visitors (Diamantis, 1999; Newsome et al, 2002). For example, a study by Moscardo et al (undated) highlighted this issue through examining how visitors, from a variety of cultural backgrounds, interpreted visitor communication in the form of graphical representation. The intent was to determine the most effective method of cross-cultural communication of behavioural regulations using non-language based signs. Magill (1995) addressed an increased cultural diversity of
natural area visitors by discussing the benefits of multilingual rangers and guides. This suggests that place of residence (on an international scale) influences how interpretive messages are received by visitors. Both of these examples highlighted the issue of understanding the diverse socio-cultural background of visitors, with related attitudes and values, and the subsequent best approach to communication with these visitors.

When considering the most effective means of interpretive communication, Ballantyne et al (1998) suggested targeting messages in order to appeal to certain visitor types. That is, shaping intended messages within a relevant context specific to the given group being addressed in order to better relate to the mind-set of the visitor. Targeted communication ideally encourages the chosen group to absorb the intended message and subsequently increases the likelihood of modifying attitudes and/or behaviour. The response of the targeted group theoretically permeates through the remaining visitor population via social interaction and the ‘lead by example’ concept. Field & Wagar (1973) had previously flagged this concept in their discussion of providing effective interpretation by addressing differing visitor groups in differing outdoor leisure settings. They pointed to the importance of being aware of the motivations of visitors and the socio-economic variables within the visitor population when designing interpretation.

In addressing the diversity within a visitor population, they divided visitors into categories of leisure type relating to how they interacted with the natural area. Each of these categories may then have specific communication strategies to address the particular attitudes and behaviour of each group (Field & Wagar, 1973).

Motivation for visitation represents another category identified as significantly affecting responsiveness to communication. Ballantyne et al (1998) found that visitors motivated by exploration were more receptive to interpretative communication than were visitors motivated by other recreational activities such as fishing. In this vein, Ballantyne et al (1998) used examples from Fraser Island, Australia, of targeted communication that improved effectiveness of communicated messages for specific activities. For example, the issue of fishing bag limits was targeted at recreational fishers to ensure sustainable fish stocks. This was approached through specifically developed communication rather than simply attempting to enforce the bag limit for particular fish. This highlighted the necessity for communication to be tailored to specific visitor contexts to maximise effectiveness and impact. It therefore follows that to influence particular attitudes or behaviours, communication must suit the given context in which the target audience
exists. That is, messages specifically tailored for certain groups using the site in a certain way will prove more effective than a generalised communication strategy (Magill, 1995; Ballantyne et al, 1998).

Hvenegaard & Dearden (1998) also advocated identification of visitor sub-groups for targeted communication despite the diversity of visitors possible in any given natural area. This approach relies on the minority group becoming an agent of the management objectives by passing messages to other groups they come in contact with. This can be an effective method of encouraging appropriate behaviour and fostering positive attitudes amongst the visitor population (Cook & Berrenberg, 1981). While McKercher (1996) and Prentice et al (1998) may have a valid point with respect to the difficulties of visitor categorisation, communication targeted at particular visitor groups may still be a significant component of effective communication (McArthur & Hall, 1993).

Rather than targeting specific groups, McKercher (1996) argued that communication in natural areas should concentrate on identifying appropriate park uses and not defined visitor types. His hypothesis was based on the premise that delineating visitors into sub-groups was largely arbitrary and thus, meaningless. In support of this idea, Prentice et al (1998) found that socio-demographic variables were not related to the manner in which visitors experienced a site. In a study of visitors to Rhondda Heritage Park in South Wales, it was found that visitor type might be categorised more significantly according to what meaning the visitor gained from the site experience rather than by the social profile of visitors. Prentice et al (1998) found that visitors experienced the site in several distinct ways according to how they related to the subject matter. This was probably closely related to how the issues were presented. This view compliments McKercher’s (1996) comments in highlighting the need for communication design to be based on the types of experience visitors have rather than their socio-demographic characteristics.

The flexible definition of ‘tourism’ and ‘recreation’ as labels for natural area experiences are indicative of the arbitrary categorisation of visitor groups. While a given group may be officially classed as undertaking tourism activities and another recreational activities, the use of these terms from the visitors’ point of view depends on personal attitudes towards natural area activities (McKercher, 1996). It is apparent that from the visitor perspective, tourism and recreation relate to the perceived naturalness
of the experience being undertaken rather than the specific activity itself. Visitors in a given location will tend to regard those in relatively more commercially developed, crowded or disturbed areas as tourists while seeing themselves as taking part in recreation (Clarke, 1997). Thus, ‘tourism’ and ‘recreation’ are arbitrary categories because the visitors’ perception of themselves as recreationists or tourists lies on a sliding scale of relativity. Moscardo (1992) and Ballantyne et al (1998) acknowledged the difficulty in identifying distinct groups within a visitor population due to the broad variation that occurs. On the other hand, identifying distinctive groups of experiential type amongst the visitor population may prove equally challenging. Ballantyne et al (1998) suggested targeting an easily identifiable minority with a tailored message may still be more effective in terms of site management than the generalised “scatter-gun” approach to communication.

Repeat and first time visitors to a specific site present an example of distinct target groups with differing wants and needs (Fakeye & Crompton, 1992; Meis et al, 1995). First time visitors may seek variety through a unique or novel experience, repeat visitors may be more commonly motivated by a want for relaxation (Fakeye & Crompton, 1991). As a reflection of this, repeat visitors tend to place more of a focus on socialisation, using the natural area site as a backdrop, while first time visitors tend to be mainly intent on exploration of the natural area (Fakeye & Crompton, 1992). For example, data relating to repeat visitors to Fraser Island indicated they generally took part in recreational pursuits, such as fishing or snorkelling. First time visitors mainly concentrated on exploration and information gathering (Ballantyne et al, 1998). As first time visitors were more interested in exploration, they were also more likely to take notice of on-site interpretation while repeat visitors tended to show less interest.

Young (1999) reported that repeat visitors had a better conceptual knowledge than first time visitors of the environment to which they are returning. The familiarity of a given natural area to repeat visitors played a role in their perceived lack of need for exploration. The different attitudes and knowledge of the repeat and first time visitor groups suggest that different methods of communication are needed to influence their attitudes and add meaning to their experience. This was highlighted by Falk & Dierking (1992) when discussing the different ways in which repeat visitors use text based signs at a site (discussed further in section 2.6.1). They considered that repeat visitors have a greater familiarity with a site than first time visitors and will spend more on particular
points of interest rather than exploring the site in general. Thus, these two distinct groups differ in terms of motivation, expectations and the type of experience sought.

Repeat visitors form an important part of visitation to a given natural area. As well as providing consistent and ongoing revenue, they act as a major conduit for site promotion to the broader community, ensuring a sustainable natural area attraction (Fakeye & Crompton, 1991; Meis et al, 1995). In this sense, it is important to ensure repeat visitors are understood as a distinct group targeted by communicative strategies to encourage their continued interest in the site.

The frequency of visitation to natural areas in general have also been identified as a factor influencing the visitor experience of a particular site. This categorisation is not as clearly defined as repeat visitation to a specific site as natural areas vary widely in terms of level of disturbance and character of experience (section 1.4.1). The accumulated experience in natural areas is thus subject to the visitors’ perception of what constitutes a natural area experience rather than the more clear cut quantification of the number of times a specific site has been visited.

While taking such points into consideration, it is important to note that McKercher (1996) identified past experience in natural areas as a key factor affecting attitudes toward such places. Collins (1995) also commented that spontaneous experiences in natural areas might result in an influence on attitudes toward natural areas. He suggested that repeated experiences in natural areas increases ecocentric attitudes toward natural areas. Similarly, Bixler and Floyd (1997) commented that childhood exposure to natural areas significantly increased the likelihood of nature oriented career paths and strengthened ecocentric attitudes later in life. Conversely, people living in urban environments, with little contact with natural areas tend to harbour negative attitudes toward nature. The assumption was that accumulated spontaneous exposure to natural areas over an extended period of time influenced attitudes in terms of creating a greater likelihood of expressing ecocentric attitudes. Rolston (1998), in the vein of Collins (1995), suggested that an accumulation of experiences in natural areas may influence attitudes toward nature. These comments revolved around long-term influences on environmental attitude through an accumulation of experiences rather than immediate changes relating to a specific experience. The prevalence of such comments leads to the conclusion that how people experience a natural area is partly a result of an
accumulation of positive experiences in natural areas over a long term period. In other words, people who have never experienced a natural area will potentially have a differing experience of a given site to those with past experiences of natural areas.

The influence of past experience in natural areas may be further understood using Maslow’s (1968) theoretical concept of the hierarchy of needs fulfilment. Maslow’s process of psychological development involved an increasing complexity of personal fulfilment over time. According to Maslow, “…man’s higher nature rests on man’s lower nature … The best way to develop this higher nature is to fulfil … the lower nature first.” (Maslow, 1968, p173). Through an accumulation of experience in a particular environment, an individual may be influenced with regards to their attitudes toward that environment as a place and the experience of that environment. It follows that individuals who have visited natural areas on a frequent basis in the past will be more likely to experience a given natural area site in a different manner than individuals who usually visit natural areas less frequently. Thus, an accumulation of experience in nature may result in a greater sense of meaning when experiencing particular natural settings.

Kuo (2002) summarised a number of demographic variables that are related to the effectiveness of interpretation in influencing the visitor. This included: gender, age, place of residence, and visitor social group composition. In terms of casual natural area experiences, the voluntary nature of visitor engagement with on-site interpretation in a non-captive audience context is also a significant factor.

Past research has identified a relationship between gender and how a site influences the visitor. For example, females generally tend to have a greater empathy toward the natural environment than males. This is most likely a socially learned behaviour partially related to a greater willingness to express emotional feelings about an experience (Dunlap, 1975; Geisler et al, 1977; Arcury, 1990). A greater willingness to express emotional feelings on the part of females may also explain the difference with males who are less likely to admit to ‘effeminate’ views such as empathy for natural settings (Xu & Bengston, 1997). In contrast, McFarlane and Boxell (2000) found that gender was not reliably associated with expression of attitudes toward natural areas as did Jurowski et al (1995). There was no detailed discussion by these authors as to why gender was found to be insignificant in terms of attitude change.
McTeer (1978) found age to be a significant factor in the expression of attitudes toward environmental issues. He found that teenaged subjects were more concerned about environmental issues than older subjects. The results suggested that younger people were more likely to care and show interest in relation to natural environments and the human relationship with them. McFarlane and Boxall (2000) also found age to be a significant factor affecting the expression of environmental attitudes but not gender. Their study of users of a natural area in Canada indicated that age was a consistent indicator of environmental concern where younger people were more likely to express attitudes in favour of natural area protection. This followed work by Jurowski et al (1995) that demonstrated age to be a significant factor in expression of environmental attitudes, which was indeed the only factor significantly related to attitude where gender and place of residence were found to be unreliable predictors.

The significance of place of residence seems to vary according to whether it is used in the context of geographical locations within a given nation or in terms of cultural background. While Jurowski et al (1995) and McFarlane and Boxall (2000) found place of residence to be insignificant in relation to expression of attitudes toward natural areas, this was in reference to different locations within the same nation. Comments by Magill (1995) indicated that visitors of different cultural backgrounds represent differing sets of attitudes and subsequent responses to interpretation. This was supported by the work of Moscardo et al (undated) who found that visitors from different cultural backgrounds responded differently to interpretive messages that also suggested differing attitudes toward the natural area experience. The comments of Bowers (2000) mentioned earlier (section 2.2.1) highlighted the significant cultural and social relationship with environmental attitudes. That is, the social and cultural context of a place where an individual lives strongly affects their attitude toward the environment. Thus, place of residence may not be significant when used to described geographical location within a dominant cultural grouping but is significant when used in term of varying cultural background, such as international versus local visitors.

The social group composition with which the visitor shares the experience appears to influence attitudes towards the place of visitation (Eisenhauer et al, 2000). For example, Fakeye and Crompton (1992) found that visitation to the Lower Rio Grande Valley in Texas, U.S.A. was significantly influenced by the social relationships
associated with the visits. People with strong socially oriented attachments to the valley were more likely to return rather visit another natural area. This suggested that the social context of visitation to natural areas may be associated with how visitors experience the site, and thus, how the site influences them. Eisenhauer et al (2000) found that perceptions of particular natural areas in the Southern Utah region of the U.S. more commonly related to associated interactions with family and friends in a natural setting. Factors such as natural physical features and recreational activities were deemed less important and formed the backdrop to the social focus of the experience. Thus, social context may be an important variable in relation to site visitation and its influence on the visitor.

Another challenge presented by interpretation at natural area sites, outside formal education programs, is the non-captive context of the intended audience. The presence of the visitor at the site is entirely voluntary and they may allocate their time according to their own personal preference. This is significant because it means that on-site interpretation must attempt to communicate messages in a casual atmosphere to visitors who do feel they have to pay attention and may shift their attention elsewhere if bored (Ham, 1992). In this sense, effective on-site interpretation is required to either attract and hold visitor attention or communicate messages within a short space of time. The interest visitors have in on-site interpretation relates to the reason why they are visiting the site.

2.6 Interpretive Media

On-site interpretation, using various forms of media, ultimately aims to communicate certain themes and messages that augment the visitors’ experience and also serve site management goals (Moscardo, 1998). The use of different types of on-site interpretive media raises some fundamental issues based on visitor preference for media; what is appropriate for the natural area site experience and resources available to site managers.

According to Mahaffey (1970) the effectiveness of on-site interpretation is significantly related to visitor preference for media. Preferred media are more likely to attract attention and thus influence the visitor. Interestingly, Munson (1987) noted that while no single media represents the best method for interpretation, different media types have not been found to be any more or less effective in terms of influencing different visitors.
This comment may be over simplified in that Munson (1987) based this note on the work of Schramm (1977) who discussed the pairing of appropriate media types with specific learning objectives, not different types of people. Munson’s (1987) comment on Schramm’s work seemed to add in the additional variable of preferred media type. She suggested that visitor preference for types of media is not related to the extent to which a certain media type influences visitors who may choose between several types during a natural area site experience.

Schramm (1977) presented evidence that “simple media” such as text, photographic images and audio presentations were equally able to achieve learning objectives as so-called “complex media” (television, films, computers). This is an important point in terms of interpretive design with limited resources. In such a circumstance, budget restrictions may dictate the use of more affordable text based media as opposed to interactive computers. That is, according to Schramm (1977), text based communication is just as able to communicate messages as tele-visual media. Ferguson et al (1995) pointed out that the comparative effectiveness of various sources of media was uncertain but appeared to rely on factors such as the objectives of the communicated message, the target audience and the type of information conveyed. The difficulties in determining whether one type of media may be more effective in influencing visitors than another probably relates to the difficulties in assessing how visitors use on-site media and what they absorb from that use (Falk and Dierking, 1992).

As the variation in visitors at a particular natural area site can be broad it is likely that no single medium will provide an all purpose solution to providing effective interpretation to the entire audience (Mahaffey, 1970). This suggests that managers at a natural area site should employ a variety of interpretive media types to ensure the majority of visitors are catered for. Interpretive media may be categorised into three basic forms: text based, interactive and interpersonal. While text based communication presents an economic and readily deployable option, the dynamic approach of interactive media may be more attractive to visitors. Interpersonal communication presents a more adaptable, visitor oriented medium. The three media types are explored in the following sections.
2.6.1 Text based interpretation

Text based interpretation, such as signs, brochures and information displays, are an economic means of communicating with visitors (Doucette & Cole, 1993; Hall & McArthur, 1998). Producing and installing or distributing such media presents a one off cost that may be disseminated over the lifetime of the medium. However, once installed or distributed, such media cannot readily guide the manner of how visitors interpret the messages. For example, Moscardo et al (undated) studied the effectiveness of pictorial symbols used to convey messages relating to minimising visitor impacts and ensuring safety in the Great Barrier Reef Marine Park, Australia. They found that cultural background and other socio-economic factors significantly affected visitor interpretation of the pictorial symbol meanings. In some instances, visitors interpreted the symbols in a manner contrary to the intended message. In cases such as this, the text based modes of on-site communication cannot actively elaborate or clarify meanings within the text for differing visitor types.

Hendee et al (1990) noted that visitors generally spent only 15% of the estimated reading time required to fully absorb messages in a text based interpretation display. This seemed to be supported by the work of Cole et al (1997) who found that, on average, visitors spent at most 25 seconds reading text on an observed display board beside a natural area walking trail. Based on these sources, it seems that effectively communicating with visitors using text based communication requires selection of messages deemed most important and expressed in an abbreviated manner to ensure visitors are able to absorb the intended message in what little time they allocate to reading. However, the reliability of the data on which these findings were based may be questionable.

McManus (1987; cited in Falk and Dierking, 1992) commented that gathering data about visitor reading habits through observation is difficult. This is mainly because it is virtually impossible to know exactly when a visitor starts and finishes reading a particular text based sign. This view was reiterated by Ferguson et al (1995) who stated that not only were the reading habits of visitors difficult to observe, the length of time spent reading a particular sign may not be related to the extent of information or meaning drawn from the text. They suggested that a visitor spending a long time reading sign text may actually be trying to understand what it means rather than
absorbing the intended meaning. Thus, even if reading time is measured accurately, it is not a reliable means of measuring successful message delivery.

Falk and Dierking (1992) raise a number of important points in regard to the use of average visitor reading time data. Firstly, they state that while all visitors will read some text at some point during their visit, a visitor population may be essentially divided into two groups: readers and non-readers. The former group may only spend a few seconds glancing at text based signs while the latter may spend minutes reading a single display. In addition, not all visitors will stop and read the same text sign. Thus, averaging the reading time of a visitor a population leads to a false impression as the data is not normally distributed but more a bimodal distribution.

Other problems raised by Falk and Dierking (1992) in relation to using reading time data related to the heavy influence of site design (e.g. design and distribution of text signs) and the location of data collection within the site. The social group with which visitors attend the site, whether they are repeat or first time visitors to the site and the extent of past experience in the same or similar locations all significantly determine what and how visitors read (Falk & Dierking, 1992).

Rather than average reading time, Falk and Dierking (1992) focussed on the varying behavioural patterns of visitors during their visit to a site. For example, the authors noted a difference between first time and repeat visitors. First time visitors typically spent the first 20 minutes or so reading every sign they came across. This behaviour changed when the first time visitor realised the extreme length of time it would take to read all of the signs at the site. At this point the visitor began “cruising”, in other words, skimming the contents of signs and being more selective about where they focussed their attention. The final stages of visitor behaviour are primarily determined by basic needs, such as hunger and fatigue, resulting from the quantity of text read and physical exertion of walking around the site. Once these needs factors come to the fore, the visitor will ignore signs and seek to satisfy their need (food, toilet) or exit the site.

In contrast, repeat visitors were more discerning to begin with and will usually focus on particular points of interest from the start, ignoring the bulk of signs that are deemed unimportant. Repeat visitors behaved in this way as they were familiar with the layout and content of the site and also do not feel compelled to see the whole site in one visit.
Thus, average reading time for a visitor population is misleading both because of the difficulties measuring such behaviour, the numerous variables that may influence the behaviour and the variations in reading behaviour that may occur with a single visitor on a particular visit.

While recognising that average reading times are meaningless, when considering the visitor population as a whole, text based signs will be given varying degrees of attention by a range of visitors (Ferguson et al, 1995). Based on this idea, a sign must therefore be able to provide meaning for those that skim the content through to visitors intent on reading every last word on the sign (including copyright information). Ferguson et al (1995) address this issue by describing a three stage method of sign layout including the title, introductory paragraph and additional detail. All of these components communicate the meaning of the sign with varying levels of detail. For example, the title on a sign may convey the theme of interpretation to the visitor such that those who only read the title and move on still receive the intended basic message. Below the title, a short introductory paragraph may provide basic information for visitors seeking to add more context to the meaning. Detailed text may then be provided for those who wish to obtain a detailed perspective in addition to (perhaps) other incidental details. Each level reiterates the theme of interpretation with increasing levels of detailed information such that all visitors, from those that skim through to those who spend time reading the whole text, will be afforded some meaning in combination with the desired level of information (Ferguson et al, 1995).

The title and introductory sections of a sign must simplify the information to cater for visitors unwilling to spend any length of time reading. Simplification of messages to cater for visitors who do not take time to read the text in its entirety becomes more of an imperative when attempting to address increasingly diverse visitor groups (Bramwell & Lane, 1993). This not only relates to different cultural or social backgrounds but also different levels of comprehension ability in the visitor population. A drawback is that a simplified or abbreviated message results in a lack of explanation for the reasoning behind the message and potential over simplification or misrepresentation of intended messages (Bramwell & Lane, 1993). Thus, while being relatively financially economic, text based communication presents a challenge in communicating messages to visitors effectively.
The effectiveness of text based media, such as signs, may relate to visual attractiveness and the subsequent level of interest as perceived by the visitor (Beckmann, 1990). Ham (1992) considered this point and stated that while a unique design may attract a larger audience, this does not necessarily correlate with greater transferral of meaning. Interestingly, Cole et al (1997) later hypothesised that enhancing the visual attractiveness of their signs may induce more attention from visitors and improve the effectiveness of communication. While they found visitors giving the display increased attention, there was no significant additional impact on knowledge. Another example cited by Lee (1998) described a nuclear power exhibit in Britain that effectively attracted the desired audience but failed to influence visitors in the intended manner (most visitors left with a more negative attitude). This was despite a vast amount of money being spent on the aesthetics of the exhibit. While visual attractiveness may encourage visitors to pay attention to a display, there is a danger of creating a pretentious overtone that is aimed at entertainment rather than enlightenment of the visitor (Harvey, 1989).

According to Ham (1992) although attractiveness is an important aspect in capturing visitor attention, the content should always take priority over the aesthetic presentation. Taking this into account, attractiveness of text based interpretation may be more significant in casual natural area experiences where visitors determine the activities they undertake and the amount of time allocated to such activities (Kuo, 2002). Owing to the purely voluntary nature of attention paid to interpretive media in such a setting, the ability to catch and hold attention is of importance.

The ultimate advantage of text based modes of communication lie in the low cost, over time, of production coupled with the ability to mass produce and distribute a message consistently (Doucette & Cole, 1993). However, updating the information may prove to be laborious given the time required for redesign, reprinting and removal of outdated messages from circulation. In addition, while individually distributed text based media such as brochures and pamphlets may be targeted at specific groups, on-site signs and displays must be designed to encompass a broad range of visitor types. This may result in over simplification or over generalisation, diluting the intended message.
2.6.2 Interactive interpretation

Use of interactive media such as: touch tables, computer based displays, videos and movies are generally appealing as they usually provide a more stimulating experience than a text based medium (Hall & McArthur, 1998). The nature of interactive displays enables the visitors’ attention to be more easily attracted and held as compared with text based displays owing to the multiple sensory stimulation (Munson, 1987). Falk and Dierking (1992) commented that visitors to a site spend most of their time looking, touching, smelling and listening - not reading. This would suggest that interactive types of interpretation are at least preferred by visitors if not more effective in communicating meaning than other forms.

Mahaffey (1970) found that given the choice between text based and more interactive media, visitor preferred interactive media as it appeared to trigger more interest and enthusiasm. This is presumably because of the multi-sensory stimulation afforded by such media. Mahaffey (1970) also pointed to the greater ease, on the part of the visitor, of receiving messages actively communicated to them in comparison to having to read a body of text and extract meaning. This point was also raised by Ferguson et al (1992) who stated that the advantage of interactive media (particularly computer based media) lay in its ability to provide the desired level of detail and style of information (text, images, sound) to the visitor without them having to filter through unwanted information. Given that visitors tend to spend more time at interactive displays, it may be assumed that they are more popular. However, equating time spent at a display with the effective communication of a message does not always hold true as the sensory attractiveness of the display may work to obscure the intended messages if not planned carefully (Ham, 1992; Lee, 1998).

Such methods of communication may also realistically simulate or immerse visitors in a natural environment without the risk of impacts associated with experiencing the place being represented (Moscardo, 1998). The merits of providing a simulated experience also relate to enabling access to places most visitors may not readily experience, either because of physical or time barriers. While simulations may enlighten visitors to concepts inaccessible by other means, whether visitors can be effectively encouraged to relate and appreciate an environment through an artificial representation is questionable. If this were the case, visitors may simply observe their chosen natural area destination
on a television and gain the same insight and experiential stimulation as physically being present in that environment. Authors such as McArthur and Hall (1993a), Collins (1995) and Rolston (1998) pointed to the importance of people actually visiting and interacting with real natural places as a method of providing meaning to life and reconnecting with primeval roots. It may be assumed that these authors would dispute the merits of experiencing such interactions in the form of a computer simulation. Thus, while interactive media may provide glimpses of environments or experiences beyond the physical means of visitors or site management, it appears that it is important for such experiences to occur in context and direct reference to the surrounding natural area of visitation. In this way, the visitor may directly relate the simulated experience to the actual natural area of visitation, potentially providing for greater insight than the natural area offers alone.

Interactive displays present somewhat of a compromise between text based media and interpersonal media. As with interpersonal communication, cost and time to develop interactive displays present a significant draw-back. However, while the up-front costs may be high, on-going costs are relatively low (Doucette & Cole, 1993). In addition, interactive media tends to be more attractive owing to its capabilities for multi-sensory stimulation and active communication of messages to the visitor, something text based media lack. A draw-back, according to Doucette (1993), lies in updating or modifying an interactive display, which may prove to be more time consuming and costly than both text based media and interpersonal media.

2.6.3 Interpersonal interpretation

Communication of messages to natural area visitors may be more easily achieved through the use of interpersonal communication as opposed to other forms of communication (Markwell & Weiler, 1998). Interpersonal communication may consist of structured or unstructured verbal presentations including guided walks, information points or organised discussions. All of these techniques are considered “more powerful” than other forms of communication (Hall & McArthur, 1998, p176). For example, rangers may actively encourage interest in specific aspects of the natural attraction relevant to the specific visitor at that time. In this way, interpersonal communication allows for flexibility in communication both in terms of differing visitor types as well as methods of communicating various messages. (Magill, 1995). In contrast, text based and interactive modes of communication, while able to be updated
or modified in the long term, cannot easily adapt to immediate or rapidly changing circumstances as presented by a diverse visitor population (Hall & McArthur, 1998).

Lipman and Hodgson (1978) found that the presence of guides in a self-guided cave tour significantly increased the visitors’ interest in the attraction. They found that providing stationary guides at key points along the walk resulted in an increased number of visitors asking questions about aspects of the attraction. This may be a function of people on holiday emphasising social interactions in conjunction with natural area experiences. Authors such as Shafer (1969), Hendee et al (1971) and Ballantyne et al (1998) listed social interaction as a common feature sought as part of natural area experiences. Dissemination of information through interpersonal communication thus taps into this socialisation focus, providing a motive for visitors to interact with rangers and/or guides. This lends itself to generating more interest and enjoyment on the part of the visitor, which perhaps is more likely to translate into a greater receptivity to communicated messages (Lipman & Hodgson, 1978, p32).

The use of interpersonal communication in the form of park rangers or guides is also advantageous in that their mere presence communicates regulatory messages in terms of appropriate visitor behaviour. This largely eliminates the need for such messages to be verbally or overtly conveyed (Manning, 1986). The lack of need to directly communicate regulations and restrictions, which may be construed as a negative message, allows for concentration on positive messages. For example, a study of visitors to Kakadu National Park found that the interpersonal communication encouraged much stronger positive feelings amongst visitors than the experience of the attraction itself (Hall & McArthur, 1998). In this sense, the presence of a human guide may work towards creating a friendly atmosphere in which the visitor feels ‘at home’. This may then encourage receptivity to communicated messages and compliance with behavioural regulations.

Interpersonal media presents the advantage of social interaction and the ability to rapidly update information and tailor it to suit different visitor types in rapid succession. It is ideal for small group situations where audience participation may be easily facilitated by a guide. However, in circumstances where a site receives large quantities of visitors on an on-going basis, interpersonal communication may prove less effective. Large groups are less likely to engage with a single guide while the guide may have
difficulty catering to the inherent increased diversity of visitors present. While employing a larger number of guides may be a solution, the cost of such an exercise could be prohibitive. Doucette and Cole (1993) noted that a significant disadvantage of interpersonal communication is the expense both in terms of time taken for initial training of presenters as well as on-going salaries or wages. The cost of employment of the guides in the study of Lipman and Hodgson (1978) was minimised by restricting the times at which guides were available. This compromise may decrease the effectiveness of guides as only a fraction of the visitor population may have access to them. Thus, in these circumstances, text based or interactive interpretive media may prove more effective in communicating meaning to the visitor population.

Selection of media type appears likely to be determined by the available budget, the style of information delivery deemed appropriate to the natural area experience and the time frame of obsolescence of the messages conveyed. General information that will not become rapidly out of date and may be effectively communicated to a broad audience in a brief manner may be best communicated using text based or interactive communication. Both text based and interactive communication, while perhaps having significant up-front costs, present a relatively cheap and consistent ongoing method of communication. Interpersonal communication is more ideally suited to situations in which complex information may be rapidly updated and individually tailored to a broad range of visitors. This may help to ensure the intended message is not skewed by oversimplification (by the delivery style) or misinterpretation (by the visitor). Interpersonal communication also has the added dimension of social interaction with management, not offered by text based or interactive techniques. Social interaction may prove to be significant in increasing the extent to which visitors access and absorb messages.

2.6.4 Short term and long term influences

The immediate influence of on-site interpretation as part of a natural area experience may not necessarily remain consistent in the long term for either knowledge or attitudes. Short term and long term effects on attitudes resulting from exposure to persuasive communication, a term including interpretation, have quite distinctive attributes. Pratkanis and Greenwald (1985) provided an overview of past research that found the influence of persuasive communication on attitude response altered as the time after
exposure to the message increased. While they were concerned with theories as to why this occurs, of importance to this thesis is the observation that persuasive communication, including interpretation, may have an immediate influence on attitudes and knowledge.

For example, Hovland et al (1949) conducted experiments where military personnel were shown army training movies based on events during World War Two to assess the influence on attitudes of the subjects. As a general finding, they surmised that while knowledge recall from the films decayed over time, attitudes towards these either remained fairly constant or increased in strength with time. Other studies also documented changes in influence of persuasive communication over time. Hovland and Weiss (1951) conducted experiments that also revealed differences between short and long term influences. They found that when an audience was exposed to a persuasive message from a source that was deemed trustworthy, there was a strong immediate positive influence on attitudes that decayed over time. Audiences who were provided a persuasive message from a source that was considered untrustworthy were influenced to a lesser degree initially, but the influence strengthened over time. The cause of this phenomenon was attributed to audiences retaining knowledge of the content of the message irrespective of source trustworthiness. While the content of the message may be remembered in the long term, the source (and its level of trustworthiness) may be forgotten. Thus, in the long term, the knowledge is dissociated from the trustworthiness of the source. In the absence of the suppression of influence on attitudes resulting from perceptions that the source was untrustworthy, the knowledge gained from the message subsequently has a stronger influence on attitudes.

Watts and McGuire (1964) performed experiments using persuasive communication on university students. Subjects were exposed to arguments relating to issues of perceived importance. The researchers noted that the immediate effect of the messages on the students altered over time with a decline in effect on the initially induced attitude. This apparent reversal of attitude is suggestive of a suppression of a response that is expressed at a later date, known as the “sleeper effect”.

Gruder et al (1978) discussed the significance of discounting cues in producing a “sleeper effect”, a reference to a delayed influence of a communicated message. They defined a discounting cue as a component associated with a persuasive message that
indicates it is not credible. This may include a source that is perceived to be untrustworthy. The “sleeper effect” is a function of dissociating the source of the message with the content through use of a discounting cue. The discounting cue determines that the subject may not immediately respond with the attitudes encouraged by the message but may either respond neutrally or with opposing attitudes. However, over time, the source of the message (and its lack of credibility) may be forgotten while the message content itself is remembered, creating the likelihood that the receiver may be influenced by the message in the long term. When explaining the factors that result in the “sleeper effect”, Lariscy and Tinkham (1999) commented that early work emphasised the importance of source credibility in creating initially suppressed attitude influences that strengthen with time. They pointed to more recent research that considers the “sleeper effect” to be a consequence of multiple situational factors, of which the most important was related to source credibility.

Lariscy and Tinkham (1999) conducted an experimental study examining the influence of negative political advertising on an audience. They documented an immediate influence in favour of the source of the attacking message. This was deemed to be strategically significant given political campaigns attempt to influence voter attitudes in the short term leading up to an election. Lariscy and Tinkham (1999) also pointed out that the best defence of the message target is to respond as quickly as possible in an attempt to counter the influence of the negative message in the short term. In the context of political campaigns, the authors also noted that the long term influence of negative persuasive messages was a strengthening of the initial attitude response of the audience.

Both Pratkanis and Greenwald (1985) and Mazursky and Schul (1988) discussed the various theories as to why short term and long term attitudinal influences of persuasive communication are different. Of interest to this thesis is the possibility that the long term changes in influence may be a result of intervening factors between exposure to the persuasive message and measurement of attitude. These factors may be artefacts of the experimental procedure itself (e.g. participants stimulated to discuss the message and compare attitudes between exposure to the message and measurement of attitude) or a result of subsequent experiences that themselves influence how the original persuasive message is interpreted by the audience. The important point to note is that measuring the influence of a particular persuasive message in the long term may prove difficult as
intervening factors may obscure the link between the attitude measured and the influence of the original message. The measurement of short term influences presents a clearer link between the attitude response and the provision of the message.

2.6.5 Interpretation and novel arguments

Presentation of a novel point of view is more likely to generate thoughtful responses and influence visitor attitudes than the use of familiar arguments or examples (Ajzen, 1992). Audience familiarity with issues, examples or arguments may potentially lead to decreased interest. Ramsey and Rickson (1976) highlighted this point in a study of environmental attitudes and knowledge, relating to pollution, of secondary school students in the U.S. They found that increased knowledge of environmental issues such as pollution lead to a moderation of attitudes in the students rather than strengthened concern. They attributed this phenomenon to information saturation through constant exposure to mass media. This suggested that students were familiar with the issue and associated information and were somewhat ‘desensitised’. Alternative knowledge or novel points of consideration may counteract the decreased expression of concern measured by Ramsey and Rickson (1976).

Such an approach may be more effective in affecting visitor attitudes than the use of familiar examples; providing the message does not deviate overly from existing visitor attitudes (Cook & Berrenberg, 1981; Ajzen, 1992). If a message deviates overly from the existing visitor attitudes the visitor will either consciously or subconsciously ignore or distort the intended message to suit their own stance depending on the extent to which they trust the source of information (Howard, 1997). In the circumstance where visitor attitudes are already aligned with the intended message the new information is assimilated into the visitors existing belief system, reinforcing the currently held attitudes (Orams, 1995). Thus, presenting unique or novel information within an unusual context may be the most effective way of influencing visitor attitudes providing the source of communication is viewed as credible.

2.7 Intensity of Interpretation

The intensity of interpretation relates to the quantity and type of media used at a site. For example, interpersonal media (such as guides) may be a more intense form of
interpretation than text based media. Interpersonal media incorporate an active delivery of messages and a multi-sensory, complex social interaction with visitors. Text based media is a passive form of communication (with restricted sensory stimulation) where visitor must extract meaning from a written message. Similarly, installing many signs or employing many guides at a site may be seen as a higher intensity of interpretation than few signs or guides.

While site managers increasingly incorporate interpretation programs into natural area management (McArthur, 1994; ANZECC, 1999), there is a danger that the intent to positively influence the visitor may backfire. Intensive use of interpretation may ruin the visitors’ sense of exploration and discovery, generating negative impressions of the experience at the site. Roggenbuck (1992) warned that a cautious approach to natural area communication was preferable in order to avoid overwhelming the visitor. In this vein, McKercher (1993) commented that visitors were generally not anthropologists or ecologists seeking intellectual enlightenment. Rather, they may be viewed as consumers of natural area experiences seeking enjoyable leisure encounters. Intensive use of interpretation may impede the pleasurable experience visitors seek in natural areas, who then may ultimately boycott the destination given the perceived negative attitudes generated in this way (Bramwell and Lane, 1993). Thus, a balance must be struck between communicating messages that are deemed important and regulating the intensity such that it does not overwhelm the visitor (Bramwell and Lane, 1993).

Howard (1998) observed that some experiences are obvious in their significance and have no need for explanation. Experiences such as this may only need a low intensity of interpretation, generating a situation in which the meaning is reliant on the visitor being able to ‘see’ the meaning without facilitation. With this in mind, low intensity approaches to on-site interpretation often raise doubts as to whether such a technique may successfully influence visitors attitudes and knowledge (Ballantyne, 1998). If a low intensity of on-site interpretation is used visitors to a site may not recognise the significance or meaning of a natural area attraction if it is not of the ilk referred to by Howard (1998). It may be argued that not all natural area experience are immediately and obviously significant in their meaning (like the sunset at Uluru or swimming with whale sharks) and the significance may not be obvious unless this is directly communicated (Uzzell, 1998). To paraphrase Rolston (1998), a natural area cannot always be fully understood simply by looking long and hard at it. This may be
especially so if visitors wish to focus on the minutiae of a natural area or with unfamiliar and strange phenomena. It follows that communicating important messages to visitors be tempered by a regulated use of communication media based on knowledge of what visitors expect.

Moscardo (1998) observed that on-site interpretation was becoming an increasingly expected part of the visitor experience. This contradicts the notion of McKercher (1993) who argued that visitors to natural areas were leisure experience consumers generally not seeking enlightenment. Moscardo (1998) pointed to the heavy investment in communication media and guides at the popular Skyrail Rainforest Experience situated in the wet tropics of north-eastern Australia. The large numbers of visitors to this attraction is Moscardo’s (1998) testament to the increasing expectation for on-site communication.

Moscardo’s (1998) comments imply that earlier studies, highlighting the need to grasp fleeting moments to communicate with recreation-seeking visitors while avoiding the teacher/pupil approach, may become irrelevant as visitors actively look for educative experiences as part of recreation in nature. Lee (1998) and Sharpley (2000) both warned that the popularity of an experience does not necessarily indicate an active seeking of knowledge and understanding. They also point out that popularity of a natural area site and its associated communication does not translate into knowledge or attitude change. Lee (1998) observed that expensive communication media designed to attract the attention of visitors may become entertainment in itself rather than a source of knowledge or attitude change. In this sense, the style, delivery and the context in which communication occurs are important factors, in addition to visitor attributes, in determining the effectiveness of on-site communication (Shanahan et al, 1999).

While some authors describe the interpretive process as a vehicle for providing visitor access to meaning, it is also possible that this may occur in the absence of environmental interpretation or other educational methods. Interpretation is a process of communication with visitors that facilitates discovery of new ways of thinking about their natural surroundings. However, Field and Gough (1998) referred to the concept of “enrichment without words” when describing the experience of a natural area site that intentionally used minimal media to communicate with visitors. This involved the idea that influences on visitor attitudes may take place by simply being in a natural setting
with no overt communicative media to guide thought. Howard (1998) also suggested people may experience alteration in attitude toward natural areas in the absence of interpretation. He cited experiences such as swimming with Whale Sharks and watching the sunset at Uluru, in Central Australia, that are so intrinsically provocative that the experience itself requires no explanation in order to profoundly and positively affect attitudes and awareness. Provocation is a central theme of interpretation in practice. If an environment or experience is provocative in itself, this may thus circumvent interpretation.

However, an important point is that interpretation is a process that seeks to influence visitor attitudes through facilitation of interactions with natural areas. While the success of interpretation may be related to certain independent visitor variables, the process is intended to either provoke self examination of these attitudes or bring to light a new meaning of the natural area being experienced. An intrinsically provocative nature experience, with no interpretation, relies more heavily on the ability of the visitor to recognise its significance (Howard, 1998). If the visitor is unaware of the significance or meaning of the experience, it may potentially have little impact on their attitudes. In this sense, interpretation may be viewed as a catalyst toward influencing attitudes and knowledge that may otherwise occur to a lesser extent or not at all.

2.8 Conclusion

While interpretation as a component of natural area site management may also contribute to other aspects such as satisfaction, activity choice and encouraging adherence to behavioural regulations, this thesis is primarily concerned with the immediate influence of interpretation on visitor attitudes and knowledge. The scope of this research thesis encompassed influences on visitor knowledge, the attitudes the visitor has toward the site experience and environmental attitudes.

Interpretation, in part, is intended to add meaning to the visitor experience of a natural area. In this context, site managers have adopted on-site interpretation as an aspect of site design with the intent, in part, of influencing visitors’ attitudes and knowledge (McArthur & Hall, 1996; ANZECC, 1999). This is reflected in the mission statements of the sites selected for this study that reflect the interpretation component of the corporate mission of the agency (CALM) as a whole. Despite the high priority of
interpretation and its association with influencing visitor attitudes and knowledge, most evaluation of interpretation to date has focussed on more market oriented and readily measurable factors such as satisfaction and visitor profiles.

Figure 2.1 summarises the variables and associated relationships that form the focus of this research thesis. While the variables detailed may also have significance in terms of other relationships between visitors and natural area experiences (for example, satisfaction) this thesis has a specific focus on the relationship between the independent visitor variables, on-site interpretation and the influence on environmental attitudes, knowledge and attitude to the site experience. The arrows in Figure 2.1 represent the relationship between the variables listed. For example, the independent visitor variables (age, gender, place of residence etc…) and the on-site interpretation variables (site design, activities and media) may each have an influence on visitor attitudes and knowledge. They may also influence the experiential context, the manner in which the visitor experiences the site, that itself may influence visitor attitudes and knowledge. This relationship is complicated somewhat in that the attitudes and knowledge visitors bring to the site may effect how the site influences these variables, hence the double headed arrow between the attitudes and knowledge variables and the experiential context of the site. Measurement of environmental attitudes, knowledge and attitude to the site experience immediately before and after experiencing the site enables these variables to be examined both as dependent variables and as factors that form part of the site influence on the visitor. The following chapter puts forward a survey methodology for specifically measuring influence of varying intensities of natural area on-site interpretation on attitudes and knowledge incorporating the variables summarised in Figure 2.1. The aim is to measure the immediate influence of relative high and low intensities of interpretation such that links may be made between survey results and specific site experiences.
Figure 2.1: Summary of variables relating to influence of a natural area site on visitor attitudes and knowledge.
3 Methodology

The application of the research was conducted in two stages. The first stage of data collection involved a preliminary survey at the Tree Top Walk site to assist in the design of the principal survey component. The preliminary survey justification and methodology is discussed in section 3.2. Secondly, a survey of visitors to the TTW and Penguin Island sites was conducted immediately prior to and after experiencing the site (paired survey) to assess influences of on-site interpretation on attitudes and knowledge of respondents. This enabled measurement of influences within each site and between the sites. As described in section 3.1, the TTW represents a site with a low intensity of interpretation while Penguin Island has a high intensity relative to the TTW but they otherwise share similar characteristics. In addition, during the TTW principal survey application, trail side signs were added to test for differences between the presence and absence of text based interpretation along the TTW walk trail. The sign trail represented an increase in the intensity of text based interpretative media at the TTW site. Thus, the method intended to measure the influence of different intensities of on-site interpretation, both within the TTW site and between the TTW and Penguin Island sites, on attitudes and knowledge of survey participants.

The TTW preliminary survey was conducted over three weeks in October 1999. The TTW principle survey was carried out in January and February then in December 2001 and March 2002. The Penguin Island survey was carried out in April and December 2001 then February 2002. These periods represented the peak visitation periods of the year during which greater numbers of visitors frequent the sites. Penguin Island is effectively closed to paying visitors from May until September. The cold and wet weather during the Autumn, Winter and Spring months are unfavourable times for visiting the island and also coincide with the breeding season of the Fairy Penguins. Limiting visitor access to the island during this time acts as a measure for conservation of the Fairy Penguins. The survey periods also coincided with holiday periods, potentially skewing the data as detailed in limitations section 3.6.

3.1 Site Descriptions

Two sites formed the focus of this study and were selected primarily for their different approaches to interpretation and the different experiences they offer while both being
small natural area sites with a strong conservation message. A detailed description of each site follows.

3.1.1 Tree Top Walk

The Tree Top Walk site (TTW) is a natural area attraction situated within the Walpole-Nornalup National Park, Western Australia, approximately 400km south of the state’s capital, Perth. The site is situated within a remnant pocket of ancient temperate Eucalypt rainforest forest known as The Valley of the Giants. The Valley of the Giants is a small area of Tingle and Karri forest near the south coast of Western Australia, between the towns of Walpole and Albany (Figure 3.1). The giant Tingle Trees are endemic to the Valley of the Giants area, being a remnant of temperate rainforests that were more widely spread over 50 million years ago (Winfield, 1996). The unique characteristics of the Tingle Trees, with their impressive girth and unusually common hollow boles, provide the focus of attraction for local, interstate and international tourists alike.

The Tree Top Walk site (TTW) was constructed in 1996 amongst a stand of relatively undisturbed Tingle and Karri trees. The TTW site was situated close to the original traditional tourist viewing location that had become severely degraded as a result of almost a century of uncontrolled visitor access. The new site design was based around two walks forming separate loops through a stand of trees dominated by Tingle (Plate 3.0). The centrepiece of the site is the TTW itself, a 600 metre long freestanding catwalk constructed from prefabricated metal bridge spans allowing a view of the forest from the canopy level. The structure is supported entirely by a series of flexible metal pylons negating the need to use the surrounding trees for support. Visitors walk along steel mesh walkways with one metre railings to prevent falls. At its highest point, the visitor stands 40m above ground level on an open structural design where-by visitors have a 360 degree view of the forest, including directly beneath through the steel mesh walkway (Winfield, 1996). The second walk, known as the Ancient Empire (AEW), is a 600m ground level walk of hardened pathways, stabilised earth and boardwalks. The AEW forms a small loop through the forest with cul-de-sacs and occasional wooden bench seating designed to encourage exploration and contemplation of the forest. The overall design of the site restricts visitors to two walking loops, spread over a few hectares, and a small visitor centre (Tingle Shelter) connected to a 50 bay car park plus
allowance for six tourist coaches. If visitors remain within the designated pathways, they may explore the entire site without actually coming in contact with the forest floor.

Figure 3.1: Location and layout of Tree Top Walk site.
Figure 3.2: TTW Site images
(clockwise from top) Tingle Shelter composite photo highlighting leaf shaped signs; the Jetty access to the TTW with leaf shaped signs; last spans of the TTW; TTW return path to the Tingle Shelter with botanical signs; the Ancient Empire Boardwalk with embedded leaf shaped plaque.
The TTW structure was designed to provide a confronting experience of the forest owing to the height visitors walk above the forest floor combined with the structural flexibility (allowing a swaying motion reminiscent of the movement of the tree canopy in a breeze) and the used of steel mesh and low railings that minimise viewing obstruction. It is intended to be the central interpretive tool in itself (Field & Gough, 1998). In essence the TTW site offers a low intensity of interpretation and a restricted range of activities intended to focus on experiencing and exploring the forest.

In contrast to the TTW design, the Ancient Empire Walk (AEW) is a more traditional, low-key ground level walk trail design. While the TTW structure is a narrow, one-way metal catwalk consisting of a single looped path, the AEW presents a more convoluted trail through the forest with considerably wider walkways. There are alternate routes, alcoves and bench seating that provide opportunities to leave the main visitor throughway and contemplate on the surrounding forest. The various loops and cul-de-sacs of the boardwalk pass close to and, in some cases, through the hollow boles of the Tingle Trees enabling close visitor contact without the danger of causing root compaction. There are very few signs along the AEW aside from the unobtrusive poetry imbedded in the boardwalks on leaf shaped metal plaques and small botanical plaques detailing the scientific names of plants.

Staff had posted temporary cardboard signs at the head of the AEW (outside the toilet) with photographs and names of plants to be found in the forest in the months before visitor surveys were conducted for this research.

On-site Interpretation
To compliment this design, a low intensity, text based approached to interpretation was adopted, whereby general information is displayed on large, leaf shaped metal information displays around the Tingle Shelter area. Some interpretation was installed along the ground level walk trail sections at the site but in a very unobtrusive manner. The site was built with no interpretive information along the TTW structure itself as the experience of walking along the flexible bridge spans was intended as the main interpretive experience. Table 3.1 summarises the interpretation available at the site.
Table 3.1: Summary of main interpretive media at the TTW site

<table>
<thead>
<tr>
<th>Media type</th>
<th>Media source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text based</td>
<td>Signs, embedded plaques</td>
</tr>
<tr>
<td>Interactive</td>
<td>TTW Structure</td>
</tr>
<tr>
<td>Interpersonal</td>
<td>Guided walk under part of the TTW structure during holiday periods</td>
</tr>
</tbody>
</table>

The bulk of interpretation at the site is text based. The signs were designed using a leaf shaped theme that is carried through in other aspects of the site design, including the shape of the suspension structures supporting the TTW. Interpretation installed in the Tingle Shelter area appears on large signs while some smaller signs are located along the TTW access jetty. These signs offer information about the construction of the TTW, the ecology and biology of the forest and the flora and fauna that it is made of and the natural history of the forest. There is also a sign at the Tingle Shelter area describing the fire management regime of CALM although the Tingle forest is not part of the prescribed burning program. The Ancient Empire Walk has small plaques imbedded in the wooden boardwalks at irregular intervals. The leaf shaped plaques have short poems inscribed on them about the forest, in the fashion of haiku. More traditional square metal plaques imbedded on square wooden posts are also situated along sections of the ground level walk. The plaques contain detailed botanical information about nearby plants.

Additional information about the site may be obtained on request from the Tingle Shelter though the staff are primarily sales oriented. A free, guided walk by site staff along the forest floor during holiday periods, beneath the first 100m of the TTW, focuses on the planning and construction of the TTW. This is a limited interpretation exercise as the visitor group sizes can be large (upwards of thirty people) the single guide’s presentation is scripted and fairly inflexible while there is little opportunity for audience participation beyond walking beneath the TTW structure and listening to the guide.
3.1.2 Penguin Island

Penguin Island is situated within the Shoalwater Marine Park near Rockingham, approximately 40km south of Perth, Western Australia (Figure 3.3). It is the largest of a chain of islands within the marine park’s 12.5 hectares. The small island is a remnant of limestone reef exposed when sea levels dropped several thousand years ago. It is a class ‘A’ reserve and provides important breeding sites for the Little Penguin and various other coastal marine birds as well as a resting ground for the rare Australian Sea-Lion (CALM, 1996b). It is the most frequently visited of the islands in the park. This is due to its relatively large size and its close proximity to the mainland that has afforded a tradition of recreational use stretching back to at least the early twentieth century (Dans, 1997).

Penguin Island has an official European history dating back to 1918 when it was gazetted for public recreational use. The island was in essence, privately owned and managed up until 1926 by an eccentric character known as Seaforth Mackenzie. Mackenzie excavated caves in the limestone cliffs at the northern end of the island to be used for holiday accommodation while building a timber and iron house for himself. The island was frequented by groups who were treated as guests of Mackenzie. In 1926, Mackenzie’s lease was cancelled when he returned to his family in New Zealand who were mystified by his where-abouts during his unexplained 20 year absence (Lord, 1994).
It was not until after the Second World War that Penguin Island was officially designated a recreation reserve for public use. Permanent shelters for holidaymakers were constructed on the island, as alternative accommodation to the caves, in the 1950’s. The built facilities on the island were intermittently expanded and upgraded until approximately 1987 when the lease was transferred to the Department of CALM (Dans, 1997).

Penguin island was redeveloped in the mid 1990’s with the aim of reducing or reversing ecological degradation by visitors in the past while maintaining a significant, easily accessible recreational facility (Orr & Pobar, 1992). The original asbestos buildings were removed and new structures constructed to provide for a visitor centre and research facility (Figure 3.4).

![Figure 3.4: Penguin Island location and layout](image-url)
Defined walk trails, comprised of boardwalks and fenced paths, create a walking loop around the island. The boardwalk extends north from the visitor centre for about 100 metres before changing into a sand track bordered by pine log railings that turns across the dunes to the western side of the island. The western beach forms part of the walk trail loop but does not have a strictly defined pathway. A second sand track defined by log railings traverses the dunes at the southern end of the Island with wooden steps to facilitate the negotiation of the steep slope on the eastern side, to the beach south of the visitor centre. The visitors must again walk along this beach, with no clearly defined trail, north to wooden stairs that provide access to a short boardwalk returning visitors to the visitor centre area.

A grassed area with wooden tables between the visitor centre and eastern beach provides for picnicking amongst the shade of native trees (Dans, 1997). The picnic area is adjacent to the eastern beach north of the sand bar that affords access to calm shallow water, protected from the ocean swell and ideal for recreational use by children and un-powered water craft. At the northern end of this beach, basic wooden shelters provide more shade for visitors. These are located next to the limestone caves excavated by McKenzie more than 70 years ago. The northern beach area is also frequented by fur seals as a rest point. The beach on the western side of the island is partly protected by fringing reefs but exposed, to a large extent, to the open ocean. Consequently, the water is rougher and deeper and is the preferred location for recreational fishers, divers and surfers. Snorkelling takes place around most of the island with particular areas of interest being the limestone reefs and cliffs at the northern and southern ends.
Visitors may access the island by foot, private water craft or use the ferry service. The sand bar provides a means for visitors to access the island on foot. This practice is actively discouraged by the management agency owing to the dangers of deep water, strong and rapidly changing tidal movements and the irregular form of the sandbar. Discussion with the site manager indicated that the concerns for safety of visitors using the sandbar were reinforced by the manager personally having to save several visitors per day on occasion (during peak season) after they have lost their footing and fallen into deep water. Many visitors access the island using private water craft, including small motorised craft, canoes, kayaks and sailboards. Visitors using their own boats usually beach them on the protected eastern side of the island, particularly on the beach to the north of the visitor centre and around the sandbar area. The final alternative is to pay for a ferry crossing. This is the preferred option for those without their own boat and who do not wish to get wet using (or risking) the sandbar crossing. The ferry is privately operated and crosses between the mainland and island on the hour from 9am until 5pm. The cost of the ferry ticket includes the return trip and entry to the visitor centre on the island, housing several Fairy Penguins. Those who do not use the ferry must pay a small entry fee to access the visitor centre.

On-site interpretation
The island has a heavy investment in interpretation relative to the TTW site. Interestingly, despite being an extremely fragile environment, the island has a low key investment in physical barriers and enclosed areas to contain visitors and prevent degradation relative to the TTW site. There are boardwalks between the jetty landing and visitor centre and then extending north for some distance that prevent visitors walking on the fragile dune vegetation. However, the beach areas have no built barriers and the walk trails crossing the island are simple sand tracks with pine log rails to guide visitors along the path. Thus, it appears that Penguin Island management has a greater reliance on intensive interpretation as a means of ensuring appropriate visitor behaviour. Interpretation available on Penguin Island consisted of three broad categories: text based media, interpersonal media and interactive media (Table 3.2).
Table 3.2: Summary of main interpretive media on Penguin Island

<table>
<thead>
<tr>
<th>Media type</th>
<th>Media source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text based</td>
<td>Signs, Pamphlets</td>
</tr>
<tr>
<td>Interactive</td>
<td>Touch tables, Visitor Centre Penguin Display</td>
</tr>
<tr>
<td>Interpersonal</td>
<td>Ferry operator, Rangers, Information desk staff</td>
</tr>
</tbody>
</table>

All visitors accessing the island by ferry are given a brief overview of the Island’s history, ecology and available activities by the ferry operator. The main attractions of the island are pointed out, such as the caves and lookouts as well as the visitor centre. Feeding times for the penguins in the visitor centre are mentioned along with the location and route of the island walk trails. Visitors are also advised regarding appropriate behaviour, such as staying on defined paths and maintaining a set distance from sea lions that occasionally rest on the beaches of Penguin Island. This was framed in terms of minimising stress on the animals but also as a safety precaution for visitors to avoid the risk of being injured.

The centre piece of Penguin Island is a visitor centre that houses a small group of hand reared and rescued Fairy Penguins in an enclosure inside the visitor centre building. These captive penguins provide visitors with the rare opportunity of viewing Fairy Penguins which otherwise hide in their burrows or are hunting in the ocean, coming ashore in the evenings. The penguins are fed at advertised times, encouraging visitors to attend. Each feeding session is accompanied by commentary by the CALM ranger describing the ecology and biology of Fairy Penguins as well as the character of each of the named captive penguins.

Interpretive media is located in and around the visitor centre and includes signs, pamphlets and touch tables. The text based media relate the cultural, geological and ecological components of Penguin Island. The touch tables are stationed near the entrance to the visitor centre and offer dried and preserved marine specimens that all visitors are free to handle and examine as they wish. Pamphlets are available from the
visitor information desk at the entrance to the visitor centre and provide similar information to that displayed on the signs.

Signs were previously placed along the island walk trails and at the lookouts but became rapidly covered in bird faeces, rendering them unreadable, owing to the large population of marine birds frequenting the island. This made trail-side signs an impractical option. Availability of detailed pamphlets providing information on the island’s history and ecology as well as recreational opportunities supplement the media installed around the visitor centre, counterbalancing the lack of trail-side signs.

Penguin Island has a strong focus on interpretation where visitors have access to interpersonal, text based and interactive forms. The intensive use of interpretation is based on the Indigenous and European history of the island, coastal marine ecology and biology in relation to the local area and the Fairy Penguins specifically.
Figure 3.6: Penguin Island images

(Clockwise from top) Penguin Visitor Centre; ranger presentation during penguin feeding time; view of Penguin Island from northern lookout; walk trail, beach and caves north of visitor centre.
3.2 Tree Top Walk Preliminary Survey

Visitors at both sites were surveyed using self-administered written surveys to ascertain the influence of on-site interpretation on attitudes and knowledge. The surveys were personally distributed by the researcher and completed on-site. A preliminary survey was carried out to obtain data to assist in the construction of the multiple choice questions in the principal survey.

3.2.1 TTW preliminary survey design

As comprehensive visitor surveys had never been conducted at the TTW site, a preliminary survey was conducted to establish basic visitor demographics, and gather data relating to the key objectives of the research. Identifying the most common responses to key questions regarding the site experience enabled construction of multiple choice questions in the principal survey. To achieve this, the preliminary survey consisted primarily of open ended questions allowing visitors to raise issues and express ideas without prompting. As this survey was concerned with collecting visitor data and not the influence of the site on the visitor, a post-visit only distribution method was applied. A summary of the key results are included in Chapter 4.

The TTW preliminary survey consisted of 11 questions, mainly open ended, aimed at gathering visitor data relating to the main impressions of the site as well as demographic information. The format was based on past CALM surveys and discussion with CALM staff as well as relevant literature. Table 3.3 presents a summary of the questions in order of appearance in the survey form.

Question 1 directly inquired as to the reason for visitation. This aspect of the survey sought to obtain information relating to the characteristics of the site that draw visitors for subsequent comparison with the site’s impact on visitor attitudes toward the experience. The reason for visiting a site reflects, in part, the meaning the site has and may be linked to the influence of the site on the visitor. The most common site specific responses to this question were subsequently incorporated into a multiple choice style question in the principal survey.

Question 2 established the social context in which the visitor experienced the site while question 3 refers to repeat visitation of the site. As demonstrated in Chapter 2, repeat visitation has been found to be a significant variable affecting the visitors’ experience of
the site and its subsequent influence while social context may also influence the visitor experience.

Table 3.3: Summary of TTW preliminary survey questions

<table>
<thead>
<tr>
<th>Question</th>
<th>Multiple Choice options (when supplied)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Why did you visit the Tree Top Walk?</td>
<td></td>
</tr>
<tr>
<td>2. Who are you visiting with?</td>
<td></td>
</tr>
<tr>
<td>3a. Have you been here before?</td>
<td>Yes, No</td>
</tr>
<tr>
<td>3b. If ‘Yes’, how often and when?</td>
<td></td>
</tr>
<tr>
<td>4. What aspect of this visit will you remember most?</td>
<td></td>
</tr>
<tr>
<td>5. Can you suggest any improvements to the site?</td>
<td></td>
</tr>
<tr>
<td>6. Are you?</td>
<td>Male, Female</td>
</tr>
<tr>
<td>8. What is your post code or country of residence?</td>
<td></td>
</tr>
</tbody>
</table>

Questions 4 and 5 sought to assess the general impact of the site on the respondents in terms of what they most remembered. Question 4 established what aspects of the TTW ‘stand out’ in terms of the visitor experience and what they associate with the TTW as a natural area destination. This would be suggestive of the most influential aspects of the site in the view of the respondent and thus, that aspect most likely to influence their attitudes and knowledge.

Question 5 relates to how the visitor attitude toward the low intensity interpretative experience, the “enrichment without words” approach taken by site designers. Suggestions for improvement may indicate what aspects of the site the visitor did not consider adequate. If this includes the minimalist approach to signage, this would suggest that low intensity interpretation is not favoured by visitors. As discussed in Chapter 2, negative feelings toward attempts to educate generally negate any potential for positive influence.
Questions 6 through 8 requested demographic information. The demographic variables included in the survey were based on those found, in past studies, to influence visitor experiences of natural areas. The multiple choice options were based on the standard Australian Bureau of Statistics format, also used by the site management agency.

3.2.2 Preliminary survey application

The preliminary survey was conducted during the first three weeks of October 1999, between the opening time of 9am until the closing time of 5pm seven days a week. This incorporated a two week school holiday period. The preliminary survey was distributed to TTW site visitors immediately upon exiting the site. The researcher stood at the head of the site access path leading from the car park to the Tingle Shelter (Figure 3.1). Approximately every third group was approached on exiting the site. This method was maintained as long as clipboards were available for use by potential survey participants. Ten clipboards were available enabling ten visitors to complete the survey form simultaneously. When all clipboards were in use, no more additional visitors were approached until such time as a clipboard was made available. The requirement for every third group to be approached with a survey request removed the bias of the researcher in regards to perceived desirable and undesirable characters.

Selected visitors were approached by the researcher with a friendly greeting and personal introduction. A brief explanation of the survey purpose was given followed by a request for participation on the part of the visitor. This was accompanied by an emphasis that participation was entirely voluntary and that all responses will be kept anonymous and confidential. This was intended to encourage participation but also to minimise social desirability bias in the responses given as advocated by Hovland et al (1949). If the visitor agreed to participate, the researcher briefly explained the layout of the survey form and the task required. The participant was provided with a survey form on a clipboard and a pen to fill in responses. Care was taken by the researcher not to appear to be observing survey participants as they completed the survey form. This was intended to reassure the participant that their responses were entirely anonymous. As each survey form was completed, the researcher thanked the visitor for their participation, collected the clipboard, pen and completed survey, noted the date at the top of the form and placed it into a cardboard box without reading the responses.
3.2.3 Preliminary survey analysis

Data from each survey form was entered word for word into an Excel spreadsheet with each column representing a survey question and each row representing a single respondent. Data were analysed using the functions available in Excel to provide descriptive statistics (frequencies) and establish common response categories to aid in the construction of the principal survey. Some comparative analysis was conducted to gain an understanding of the relationships between TTW visitor variables and responses. Chi-square analysis was also used to establish the presence of significant patterns of response between independent variables such as age, gender and social groupings. The primary aim was establishing common themes in visitor responses to the reasons for visiting, site impressions and suggested improvements. Comparative analysis was conducted to investigate underlying factors influencing comments made to better understand the visitor experience at the site. All statistical analysis procedures were carried out at the 0.05 confidence level.

3.3 Principal Survey

The principal survey was specifically designed to address the research objectives relating to the influence of on-site interpretation on respondent attitudes and knowledge. It was designed as a paired survey with data collected immediately before and after the experience. This enabled analysis of the change in knowledge and attitudes in the context of the experience of the specific sites at the individual respondent level. In order to test for reactivity bias in the paired survey as a result of completing a form prior to the experience, a sample of responses were collected using only the post-visit survey form after the experience.

A short time frame of completion was a significant consideration in the design of the survey. The key consideration here was the understanding that the respondents were in an casual setting and were volunteering time that may be otherwise spent on other, possibly more pleasant, activities. Minimising the time taken to complete the survey also minimised any negative responses to the task through perceived unnecessary delays or disruptions to the holiday routine (Hall & McArthur, 1998). In addition, visitors were more likely to provide accurate answers when in a positive mind set (Fowler, 1995). Thus, the less time required to participate in the survey, the more likely visitors were to involve themselves and provide representative responses; a phenomenon noted by Zinn (1998).
Logistical constraints relating to Penguin Island were also a determining factor in the requirement for a short survey completion time. The minimal time frame of completion was essential in coordinating the completion of the Penguin Island survey with the length of time taken for the ferry crossing at the Penguin island site. Having to complete the survey form after the ferry has arrived at its destination both disrupts the boarding and disembarkation of visitors as well as the participants’ experience of the island. As the ferry trip takes between 7 and 9 minutes, with approximately five minutes between boarding and departure, it was essential that the survey instrument was the same as the TTW site survey but able to be completed within the limited time of the ferry crossing. Thus the survey was designed for both the short ferry crossing and the minimal disruption of visitors who volunteer their time at the TTW site.

3.3.1 Principal survey design

A predominantly multiple-choice approach to data collection was adopted to not only ensure minimal time disruption to visitors but also to facilitate in comparative analysis of responses. Neuman (2000) commented that there are several advantages of multiple-choice questions. These include: greater ease of response on the part of the visitor; more rapid completion of the survey; and the greater ease of comparison of quantitative survey responses. Open ended questions may provide for more flexibility of response and greater depth or detail but take considerably more time to complete, are less able to be comparatively analysed and disadvantage respondents with low levels of English literacy or comprehension (Neuman, 2000).

Certain questions were open ended, inviting a written response by the participant. Open ended question were use when the possible responses were too numerous or disparate to be represented by multiple-choice options or where possible responses were unpredictable.

Demographic questions were placed at the end of the paired survey (post-visit form) in accordance with the recommendations of Fowler (1995) and Neuman (2000). They suggested that questions relating to social variables may generate negative feelings and, consequently, inaccurate responses in any subsequent questions. This may be a result of perceptions of invasion of privacy or feelings of inadequacy in social status. Placing demographic (hence personal) questions at the end of the survey removed the
probability of any generation of negative feelings colouring the responses to the remaining survey. Other questions relating to visitor variables were distributed between the paired survey forms as chronologically appropriate.

Key components of the survey, measuring visitor attitudes and knowledge, were included in both the paired survey forms to provide for analysis of the influence of the site in changing visitor perceptions. The order of the repeated questions was altered between the paired survey forms to minimise recall and patterned reactivity bias to multiple-choice questions.

While the surveys for both sites were the same in terms of the type of data collected, the wording of the questions was site specific so as to ensure participants were able to see the direct relevance of the survey to their experience of the given site. This aided in ensuring responses were specific to the site being visited. As a result, the following description of the paired survey questions are organised according to site of visitation. That is, the summary of paired survey questions for the TTW site will be described followed by the questions for the Penguin Island site. The general description of the paired surveys for each site are followed by three sections addressing the measurement of environmental attitude, knowledge and attitude to the site experience respectively. Each of these sections includes description of the TTW and Penguin Island version of the questions used.

**TTW Paired Survey Design**

Tables 3.4 and 3.5 summarise the paired survey questions for the TTW site. Table 3.4 describes the survey form completed before the experience and Table 3.5, after the experience. Subsequent tables detail the attitude and knowledge scale questions included in the paired survey. It is important to note that the wording of the environmental attitude scale and knowledge quiz remained the same for the paired survey forms completed before and after the experience but the order of the individual statements that make up these questions was altered. The attitude to the site as experience question was written in future tense for the paired survey completed before the experience and in past tense for the survey completed after the experience. This placed the comments in chronological context for the participant and ensured responses were specific to the immediate experience of the site at the time the survey was completed.
Options provided for the multiple choice questions relating to the site experience were constructed based on the most frequent categories found in the TTW preliminary survey.

Table 3.4: Summary of paired survey questions completed immediately before experiencing the TTW site.

<table>
<thead>
<tr>
<th>Question</th>
<th>Multiple Choice Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Can you indicate the main reason(s) for your visit?</td>
<td>• to see the TTW</td>
</tr>
<tr>
<td></td>
<td>• to see the Forest</td>
</tr>
<tr>
<td></td>
<td>• to show others the TTW</td>
</tr>
<tr>
<td></td>
<td>• to show others the forest</td>
</tr>
<tr>
<td></td>
<td>• other. (open ended)</td>
</tr>
<tr>
<td>2. Have you visited the Tree Top Walk before?</td>
<td>• yes</td>
</tr>
<tr>
<td></td>
<td>• no</td>
</tr>
<tr>
<td>3. How many times have you visited the Tree Top Walk before today?</td>
<td>(open ended)</td>
</tr>
<tr>
<td>4. Please indicate true, false or don’t know for the following statements</td>
<td>(Knowledge quiz, see section 3.3.3 and Table 3.11)</td>
</tr>
<tr>
<td>5. Please indicate whether you agree or disagree with the following statements:</td>
<td>(Environmental Attitude (NEP) scale, see section 3.3.2 and Table 3.9)</td>
</tr>
<tr>
<td>6. Please indicate the extent to which the following statements apply to your visit to this site.</td>
<td>(Attitude to site experience, see section 3.3.4 and Table 3.13)</td>
</tr>
<tr>
<td>7. During an average calendar year (January to February) how many separate trips from home would you take to visit national parks or other natural areas?</td>
<td>• none</td>
</tr>
<tr>
<td></td>
<td>• 1-2</td>
</tr>
<tr>
<td></td>
<td>• 3-6</td>
</tr>
<tr>
<td></td>
<td>• 6-12</td>
</tr>
<tr>
<td></td>
<td>• &gt;12</td>
</tr>
</tbody>
</table>

Where appropriate, multiple choice questions included an “other” response where which participants could write their own answer if none of the categories applied. The demographic questions were selected according to those found to be of significance in the literature in relation to the influence of interpretation and natural area experiences on visitors.
The paired survey form completed before the TTW site experience contained questions relating to main reason for visitation along with repeat visitation to the site and the frequency of natural area visitation.

Question 1 requested the participant to indicate their main reason for visitation to the TTW site. The paired survey provided four of the most common site-specific responses provided in the TTW preliminary survey. Allowance was also made for alternative responses not provided by the survey form by including an “other” response. This ensured that visitors gave reasons relating to the attribute of the site rather than secondary reasons such as personal recommendations or advertisements. The main reasons for visitation could then be compared with specific aspects of the site experience.

Questions 2 and 3 collected data relating to repeat visitation to the site by establishing whether the respondent was a repeat visitor then requesting the number of prior visits. Repeat visitation is an important variable while the number of prior visits to the site was included as a precaution as the number of prior visits may be significant in terms of how the experience influences the visitor.

Question 4 requested that the participant respond to a series of statements about the TTW site and forest as part of a knowledge quiz. Participants used a multiple choice format to indicate “true”, “false” or “don’t know” in response to ‘factual’ statements about aspects of the Tinge Forest. The content was based on information provided by on-site interpretation. Section 3.3.3 has a detailed description of the knowledge quiz which is also detailed in Table 3.11.

Question 5 involved the participant responding to an environmental attitude scale adapted from the NEP scale of Dunlap and van Leire (1975). Experience of natural areas has been identified has a factor influencing the environmental attitude of individuals as discussed in Chapter 2. The statements of attitude were written in the context of the TTW as a natural area tourism destination specifically. This is discussed further in section 3.3.2 with a detailed description of the scale provided in Table 3.9.
Question 6 aimed to collect data relating to the participant’s attitude toward the specific site as a natural area experience immediately prior to actually experiencing it. This differs from environmental attitude which is refers to a conception of the relationship (ecocentric or anthropocentric) between humans and the environment globally. The attitude the visitor has toward the specific natural area site relates directly to the meaning they connect with it, and subsequently, how on-site interpretation may influence this meaning. The statements were written in future tense to provide a consistency of context in terms of the respondent having not yet experienced the site. Further discussion is provided along with a detailed description of the question in Table 3.13.

Question 7 aimed to quantify frequency of natural area visitation by requesting the visitor to select a frequency category according to their own estimate. Selection of an annual natural area visitation category enabled comparative responses between participants. The indicated frequency of annual natural area visitation was presumed to also indicate a relative level of accumulated experience in natural areas. That is, a respondent who indicated more than 12 visits per year was assumed to have a greater accumulation of experience in natural areas than a respondent indicating one or two visits per year.

The paired survey completed after experiencing the TTW site contained the knowledge quiz, environmental attitude scale and attitude toward the site as experience as well as other questions relating to visitor variables and on-site experience as detailed in Table 3.5.
<table>
<thead>
<tr>
<th>Question</th>
<th>Multiple Choice Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Please indicate the extent to which the following statements applied to your visit to this site.</td>
<td>(Attitude to site experience, see section 3.3.4 and Table 3.13)</td>
</tr>
<tr>
<td>2. Please indicate true, false or don’t know for the following statements:</td>
<td>(Knowledge quiz, see section 3.3.3 Table 3.10)</td>
</tr>
<tr>
<td>3. What sources of information did you make use of at this site?</td>
<td>• trail-side signs • pamphlet/brochure • information display • human guide/ranger • tingle shelter staff • other</td>
</tr>
<tr>
<td>4. What activities did you participate in at this site?</td>
<td>• Tree Top Walk • Ancient Empire Walk • other</td>
</tr>
<tr>
<td>5. Please indicate whether you agree or disagree with the following statements:</td>
<td>(Environmental Attitude (NEP) scale, see section 3.3.2 and Table 3.8)</td>
</tr>
<tr>
<td>6. Are there any suggestions you have for improvement of this site?</td>
<td>(open ended)</td>
</tr>
<tr>
<td>7. You are?</td>
<td>• Male • Female</td>
</tr>
<tr>
<td>8. What age group do you belong to?</td>
<td>• &lt;15 • 15-24 • 25-39 • 40-59 • 60+</td>
</tr>
<tr>
<td>9. What is your postcode or country of residence?</td>
<td>(open ended)</td>
</tr>
<tr>
<td>10. Who are you visiting with?</td>
<td>• friends • family • spouse/partner • tour group • by yourself</td>
</tr>
</tbody>
</table>

Question 1 again requested the participant to indicate their responses to the environmental attitude scale as detailed in section 3.3.2 and Table 3.9. This second environmental attitude task enabled any alterations in response to be measured for each
individual participant. The order of the statements in the paired survey form completed after the site experience was different to that in the form completed before the experience. This minimised patterned reactivity bias. In addition to this, a group of visitors was invited to complete the second half of the paired survey only after they had experienced the site (i.e. without having completed the survey before the site experience) as part of a post-visit only survey. This enabled an assessment of whether completing a paired survey skewed the data.

Question 2 requested the participant to again complete the knowledge quiz as detailed in section 3.3.3 and Table 3.11. As with the attitude scale, the repeated completion of the second knowledge quiz enabled differences to be assessed on an individual basis. Again, the order of the questions was altered in relation to the paired survey completed before the experience of the site.

Question 4 requested that respondents indicate any information sources they used during their visit to the site. A list of media available at the site was provided as a multiple choice list in the survey and the respondent selected those used. These responses were later categorised according to media type.

Question 5 requested that the participant respond to statements relating to their attitude toward the site as an experience (Table 3.13). As well as the order of the statements changing between the paired survey forms, the tense was also altered where-by the question completed before the experience was written in future tense and that completed after the experience in past tense. This ensured that responses were specific to the natural area sites being experienced at the time the survey was completed.

Question 6 provided an opportunity for respondents to suggest improvements that they considered could be made to the site. While this reflected more on the extent of satisfaction with the experience, survey participants welcomed allowance for comment about the site. The type or appropriateness of suggestions (in the context of the management objectives) may also relate to the effectiveness of site communication in justifying the management choices made in relation to the construction of the experience for visitors.
Questions 7 to 10 collected demographic data that were identified as significant in Chapter 2 in relation to how on-site interpretation influences visitors. The principal survey demographic questions were the same as the preliminary TTW survey allowing some comparisons to be made. The design of the TTW paired survey was the same as the Penguin Island survey to facilitate comparisons between the sites.

*Penguin Island Paired Survey Design*

The only significant difference in content between the Penguin Island survey and the TTW survey was the context of the wording used in the questions. Where the TTW survey referred to the forest and other aspects of the TTW site, the Penguin Island survey questions referred to the island and other marine related aspects associated with the island experience. Consequently, the Penguin Island survey was effectively identical to the TTW survey in form and intent.

Multiple choice options included in the Penguin Island paired survey were derived from the most common responses to past survey data obtained from CALM. Tables 3.6 and 3.7 summarises the paired survey questions where Table 3.6 demonstrates the survey questions completed before experiencing Penguin Island and Table 3.7 represents the form completed after experiencing Penguin Island. The options for the multiple choice questions are indicated excepting those for the attitude and knowledge questions which are discussed in more detail in the following sections.
Table 3.6: Summary of paired survey questions completed immediately before experiencing the Penguin Island site.

<table>
<thead>
<tr>
<th>Question</th>
<th>Multiple Choice Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Can you indicate the main reason(s) for your visit?</td>
<td>• to see the penguins</td>
</tr>
<tr>
<td></td>
<td>• to go swimming</td>
</tr>
<tr>
<td></td>
<td>• to show others the penguins</td>
</tr>
<tr>
<td></td>
<td>• to show others the island</td>
</tr>
<tr>
<td></td>
<td>• other.</td>
</tr>
<tr>
<td>2. Have you visited Penguin Island before?</td>
<td>• yes</td>
</tr>
<tr>
<td></td>
<td>• no</td>
</tr>
<tr>
<td>3. How many times have you visited Penguin Island before today?</td>
<td>(open ended)</td>
</tr>
<tr>
<td>4. Have you visited the Penguin Experience before?</td>
<td>• yes</td>
</tr>
<tr>
<td></td>
<td>• no</td>
</tr>
<tr>
<td>5. How many times have you visited the Penguin Experience before today?</td>
<td>(open ended)</td>
</tr>
<tr>
<td>6. Please indicate true, false or don’t know for the following statements.</td>
<td>(Knowledge quiz, see section 3.3.3 and Table 3.12)</td>
</tr>
<tr>
<td>7. Please indicate whether you agree or disagree with the following statements:</td>
<td>(Environmental Attitude (NEP) scale, see section 3.3.2 and Table 3.10)</td>
</tr>
<tr>
<td>8. Please indicate the extent to which the following statements apply to your visit to this site.</td>
<td>(Attitude to site experience, see section 3.3.4 and Table 3.14)</td>
</tr>
<tr>
<td>9. During an average calendar year (January to February) how many separate trips from home would you take to visit national parks or other natural areas?</td>
<td>• none</td>
</tr>
<tr>
<td></td>
<td>• 1-2</td>
</tr>
<tr>
<td></td>
<td>• 3-6</td>
</tr>
<tr>
<td></td>
<td>• 6-12</td>
</tr>
<tr>
<td></td>
<td>• &gt;12</td>
</tr>
</tbody>
</table>

The paired survey form completed before experiencing Penguin Island contained two references to repeat visitation. Question 3 collected data relating to repeat visitation to Penguin Island as a whole. Question 4 referred to repeat visitation to the “Penguin Experience” specifically. This was designed to ascertain how many respondents visited the Island repeatedly as compared with the number who visited the “Penguin
Experience” at the visitor centre on more than one occasion. The remaining questions in the paired survey form completed before experiencing the island were the same as those in the TTW survey described previously.

In order to relate the paired survey to the particular site, some differences in multiple choice options existed between the two respective site surveys. This was primarily with regard to the interpretive media options provided and the range of activities available for access by respondents at each site as shown in Table 3.7.

<table>
<thead>
<tr>
<th>Question</th>
<th>Multiple Choice Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Please indicate the extent to which the following statements apply to your visit to this site</td>
<td>(Attitude to site experience, see section 3.3.4 Table 3.14)</td>
</tr>
<tr>
<td>2. Please indicate true, false or don’t know for the following statements.</td>
<td>(Knowledge quiz, see section 3.3.3 and Table 3.12)</td>
</tr>
<tr>
<td>3. What sources of information did you make use of at this site?</td>
<td>• trail-side signs</td>
</tr>
<tr>
<td></td>
<td>• ranger/guide</td>
</tr>
<tr>
<td></td>
<td>• brochure/pamphlet</td>
</tr>
<tr>
<td></td>
<td>• information staff</td>
</tr>
<tr>
<td></td>
<td>• information display</td>
</tr>
<tr>
<td></td>
<td>• touch table</td>
</tr>
<tr>
<td></td>
<td>• other</td>
</tr>
<tr>
<td>4. What activities did you participate in at this site?</td>
<td>• island walks</td>
</tr>
<tr>
<td></td>
<td>• Penguin Experience</td>
</tr>
<tr>
<td></td>
<td>• swimming</td>
</tr>
<tr>
<td></td>
<td>• other</td>
</tr>
<tr>
<td>5. Please indicate the extent to which you agree or disagree with the following statements</td>
<td>(Environmental Attitude (NEP) scale, see section 3.3.2 and Table 3.10)</td>
</tr>
<tr>
<td>6. Who are you visiting with?</td>
<td>• friends</td>
</tr>
<tr>
<td></td>
<td>• family</td>
</tr>
<tr>
<td></td>
<td>• spouse/partner</td>
</tr>
<tr>
<td></td>
<td>• tour group</td>
</tr>
<tr>
<td></td>
<td>• by yourself</td>
</tr>
<tr>
<td>7. You are:</td>
<td>• male</td>
</tr>
<tr>
<td></td>
<td>• female</td>
</tr>
<tr>
<td>8. What is your postcode or country of residence?</td>
<td>(open ended)</td>
</tr>
<tr>
<td>9. Which age group do you belong to?</td>
<td>• &lt;15</td>
</tr>
<tr>
<td></td>
<td>• 15-24</td>
</tr>
<tr>
<td></td>
<td>• 25-39</td>
</tr>
<tr>
<td></td>
<td>• 40-59</td>
</tr>
<tr>
<td></td>
<td>• 60+</td>
</tr>
</tbody>
</table>

In keeping with the relatively higher intensity of interpretation at the Penguin Island site, the question inquiring about information sources used (question 3) provided several more options than did the TTW survey, for example a “touch table”. As with the TTW responses, the options provided in the Penguin Island survey were categorised according to media type in the subsequent data analysis (text based, interactive, interpersonal).
Similarly, options provided for the question relating to activities the respondent undertook while at the site differed in accordance with what was offered at the island. The remaining questions were identical to those in the TTW paired survey completed after the experience of the site. Detailed descriptions of measurement of environmental attitude, knowledge and attitude to the site experience are addressed respectively in the subsequent sections.

3.3.2 Measurement of environmental attitude

A key objective of this research was to examine the influence of the site experience on visitor attitudes. This was in terms of attitudes toward the environment in general (environmental attitude) and attitudes toward the experience of the site specifically (discussed in section 3.3.4). The method used to measure environmental attitude will be described in relation to the TTW and Penguin Island paired surveys respectively in turn.

One aim of interpretation is to influence visitor attitudes as a component of adding meaning to the natural area being experienced. As previously discussed, this was required to be done within a limited time, meaning a multiple choice type approach was preferable over a narrative or discussion group method. The narrative method involves presenting participants with a short story and measuring their attitudinal responses by using a series of questions or comments relating to the text. Discussion groups may use a similar technique with the added component of social interaction between group members. Although the use of narrative stories and discussion groups may provide for more depth of understanding with regard to attitudes, the length of time taken to complete the task significantly reduces the response rate. The requirement for in-depth analysis on the part of the participant also has a bias towards relatively educated people interested in environmentally related issues (Shanahan et al, 1999). However, the length of time taken to conduct such a survey was considered the primary aspect that would be unworkable in the context of the Penguin Island ferry crossing. Thus, use of the New Environmental Paradigm (NEP) Likert Scale adapted from Jurowski et al (1995) and Manning (1999) was deemed most appropriate despite its limitations (discussed in section 3.6).
The NEP scale consists of a series of statements reflecting the human relationship with the environment on a global scale. This is expressed with both human use and intrinsic ecological value centred attitude statements about the environment. Participants respond to the statements using a five point scale ranging from strongly agree to strongly disagree. Table 3.8 illustrates the original scale used by Dunlap and van Leire (1978). It represents a broad attitude toward the general environment.

Table 3.8: NEP scale statements as used by Dunlap and van Liere (1978) and Jurowski et al (1995).

- The earth is like a spaceship with only limited room and resources
- Mankind is severely abusing the environment.
- The balance of nature is very delicate and easily upset
- Humans must live in harmony with nature to survive.
- There are limits to growth beyond which our industrialised society cannot expand.
- To maintain a healthy society we will have to develop a steady state economy where industrial growth is controlled.
- We are approaching the number of people the earth can support
- When humans interfere with nature it often produces disastrous consequences.
- Mankind was created to rule over nature.
- Plants and animals exist primarily to be used by humans.
- Humans have the right to modify the natural environment to suit their needs
- Humans need not adapt to the natural environment because they can remake it to suit their needs.

The scale used in this thesis was adapted from that used by Dunlap and van Leire (1978) and Jurowski et al (1995) to a more specific context with the aim of providing a more site specific instrument for attitude measurement. While the themes remained similar, the wording was altered to reflect the context in which the respondent was completing the survey; that is, as a visitor at a natural area attraction.

The context in which attitudes are measured have been shown to affect the outcome of such an exercise. That is, the situational context within which attitudes are measured is an integral component of how they are expressed (McGuire, 1985). Thus, assessing attitudes towards a particular natural area, such as a forest, in a physical context removed from that environment may produce attitudinal responses different to those
measured while actually standing in a forest. It may then be assumed that the written context of the statements, be they referring to a global environment or a specific environment, also influence how attitudes are expressed. In addition, a more specific contextual framework for attitude statements, in relation to the natural area being visited, may be more closely associated with the interpretive goals of the site. That is, interpretive media at a natural area attraction may not necessarily be attempting to influence environmental attitudes in a global sense but in the more specific context of the site in question.

In addition to adapting the NEP wording to the specific context of the sites, the statements were also modified to reflect the context of interaction with the relevant environment in terms of tourism and recreation specifically. Studies examining visitor perceptions of tourism and recreation in parks by McKercher (1996) and attitudes toward recreation and tourism in natural areas by Manning et al (1999) and Hunt et al (2000) were used as templates for the survey design. Thus, as well as having a specific focus in terms of the interaction between humans and the particular natural environment, the attitude scale also reflected the specific context in which the visitors were completing the survey. This enabled more meaningful comparison between the measured visitor attitudes to the environment and other site-specific components of the survey such as attitude to the site experience.

Together with the written context, the physical context in which attitudes are measured may also influence results. It appears that information relating to environmental attitudes in relation to natural area experiences has commonly been collected through the use of mail out surveys or surveys conducted in isolation from natural settings. For example, the environmental attitude research of Dunlap and Heffernan (1975) and Dunlap and van Liere (1978) were comprised of mail back surveys sent to randomly selected Washington State households. Many other past studies have used attitudinal surveys in this manner to draw conclusions both about environmental attitudes and the techniques of measurement of such attitudes in relation to natural areas. Those cited in this thesis include: Lynne and Bowman (1974); Born and Wieters (1978); Driscoll et al (1994); Jurowski et al (1995); Anderton (1997); Manning et al (1999); and Shanahan et al (1999). While such research has obviously contributed significantly to the understanding of the human relationship with the environment, attitude responses by participants may be affected by the context in which they complete the survey.
Tables 3.9 and 3.10 present the attitude statements included in the TTW and Penguin Island paired surveys respectively. The meaning of the individual statements were consistent across the two surveys while the context of the wording was altered to relate to the respective sites. As discussed earlier, the order of statements was changed randomly between the survey completed before experiencing the site and that completed after experiencing the site.

Table 3.9: Environmental attitude scale adapted for use at the TTW site.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recreation needs are more important than the needs of the forest and its wildlife.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Ideally, humans should not be allowed to visit the Tingle Forest to ensure that it is not damaged or degraded.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>The Tingle Forest should be further developed to encourage more visitors to the area.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Jobs created by tourism are more important than conservation of forests.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>The Tingle Forest is a very delicate environment and easily disturbed.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Humans have a right to modify the forest to suit their needs.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Conservation of nature is more important than the economic viability of the Tree Top Walk.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>The economic health of the local community should be given highest priority when making management decisions about the Tingle Forest.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>The Tingle Forest should be protected whether or not it attracts tourists</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Human visitation severely disturbs the natural balance of the Tingle Forest.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>
Table 3.10: Environmental attitude scale adapted for use at the Penguin Island site.

<table>
<thead>
<tr>
<th>Please indicate the extent to which you agree or disagree with the following statements:</th>
<th>Strongly agree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recreation needs are more important than wildlife needs on Penguin Island.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Ideally, humans should not be allowed to visit Penguin Island to ensure that it is not damaged or degraded.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Penguin Island should be further developed to encourage more visitors to the area.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Jobs created by tourism at Penguin Island are more important than conservation of breeding grounds for marine wildlife.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Penguin Island is a very delicate environment and easily disturbed.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Humans have a right to modify Penguin Island to suit their needs.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Conservation of nature is more important than the economic viability of Penguin Island.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>The economic health of the local community should be given highest priority when making management decisions about Penguin Island.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>The island should be protected whether or not it attracts tourists.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Human visitation severely disturbs the natural balance on Penguin Island.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>

Thus the objective of the modified scale was to measure attitudes within the specific context of the natural area site and its particular interpretive media. As context is a major component of attitudinal measurement and expression, adapting the scale to reflect a specific context presents a more targeted measurement of environmental attitudes within the confines of this thesis. The modified attitude scales designed for this research were narrowed to represent attitudes to natural areas used as destinations for tourism and recreation.
The NEP attitude scale devised by Dunlap and van Leire (1978) was based on concepts relating to the general human relationship with the global environment and its finite capacity for absorption of wastes and provision of resources. The survey was refined to specifically address the ideologies of the use of the natural environment as a tourism commodity, or the visitation of a natural area that has intrinsic valued beyond that of tourism. This more specific context enables a more meaningful comparative analysis of environmental attitude with the other site-specific components of the survey instrument. Subsequently, the application of this scale as part of a paired survey completed immediately before and after experiencing the sites enabled any alterations between the two completions of the scale to be assessed in the context of the site visited.

3.3.3 Measurement of knowledge

As established in Chapter 2, while knowledge acquisition itself does not necessarily influence attitudes or reflect effective interpretation in this sense, knowledge forms an important basis for interpretation to add meaning to the experience. In one respect, knowledge transferral indicates the effectiveness of the interpretive media in terms of communicating content to the respondent and the respondents receptiveness to the messages being communicated. It also provides an approximate indication of the effectiveness of the communication media in terms of visitor comprehension of themed messages.

Knowledge of respondents was assessed using a quiz type format in both of the paired survey forms at each site. The order of the questions was randomly changed between the survey completed immediately before the experience and that completed immediately after the experience to minimise patterned reactivity bias. While a knowledge quiz may represent a fairly limited measure of learning (as discussed in section 3.6) the quiz style format was deemed adequate as a guide to factual learning with the advantage of a short time frame of completion.

To assess knowledge, participants responded to a series of statements containing facts and concepts based on the content of on-site interpretive media at each site. Responses were ascertained using a multiple choice format where participants circled “true”, “false” or “don’t know” for each of a series of ‘factual’ statements about the natural aspects of the respective sites. Half of the statements in the knowledge quiz
were intentionally false. The inclusion of a “don’t know” option was intended to minimise the possibility that participants would try to guess the correct response. Guessing, or random selection of multiple choice responses may create a skewed set of data in terms of the level of correct or incorrect knowledge of participants in relation to the on-site interpretation content. Table 3.11 presents the knowledge quiz for the TTW site respondents while Table 3.12 details the knowledge quiz for Penguin Island survey participants.

Table 3.11: Knowledge quiz designed for TTW respondents

<table>
<thead>
<tr>
<th>Statement</th>
<th>True</th>
<th>False</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>The largest Tingle Trees are over a thousand years old.</td>
<td>true</td>
<td>false</td>
<td>don’t know</td>
</tr>
<tr>
<td>Observing animals in the Tingle Forest is difficult because most are nocturnal.</td>
<td>true</td>
<td>false</td>
<td>don’t know</td>
</tr>
<tr>
<td>The dead branches protruding above the canopy are the result of disease attacking the trees.</td>
<td>true</td>
<td>false</td>
<td>don’t know</td>
</tr>
<tr>
<td>The canopy helps generate the climate enabling survival of the forest inhabitants.</td>
<td>true</td>
<td>false</td>
<td>don’t know</td>
</tr>
<tr>
<td>Tingle Trees are found throughout the south west of Western Australia.</td>
<td>true</td>
<td>false</td>
<td>don’t know</td>
</tr>
<tr>
<td>The Tingle Forest is an example of life surviving from ancient times.</td>
<td>true</td>
<td>false</td>
<td>don’t know</td>
</tr>
<tr>
<td>Only birds and insects live in the forest canopy.</td>
<td>true</td>
<td>false</td>
<td>don’t know</td>
</tr>
<tr>
<td>It is difficult to observe animals in the Tingle Forest because very few live in it.</td>
<td>true</td>
<td>false</td>
<td>don’t know</td>
</tr>
<tr>
<td>The forest canopy blocks out most of the sunlight, slowing the growth of other plants to prevent competition with the Tingle Trees for nutrients and water.</td>
<td>true</td>
<td>false</td>
<td>don’t know</td>
</tr>
<tr>
<td>The Tingle Forest is hundreds of millions of years old.</td>
<td>true</td>
<td>false</td>
<td>don’t know</td>
</tr>
</tbody>
</table>
Table 3.12: Knowledge quiz designed for Penguin Island respondents

<table>
<thead>
<tr>
<th>Statement</th>
<th>True</th>
<th>False</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Little Penguins only live in the area around Penguin Island.</td>
<td>true</td>
<td>false</td>
<td>don’t know</td>
</tr>
<tr>
<td>Penguins are the only birds that breed on Penguin Island.</td>
<td>true</td>
<td>false</td>
<td>don’t know</td>
</tr>
<tr>
<td>Fishing is allowed on Penguin Island.</td>
<td>true</td>
<td>false</td>
<td>don’t know</td>
</tr>
<tr>
<td>Australian Sea Lions are rare as a species.</td>
<td>true</td>
<td>false</td>
<td>don’t know</td>
</tr>
<tr>
<td>Penguin Island is an extremely robust environment.</td>
<td>true</td>
<td>false</td>
<td>don’t know</td>
</tr>
<tr>
<td>Penguin Island is part of a marine park, like a national park on the ocean.</td>
<td>true</td>
<td>false</td>
<td>don’t know</td>
</tr>
<tr>
<td>It’s OK to bring dogs onto the island if you have your own boat.</td>
<td>true</td>
<td>false</td>
<td>don’t know</td>
</tr>
<tr>
<td>It is difficult to find wild penguins on the island because there aren’t many left.</td>
<td>true</td>
<td>false</td>
<td>don’t know</td>
</tr>
<tr>
<td>Many of the caves on Penguins Island were excavated by Aboriginal people in the past for shelter.</td>
<td>true</td>
<td>false</td>
<td>don’t know</td>
</tr>
<tr>
<td>Penguin Island is part of an important breeding area for many sea birds.</td>
<td>true</td>
<td>false</td>
<td>don’t know</td>
</tr>
</tbody>
</table>

Completing the knowledge quiz immediately before and after experiencing the site enabled scores for “true”, to be compared on an individual basis owing to the pairing system described in section 3.4. The same system enabled alterations in response to the site experience to be measured also.

3.3.4 Measurement of attitude to site experience

Attitudes to the site experience as a natural area destination were ascertained using a series of statements to which the respondent indicated the importance in the context of their visit using a rating system. The use of attitude in this sense is not consistent with much of the mainstream attitude literature in that it is not a like-dislike type response. The intent was to measure what emphasis respondents placed on the natural area site as an experience and whether this was influenced by visiting the site. The statements represented a set of attitudes to the experience of the natural environment adapted from Rolston (1998) and Manning et al (1999) as discussed in Chapter 2. These represent how the respondent related to the natural area in terms of interaction with a specific site.
Interactions may range from aesthetic and cognitive appreciation through to less tangible concepts relating to spiritual and emotional perceptions of well-being as described by Maslow (1968). This differs from the environmental attitude (NEP) scale that refers to broader conceptions of the human relationship with the natural environment in terms of ecocentric or anthropocentric attitudes and how this influences ideas of what is right or wrong.

The attitude to the experience of the site was included in both parts of the paired survey. The statements in the paired survey form completed immediately before experiencing the site were written in a future tense while the same statements in the paired survey form completed immediately after experiencing the site were written in past tense. The change in tense was intended to ensure participants focussed on their experience at the actual site at that moment in time rather than referring to planned future activities or previous visits to the site. Tables 3.13 and 3.14 present the before and after versions of the attitude scale as included in the paired survey for the TTW site. Tables 3.15 and 3.16 present the same attitude scale written for the Penguin Island site. A detailed discussion of the content of the attitude to site experience scale may be found in Chapter 2, section 2.4.

Table 3.13: Attitude to TTW site experience instrument designed for completion immediately before experiencing the site

<table>
<thead>
<tr>
<th>Please indicate the extent to which the following statements apply to your visit to this site:</th>
<th>Strongly Applies</th>
<th>Doesn’t apply at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opportunity to enjoy the beauty of the forest.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Opportunity to participate in recreation in the forest.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Opportunity to learn more about the Tingle Forest.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Opportunity to see and experience nature in its pristine state.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Opportunity to think creatively and be inspired by the forest.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Opportunity to obtain spiritual meaning through contact with nature.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Opportunity to exercise a moral duty to help protect the Tingle Forest.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Opportunity to see and experience the Tingle Forest enhanced by human made facilities.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>
Table 3.14: Attitude to TTW site experience instrument designed for completion immediately after experiencing the site.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Applies</th>
<th>Doesn’t apply at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obtained spiritual meaning through contact with the forest.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Human made facilities enhanced the Tingle Forest experience.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Learnt more about the Tingle Forest.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Experienced nature in its pristine state.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Inspired by the forest to think creatively.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Regained physical or mental well-being through contact with the Tingle Forest.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Helped to exercise a moral obligation to protect the Tingle Forest.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Had a fulfilling recreation experience in the forest.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Enjoyed the beauty of the forest.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>

Table 3.15: Attitude to Penguin Island site experience instrument designed for completion immediately before experiencing the site.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Applies</th>
<th>Doesn’t apply at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opportunity to enjoy the beauty of the island.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Opportunity to participate in recreation on Penguin Island.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Opportunity to learn more about Penguin Island.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Opportunity to experience nature in its pristine state.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Opportunity to think creatively and be inspired by nature on Penguin Island.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Opportunity to obtain spiritual meaning through contact with Penguin Island.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Opportunity to exercise a moral obligation to help protect Penguin Island.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Opportunity to see and experience Penguin Island enhanced by human made facilities.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Opportunity to maintain or regain physical or mental well-being through contact with nature on Penguin Island.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>
Table 3.16: Attitude to Penguin Island site experience instrument designed for completion immediately after experiencing the site

<table>
<thead>
<tr>
<th>Please indicate the extent to which the following statements applied to your visit to this site:</th>
<th>Strongly Applies</th>
<th>Doesn’t apply at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experienced nature in its pristine state.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Regained physical or mental well-being through contact with nature on Penguin Island.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Learnt more about Penguin Island.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Human made facilities enhanced the Penguin Island experience.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Inspired by Penguin Island to think creatively.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Enjoyed the beauty of Penguin Island.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Helped exercise a moral obligation to protect Penguin Island.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Had a fulfilling recreation experience on Penguin Island.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Obtained spiritual meaning through contact with nature on Penguin Island.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>

Quantifying attitude to the natural area site experience immediately before and after actually experiencing the site affords the opportunity to assess any alterations in attitude toward interaction with natural areas at a site specific level. As with the knowledge and environmental attitude components, the paired surveys enabled alterations to be detected at the individual respondent level. The overall design of the paired survey was intended to assess differences in response between the survey form completed before the experience and that completed immediately afterwards. The importance of this design lies in the close link between the paired survey responses and the intensity and type of on-site interpretive media enabling reliable conclusions to be drawn about the influence of a particular site design on survey respondents. Data obtained from mail back surveys or surveys completed at a later date may not be directly related to the specific natural area experience of interest as participants may be exposed to other influencing factors in the interim. Distribution and completion of a paired survey immediately before and after a natural area site experience provides management agencies with specific information about how successfully interpretive media works to influence knowledge and attitudes of respondents in direct relation to the site in question.
3.4 Principal Survey Application

Application of the paired survey and post-visit only survey was based on methodology described by Schuman & Kalton (1985) and Sarantakos (1998). These authors provided detailed descriptions on written survey methodology regarding minimisation of reactivity bias and selective sampling. The researcher wore a staff uniform shirt and nametag to reassure visitors of the official nature of the survey. Division of the survey into two forms, together with a minimum number of open-ended questions, resulted in the time spent completing the forms being spread over two periods of approximately 5-7 minutes rather than one period of 12-15 minutes. An attempt was also made, through the careful construction of the questions and controlled interaction between the researcher and the respondents, to minimise influences on visitor reactivity bias as also advocated by Fowler (1995) and Neuman (2000).

3.4.1 TTW principal survey application

TTW surveys were carried out in January, February and December of 2001 and then March 2002. Data was collected every day, including weekends and weekdays, during opening hours (9am-5pm). Visitors were surveyed immediately before entering and after exiting the TTW site. The last paired survey was distributed two hours prior to closing time to ensure the participant did not feel the need to rush their experience owing to the threat of an imminent closure of the site and the need to complete a survey after the experience. This was based on the incidental observation during the preliminary survey that visitors generally took just over an hour to experience the site though some visitors may take up to two hours or more. Post-visit only surveys, used as a type of control data set to test for reactivity bias in the paired survey, were distributed up until closing time.

Approximately very third visitor group was approached by the researcher as they entered the site access path leading from the car park to the visitor kiosk. The selection of every third visitor group was intended to remove bias as to who was approached by the researcher. Ten clipboards were available, allowing for five surveys to be completed simultaneously by separate participants immediately before and after the experience respectively (or any combination as required). The researcher greeted selected visitors with a personal introduction and a short explanation of the purpose of the survey as well as the requirement to complete two survey forms as part of a paired survey. The selected visitor was then asked if they would like to participate. The
confidentiality of the survey data was stressed along with the anonymity of responses. If the visitor agreed, the survey layout was briefly explained. Each participant was also issued with a numbered raffle ticket. The researcher explained that the purpose of the ticket system was to match the individually paired survey forms of participants for later comparative analysis. The participant was instructed to write the number of the ticket at the top of their survey form and then keep the ticket during their experience of the site. On exiting the site, participants completed the second half of the paired survey, writing the number of their raffle ticket at the top of the form. This system enabled effective pairing of survey data without compromising anonymity in the eyes of the visitors. To reinforce this, the researcher was careful not to be perceived as observing responses as they were written by participants as a reassurance of the anonymity of the information.

Once each new participant began filling in a survey form, the researcher repeated the survey distribution process as long as clipboards were available. If all clipboards were in use, the researcher waited until such time as a clipboard became available then recommenced the visitor survey process. Some judgement on the part of the researcher was required to ensure that clipboards were available for participants having just experienced the site. This was achieved using anecdotal knowledge about the average length of time visitors spent at the site and reservation of forms for distribution to those exiting the site and ready for the second half of the paired survey. The intent was to ensure that participants did not have to wait after their experience of the site for a clipboard to become available.

In addition to the paired survey distribution, the researcher also approached visitors exiting the site who had not completed a survey form before their experience. This group was identified as the post-only group. This group were issued with the second half of the paired survey. The same distribution method as that described for the paired survey was used. The primary aim was to collect the data relating to attitudes and knowledge so as to compare the post-visit only group responses with the paired survey data. This enabled the researcher to determine whether the paired survey resulted in any reactivity bias.

While the survey forms for the TTW site and Penguin Island were effectively the same, distribution methods at each site required slightly different approaches. The TTW site offered a single entry and exited point through which visitors filed, enabling a sample to
be taken simply by approaching every third person or group to pass through. The Penguin Island survey was required to be distributed to visitors seated on a ferry. This meant that the selection of every third person as used at the TTW was not practical. The following section describes the Penguin Island survey application process.

3.4.2 Penguin Island principal survey application

Surveys of visitors to Penguin Island were carried out weekdays and weekend days during February, April, November and December 2001. While visitors to Penguin Island may access the site by various methods such as walking across the sand bar or using private boats, surveys were conducted on the ferry as this represented a more controlled environment for data collection. Visitors using other means of access may have had various departure and arrival points at irregular intervals of time. Additionally, site management actively discourage the use of the sand bar for island access due to the dangers posed by strong currents, deep water and uneven footing. Hence it would not have been appropriate to encourage this practice through formal recognition afforded by completion of visitor surveys at the point of access. On the other hand, the ferry service presented a regular and safe mode of access from specific locations at specific times of the day. This enabled greater ease in gathering consistent paired survey data. Another important determination was that the ferry based visitors were equivalent to the TTW visitors in terms of paying to gain access to the site experience.

The time taken to complete surveys was minimised at both sites to ensure visitors were not overly disrupted during their experience. However Penguin Island posed an additional and more tangible challenge owing to the length of time taken to travel between the mainland and the island using the ferry. That is, the length of the survey was a particularly important factor for the Penguin Island sample as it was vital that the time taken to complete the form was less than the time required to make the ferry crossing. While the survey was initially designed with the time taken for the ferry crossing in mind, a pilot survey was conducted just prior to the principal survey to ensure the timing was correct. It was found that all visitors who took part in the pilot survey were able to complete the forms before being required to disembark from the ferry. The Penguin Island pilot survey was also used to familiarise the researcher with
the visitor ferrying procedure in order to ensure maximum efficiency and effectiveness in obtaining visitor data.

The ferry ran on the hour from 9am until 5pm with two 1 hour stopovers at the Island jetty and the remaining stopover times spent moored at the mainland jetty. The ferry crossing was approximately 7 to 8 minutes depending on the weather conditions. Up to 50 people could board the ferry at any one time although this was rarely the case with some trips involving as little as two or three visitors. Visitors using the ferry were able to board up to 10 minutes before departure. The time prior to departure was valuable for allowing distribution and explanation of surveys to the maximum number of willing participants. Where possible, the researcher boarded the ferry up to 15 minutes before departure in order to allow time to organise the survey forms before visitors began boarding. This varied according to the time of day and whether the ferry driver had other chores to attend to. All visitors who subsequently boarded the ferry were asked to participate in the survey.

On the ferry from the mainland to the island, the researcher greeted visitors with a personal introduction and a short explanation of the purpose of the survey. This was aided with an announcement by the ferry operator in reference to the survey research being undertaken. In addition to the introduction, visitors were made aware that participation required completion of paired survey forms both immediately before and after experiencing the site. The visitors on the ferry were then asked if they would like to participate. Those that agreed were given a brief explanation of the form before the visitor completed the survey using a pen and clipboard provided by the researcher. 10 clipboards were available, allowing for up 10 participants to complete the survey simultaneously. Visitors were requested to write their ferry ticket number at the top of each of the paired survey forms. As with the raffle ticket system used at the TTW, this enabled pairing of forms without compromising anonymity in the eyes of the visitors.

On the return crossing (from the island to the mainland), visitors boarding the ferry were asked whether or not they had completed a survey on the trip from the mainland to the island. Visitors who indicated they had were given priority in the distribution of forms owing to the restricted time afforded by the ferry crossing. This ensured that all visitors who had completed a paired survey before their experience also completed one after their experience. Once forms had been distributed to the paired survey
participants, the second half of the paired survey forms were then distributed to visitors who had not completed the form before their site experience. This provided data in relation to a post-visit only group similar to the TTW data. Collection of from visitors who were unaware of the paired survey form content before experiencing the island afford a control group, thus allowing testing for reactivity bias in the paired data.

3.5 TTW Trail-side Sign Trial

During the January-February 2001 survey period, a sign trial was carried out in which interpretive signs were designed by the researcher (with assistance from CALM staff) and installed along the TTW structure. The TTW walk trail was designed and built intentionally with no trail-side signs. The intent was to increase the level of interpretation at the site, along the TTW in particular, in an attempt to ascertain whether this would significantly alter the influence of the site on respondents. Comments by respondents in the preliminary survey relating to the perceived need for more interpretation supported the rationale for this trial.

The trial consisted of three interpretive signs placed at intervals along the TTW structure. The signs were a metal leaf shaped design in keeping with those situated at the visitor kiosk and along the access jetty. Each sign was attached to the inside of the railing of a viewing platform. The signs were positioned prominently to ensure visitors noticed them on their approach to the platform along the bridge spans. Figure 3.7 illustrates the positioning of the signs along the TTW structure.
The two display signs situated at the visitor kiosk provided information relating to CALM controlled burning regimes and the unique flora and fauna of the Tingle Forest respectively. Interpretive display signs along the access jetty provided information relating to the natural history of the Tingle Forest; biological facts about the Tingle Trees and finally, a description of the TTW structure with associated visitor safety precautions.

The researcher wrote the signs in the context of the theme: the Tingle Forest as a home for unique plants and animals. Each sign contained a maximum of fifty words; to ensure reading time was less than 25 seconds, along with an illustration relevant to the particular text. The experimental interpretive signs contained concepts and components of information that elaborated on the pre-existing sign displays. Figures 3.8- 3.11 illustrate the design and text of the signs.

Figure 3.8: Example of prominent positioning of experimental TTW trail-side interpretive sign (platform 1).
Sign 1 Home in the Forest – text: A variety of furred animals live within the Tingle Forest. Most are nocturnal and secretive. The Quenda and Quokka forage at night on the forest floor. The Brush-tailed Possum, Wambenger and bats shelter in tree hollows during the day.

Figure 3.9: Experimental TTW trail-side sign installed at platform 1.

Sign 2: The Big Picture – text:
The Tingle forest canopy is a living shield protecting the ancient community of plants and animals within. Dead branches protrude above the greenery, like fingers of giants reaching towards the sky, reminders of past wildfires that threatened this cool temperate forest. The larger Tingle trees are over 400 years old.

Figure 3.10: Experimental TTW trail-side sign installed at platform 2.
Figure 3.10 Experimental TTW trail-side sign installed at platform 5.

Location of on-site signs is related to management issues such as vandalism (Baxter, pers. comm., CALM, 27/7/2001). Centrally located signs, in the proximity of on-site staff, are less likely to be vandalised than signage distributed along secluded walk trails. There is evidence of vandalism of signs installed along the Ancient Empire ground level walk at the TTW site. Plaques embedded in the board walks and on wooden posts, have been both vandalised and stolen on frequent occasions (D. Blight, pers. comm. CALM, 20/4/2000). This may be due to the secluded nature of the ground level walk while the signs around the visitor kiosk and jetty are under the permanent gaze of site staff. Therefore, centrally located signs may have a lower cost of maintenance than trail-side signage given the potential that exists for vandalism at a site.

Visual pollution, or distraction from the natural attraction, may also result from installation of trail-side signs (Bramwell and Lane, 1993; Baxter, pers. comm. CALM, 27/7/2001). With this in mind, the signs installed along the TTW were placed as unobtrusively as possible. Installation of the TTW interpretive signs in an unobtrusive but attention-grabbing manner was made easier due to the nature of the structure itself (i.e. existence of metal barriers and hand rails). While the placement of the TTW experimental signs ensured that visitor attention was captured without obstructing the view, the signs previously installed along the Ancient Empire ground level walk frequently went unnoticed by visitors due to the subtlety of placement. During both the preliminary and principal surveys, many respondents expressed surprise when informed

Sign 3: Beneath the Canopy – text:
Over 70% of sunlight is shaded out, never reaching the forest floor. This cool, moist environment is home to many invertebrates such as the rare Tingle Spider. Look and listen for insectivorous birds amongst the foliage, searching the thick bark and foraging the forest floor for invertebrates.
by the researcher that signs had been imbedded into the boardwalks of the Ancient Empire at various intervals. Thus, the intent of installing low intensity interpretation has resulted in the failure to draw respondent attention to the text.

3.6 Data Analysis

This section contains a general description of the approach to analysis of the survey data followed by subsections detailing the analysis of the complex attitude response data. To aid in examination of the data collected, literature sources relating to statistical analysis of survey data were accessed including: Hinkle et al (1988), Kline (1994), and Healey (1996). Specific information relating to the use of the SPSS software package was obtained from: Norusis (1990), Kinnear and Gray (2000) and Coakes and Steed (2001).

The individual paired survey forms were matched using the ticket numbers recorded on the form, and entered verbatim into Excel spreadsheets as were the post-visit only data. Each question in the survey was assigned a spreadsheet column and each row represented a particular respondent. The paired before and after experience data were entered on separate Excel work sheets with the form number used as identification to match individual respondents. The multiple choice responses were coded according to the alternatives available while open-ended responses were categorised according to key common terms used by respondents. All statistical tests were conducted at the standard significance level of $\alpha = 0.05$ using the SPSS v10 statistical software package. Results of significance were expressed quoting the test statistic, degrees of freedom (where appropriate) and the probability value (p value) to demonstrate a statistical difference.

Non-parametric tests were used for the majority of the data analysis as the survey data was mainly nominal and ordinal in nature. Nominal categorical data was compared using Chi-square analysis. This mainly provided indications of any significant relationships between the independent visitor variables. Cramer’s V test was used to assess the strength of association where Chi-square tests revealed significant relationships. Ordinal data such as rated responses and knowledge scores were also analysed using non-parametric tests. Paired comparative analysis of non-parametric data sets were conducted using Wilcoxon and Friedman tests and while comparison of independent data were carried out using Mann-Whitney U tests and Kruskal-Wallis H tests.
3.6.1 Environmental attitude analysis

The environmental attitude statements were comprised of two subsets. One subset represented attitudes toward the environment centred on perceptions of intrinsic ecological value (ecocentric). The second subset of statements reflected perceptions of the natural environment valued as a resource for human use (anthropocentric). Table 3.17 demonstrates the groupings of the statements into these two categories using the TTW environmental attitude scale as an example. The survey participants responded to the statements using a five point Likert rating scale ranging from ‘strongly agree’ (1) to ‘strongly disagree’ (5). (3) was designated as a neutral response. The rating of the human use statements were reversed to create a scale representing and ecocentric/anthropocentric spectrum.
Table 3.17: TTW survey environmental attitude scale statements grouped into Human use and intrinsic ecological value themes.

<table>
<thead>
<tr>
<th>Statements representing intrinsic ecological value</th>
<th>Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Conservation of nature is more important than the economic viability of the Valley of the Giants.</td>
<td>1(1) 2(2) 3(3) 4(4) 5(5)</td>
</tr>
<tr>
<td>• Ideally, humans should not be allowed to visit the Tingle Forest to ensure that it is not damaged or degraded.</td>
<td>1(1) 2(2) 3(3) 4(4) 5(5)</td>
</tr>
<tr>
<td>• The Tingle Trees should be protected whether or not they attract tourists.</td>
<td>1(1) 2(2) 3(3) 4(4) 5(5)</td>
</tr>
<tr>
<td>• The Tingle Forest is a very delicate environment and easily disturbed.</td>
<td>1(1) 2(2) 3(3) 4(4) 5(5)</td>
</tr>
<tr>
<td>• Human visitation severely disturbs the natural balance of the Tingle Forest.</td>
<td>1(1) 2(2) 3(3) 4(4) 5(5)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Statements representing human use</th>
<th>Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Recreation needs are more important than the needs of the forest and its wildlife.</td>
<td>1(5) 2(4) 3(3) 4(2) 5(1)</td>
</tr>
<tr>
<td>• Humans have a right to modify the forest to suit their needs.</td>
<td>1(5) 2(4) 3(3) 4(2) 5(1)</td>
</tr>
<tr>
<td>• The economic health of the local community should be given highest priority when making management decisions about the Tingle Forest.</td>
<td>1(5) 2(4) 3(3) 4(2) 5(1)</td>
</tr>
<tr>
<td>• The Valley of the Giants should be further developed to encourage more visitors to the area.</td>
<td>1(5) 2(4) 3(3) 4(2) 5(1)</td>
</tr>
<tr>
<td>• Jobs created by tourism are more important than conservation of forests and wildlife.</td>
<td>1(5) 2(4) 3(3) 4(2) 5(1)</td>
</tr>
</tbody>
</table>

*Ratings in brackets indicate scores allocated after reverse coding of anthropocentric responses.*

Attitude scores were calculated for the overall environmental attitude as well as scores for the human use and intrinsic ecological value subsets. This provided a general environmental attitude score but also broke the total score down into attitude responses to the concepts of the natural environment having intrinsic value and the natural environment valued as a resource for humans. Individual post visit scores were
deducted from their pre-visit counter parts to provide a change in attitude value for analysis.

3.6.2 Knowledge analysis

The knowledge scores of respondents were analysed by first adding the number of respective correct, incorrect and don’t know responses made by individuals. As the questions were based on information provided by on-site interpretive media, responses were deemed correct when they reflected the factual information provided by the source. Paired survey knowledge scores from before and after the experience were compared using paired non-parametric analysis while the number of correct, incorrect and don’t know responses were compared using independent non-parametric tests. As with the attitude scores, the knowledge scores achieved after the experience were deducted from the those before the experience to provide a change in knowledge value for comparative analysis at the individual respondent level.

3.6.3 Attitude to site experience

The analysis of attitude to the site as an experience was not intended to provide an overall score. Rather, each statement represents a certain aspect of interaction between the respondent and the natural area. The strength of response on the “strongly applies”, “does not apply at all” range indicated which of the aspects represented related to the respondent’s attitude to the site as a natural area experience. Completion of a paired survey immediately before and after the experience enabled any changes in response at the individual level to be detected. As with knowledge and environmental attitude, non-parametric paired and independent tests were used in the analysis of this data.

The character of the data resulting from the attitude to the site experience seemed suitable for Factor Analysis, a process commonly used in the literature in relation to grouped analysis of rated responses to related attitude statements. Consequently, Factor Analysis was investigated in relation to analysing the attitude to the site experience component of the survey. An extensive search of the literature and consultation with a professional statistician resulted in the conclusion that the process of Factor Analysis tended to raise more questions than it answered. Given the myriad ways in which Factor Analysis may first be conducted, then interpreted, this particular method was not used in this thesis.
The 1 – 5 response range used in the survey and analysis of attitude to site experience was graphically represented in the form of a -2 to +2 Y axis scale. Note that the graphical representation still includes five points (including zero) as did the original survey rating instrument. The data were graphically represented in this way so as to provide a clear visual distinction between the “strongly applies” (+2) and “doesn’t apply at all” (-2) responses. Data was converted from the survey values to graphical values by substituting 1, 2, 3, 4 and 5 with -2, -1, 0, 1, 2 respectively by deducting 3 from the rating given.

3.7 Limitations

The survey instrument was designed as a rapid assessment tool for application with minimal disruption to the visitor experience and to facilitate comparative analysis within and between sites. However, this design, together with aspects of the survey distribution resulted in a limited data set as explained in the following sections.

3.7.1 Representativeness of sample

The data was gathered from moderately small sample populations at two sites within Western Australia offering particular natural area experiences. As a result, data may not be accurately generalised across all circumstances where on-site interpretation may be experienced. In addition, the strictly Western Australian source of data may limit the extent to which comparisons may be made with other interstate and international destinations. Although the intent was to provide a comparison of two sites with relatively high and low intensities of interpretation and the subsequent impact on visitor attitudes and knowledge, caution must be taken if extrapolating these results to other experiences.

Surveys were mainly carried out during school holiday periods meaning data may not be representative of the total visitor population at the site over the course of a year. This research was not attempting to examine a representative sample of the entire population, but rather, obtain a statistically viable sample for the purposes of assessment of influence of interpretation in a case study context. However, as with the geographical limitations, caution should be taken if extrapolating the results to other sites.
It is likely that the ferry user population at Penguin Island was not representative of the general island visitor population. The primary reason for this assumption was that the island is quite close to the mainland and may be accessed easily by means other than the ferry. Casual observation indicated that many visitors accessed the island by foot across the sandbar, despite being discouraged by management owing to dangerous conditions, as well as by private water craft as indicated in the site description in section 3.1.2. Thus people not using the ferry were not represented by the survey where ferry users represented a particular type of visitor to the island. This visitor type was defined by the requirement to essentially pay an entry fee in the form of a ferry ticket while visitors using other means of access did not pay any entry fee.

While the sample population may not be representative of the wider Penguin Island population, it is comparable with the TTW population. Both groups are paying a fee to access the respective sites. Given that the cost of entry to the Penguin Experience is included in the ferry ticket, the sample populations from both sites are willingly paying for a particular nature based activity. The non-paying group present on Penguin Island was not present at the TTW site due to the main focus of this site being the TTW structure. Thus, in the context of this thesis, surveying Penguin Island ferry users provided a survey sample comparable with that of the TTW site. Surveying non-paying visitors types at Penguin Island would have provided data more representative of the general visitor population but irrelevant to the TTW site. Given that comparison of survey results between sites forms a significant aspect of this study and that the aim of this thesis was to explore the influence of varying intensities of interpretation and measurement of these influences (as opposed to generating a overview of visitor types and responses at each site) surveying the wider population of Penguin Island was deemed unnecessary.

The issue of non-response bias was not factored into the data analysis in this thesis. As with most survey exercises, a significant number of visitors refused to participate when approached at the sites. It may be possible that those who refused participation represent a distinct segment of the visitor population that was not represented by the data. In this way, the results of the surveys may be biased as they excluded a segment of the visitor population.
3.7.2 Data collection method

The method of data collection was limited to self-administered written surveys based largely on multiple choice questions as completion time was required to be kept to a minimum. Data gathered using multiple choice methods produces a particular type of data that may not readily provide underlying reasons for responses afforded by in-depth interviews, visitor group discussions and other methods of data gathering.

The use of an NEP style component with a Likert type rating method adapted from Jurowski et al (1995) and Manning (1999) to measure attitudes consists of a series of statements reflecting both human use and intrinsic ecological value centred attitudes. However, the rating method has limitations, primarily relating to the lack of weighting given to the statements being rated and the lack of access to the underlying reasons for the ratings given. Scaling is a significant issue as respective respondents may place varying degrees of importance on individual statements while the rating system used does not reflect this. Additionally, different respondents may view statements in varying contexts of significance that influence their rating. For example, a hypothetically anthropocentric respondent may rate conservation of a natural area as equally important as a ecocentric counterpart but for differing reasons. Thus the NEP scale provides a convenient and rapid sketch of a respondent’s attitude but affords a limited scope for analysis owing to a lack of depth in understanding the mental processes behind the rating of the statements. This poses particular problems if attempting to explain subsequent behaviour based on the attitudes measured. This research was not concerned with behavioural factors.

The quiz method of knowledge appraisal has limitations but has also been commonly used. Similar quiz style methods for measurement of knowledge were used by Burrus-Bammel (1978); Anderton (1997); Cole et al (1997) and Ballantyne et al (1998). These authors used such data to draw conclusions about the effectiveness of communication media and knowledge transferral. However, as with the attitude scale, the quiz approach does not provide for any indication of depth of understanding on the part of the visitor. That is, the knowledge quiz primarily assesses the ability for isolated factual recall of information communicated by on-site interpretation. In this sense, the knowledge quiz may be more a measure of how effective on-site media are at
communicating information to visitors as opposed to how effective the interpretation is at influencing attitudes and providing meaning.

There was also the possibility that survey participants shared information while completing the forms. This was possible owing to the circumstance whereby several people may be completing the same survey form at the same time. The necessity to gather the maximum amount of data with the given survey period required simultaneous completion of survey forms by a number of people. In combination with this, the context in which surveys were distributed made it difficult to isolate respondents from each other or prevent them communicating information without the researcher seeming rude and/or causing offence. Politeness and not offending respondents was additionally important owing to the voluntary nature of the survey participation.

As the knowledge quiz could be seen as a type of test by survey participants, getting the answers correct may have been considered to be important. Thus, where a respondent was unsure about the ‘correct’ response to a statement, they may have communicated with others completing the survey at the same time in order to obtain the desired information. In this way, respondents may have given correct responses in the knowledge quiz without having learned the information during their experience of the site.

Authors critical of quiz style assessments typically recommend in-depth discussions and presentation of hypothetical role-plays over a longer period of time to assess visitor knowledge and understanding. These techniques may reduce the sense (one the part of participants) of being tested and increases the quantity of data collected relating to the depth of understanding participants have and how the knowledge was acquired. However, Zinn (1998) noted that the time required for more involved methods acted as a disincentive for voluntary participation. The quantity of reading and the level of intellectual ability required to participate may bias the data towards participants with high levels of literacy in English and long concentration spans. Given these drawbacks, as well as the time constraints placed on the visitor surveys in this study, the quiz style format was deemed most appropriate.

Chapters 4 and 5 provide a description of the survey data collected from the TTW and Penguin Island respectively. Analyses of statistically significant relationships are
provided in relation to the research questions and divided into the sections of environmental attitudes, attitude to site experience and knowledge.
4 TTW Survey Results

This chapter presents data in two main parts: those from the preliminary survey and those from the principal survey. The preliminary survey data assisted in the content design of the principal survey as discussed in the methodology chapter. Results that were significant to the outcomes of the principal survey and the objectives of the research thesis are presented in the following section.

4.1 TTW Preliminary Survey Results

A preliminary survey to gather visitor data was carried out at the TTW during October 1999. The preliminary survey sought to gather information relating to visitor demographics, their reason for visiting the site and the aspects of the site that provided the greatest impression in the context of a low intensity use of interpretation. The data were then used to construct the multiple choice questions for the principal survey. Over the two week survey period, 385 surveys were completed (approximately 7% of the visitor population during that period). The preliminary survey had a refusal rate of 32%.

4.1.1 Summary of respondent characteristics

Table 4.1 details the independent variables of the preliminary respondent group. The data approximately follows that described in the Australian Bureau of Statistics (2002) data pertaining to national park visitation in Australia.
Table 4.1: Summary of respondent variables from preliminary TTW survey data

<table>
<thead>
<tr>
<th>Category</th>
<th>No.</th>
<th>%</th>
<th>Category</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td>TTW repeat visit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>female</td>
<td>203</td>
<td>52.7%</td>
<td>First time visit</td>
<td>315</td>
<td>81.8%</td>
</tr>
<tr>
<td>male</td>
<td>182</td>
<td>47.3%</td>
<td>Repeat visit</td>
<td>66</td>
<td>17.1%</td>
</tr>
<tr>
<td>Not stated</td>
<td>-</td>
<td>-</td>
<td>Not stated</td>
<td>4</td>
<td>1.0%</td>
</tr>
<tr>
<td>Total</td>
<td>385</td>
<td>100%</td>
<td>Total</td>
<td>385</td>
<td>100%</td>
</tr>
<tr>
<td>Age group (yrs)</td>
<td></td>
<td></td>
<td>Visiting with</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;15</td>
<td>7</td>
<td>1.8%</td>
<td>Friends</td>
<td>100</td>
<td>26.0%</td>
</tr>
<tr>
<td>15-24</td>
<td>38</td>
<td>9.9%</td>
<td>Family</td>
<td>148</td>
<td>38.4%</td>
</tr>
<tr>
<td>25-39</td>
<td>120</td>
<td>31.3%</td>
<td>Partner</td>
<td>115</td>
<td>29.9%</td>
</tr>
<tr>
<td>40-59</td>
<td>130</td>
<td>33.9%</td>
<td>Tour group</td>
<td>10</td>
<td>3.8%</td>
</tr>
<tr>
<td>60+</td>
<td>90</td>
<td>23.4%</td>
<td>Alone</td>
<td>8</td>
<td>2.1%</td>
</tr>
<tr>
<td>Not stated</td>
<td>-</td>
<td>-</td>
<td>Not stated</td>
<td>4</td>
<td>1.0%</td>
</tr>
<tr>
<td>Total</td>
<td>385</td>
<td>100%</td>
<td>Total</td>
<td>385</td>
<td>100%</td>
</tr>
<tr>
<td>Place of residence</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WA</td>
<td>155</td>
<td>40.7%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interstate</td>
<td>133</td>
<td>34.5%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>International</td>
<td>67</td>
<td>17.4%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not stated</td>
<td>32</td>
<td>8.0%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>385</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Slightly more females were surveyed than males while the most frequent age groups surveyed at the TTW site were between 25 and 59 years of age. This may reflect the family oriented nature of the site. Visitors under the age of 15 may be under represented in this survey as older companions generally accompanied them. There was a tendency for young group members to default to their older peers when completing the survey. That is, adults either took control of the survey or did not allow young members of the group to become involved.
The largest proportion of respondents resided within WA with interstate residents closely following in numbers. International visitors represented a significantly lower proportion in relation to local (Western Australian) and interstate residents.

The majority of respondents were with family groups, paralleling the national trend of social groups visiting national parks (ABS, 1999). The frequency of the “tour group” response may be an under-representation. Visitors taking part in bus tours, or other forms of tour groups, frequently did not wish to fill in the survey form due to time constraints. This resulted in the low frequency of the response. Anecdotal evidence suggested that up to 10 tour groups may visit the TTW site each day during peak periods. Tour group sizes seemed to range from 5 or 6 up to 50 individuals meaning several hundred people may visit the site as part of a tour group each day.

4.1.2 Main reason for visitation

Main reason for visitation was an open ended question to which the survey participant wrote a response. The reason given for visiting a natural area was suggestive of the meaning associated with place, how visitors interact with that place and are influenced by their experience. The most common responses were used to construct a multiple choice style question in the principal survey. Table 4.2 lists categories of responses given.

<table>
<thead>
<tr>
<th>Response Category</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Aspects</td>
<td>78</td>
<td>20.3%</td>
</tr>
<tr>
<td>Recommended</td>
<td>76</td>
<td>19.7%</td>
</tr>
<tr>
<td>It is a tourist attraction</td>
<td>67</td>
<td>17.4%</td>
</tr>
<tr>
<td>TTW structure</td>
<td>56</td>
<td>14.5%</td>
</tr>
<tr>
<td>Opportunistic visit</td>
<td>50</td>
<td>13.0%</td>
</tr>
<tr>
<td>Saw an advertisement</td>
<td>35</td>
<td>9.1%</td>
</tr>
<tr>
<td>To show others</td>
<td>35</td>
<td>9.1%</td>
</tr>
<tr>
<td>Wanted to see TTW again</td>
<td>4</td>
<td>1.0%</td>
</tr>
<tr>
<td>Not stated</td>
<td>8</td>
<td>2.1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>409</td>
<td>106%</td>
</tr>
</tbody>
</table>
The most frequent reasons for visitation related to the natural aspects of the site. This category included references to the Tingle trees, forest and/or wildlife seen during the experience. This is indicative of the site as a place for viewing natural phenomena with aesthetic appeal. The “Recommended” category referred to reasons based on a personal recommendation by family, friends or tourism industry related contacts. Identification of the site as a tourist attraction included cases in which this was specifically stated by the respondent. This category relates primarily to the promotion of the TTW through the media as an important tourism destination.

The “TTW structure” category included statements identifying this structure as a main reason for visitation. “Opportunistic visit” included respondents who indicated that they were ‘just passing through’ and decided on the spur of the moment to visit the site. In contrast to this, the “Saw an advertisement” referred to responses that specified visitation to the site was a direct result of being exposed to promotional material in the media. Responses included in the category ‘to show others’ were almost entirely provided by repeat visitors and focussed on bringing friends or family to see the site. Very few responses by repeat visitors were due to a specific wish to see the TTW site again.

Responses referring to recommendations or tourism attraction status were determined to be secondary type reasons. That is, recommendations or tourism attraction status probably centred on a particular aspect of the site. As this research is concerned with the influence of on-site variables, specific attributes of the natural area itself were of prime importance rather than external factors such as recommendations to visit. The specific attribute that was recommended or that provides its tourism attraction status was not specified. Therefore, these options were not included in the principal survey as they are ambiguous in the context of this research.

Significant differences in the main reason for visitation were found between the repeat visitor and first time visitor groups ($\chi^2 = 151.98, p < 0.001$). Almost half (43%) of repeat visitors stated that their main reason for visiting the site at the time of the survey was to bring friends or relatives (i.e. “show others” category in Table 4.2). The next most frequent response was to experience the TTW again (18.5%). First time visitors mainly stated their reason for visiting was to experience the natural aspects of the site (22%), or because friends, relatives or tourism agencies recommended the site (21%).
Of the first time visitors, 13% identified the TTW structure as the main motive for visitation. The differing reasons for visitation of first time and repeat visitors were consistent with findings in past studies identifying repeat visitors as a distinct group (Fakeye & Crompton, 1991; Meis et al, 1995; and Ballantyne et al, 1998).

4.1.3 Most remembered aspect of site experience.

This was an open ended question that invited respondents to write down what they most remembered about the site. In addressing this, the preliminary survey sought to ascertain the impact the TTW site had on visitors in terms of the aspect of the experience that most influenced respondents. This provided information regarding the most influential components of the site that may have the greatest effect on attitudes and knowledge. The responses were categorised as listed in Table 4.3. Respondents frequently listed two or more aspects of their visit thus the accumulated proportions of the responses total more than 100%.

<table>
<thead>
<tr>
<th>Response Category</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTW structure</td>
<td>121</td>
<td>31.4%</td>
</tr>
<tr>
<td>Trees</td>
<td>118</td>
<td>30.6%</td>
</tr>
<tr>
<td>Feelings/emotions invoked</td>
<td>74</td>
<td>19.2%</td>
</tr>
<tr>
<td>Scenic view</td>
<td>21</td>
<td>5.4%</td>
</tr>
<tr>
<td>Fear of TTW structure</td>
<td>19</td>
<td>4.9%</td>
</tr>
<tr>
<td>Wildlife</td>
<td>16</td>
<td>4.2%</td>
</tr>
<tr>
<td>Ancient Empire Walk</td>
<td>11</td>
<td>2.8%</td>
</tr>
<tr>
<td>Organised activities / entertainment</td>
<td>6</td>
<td>1.5%</td>
</tr>
<tr>
<td>Minimal impact design</td>
<td>1</td>
<td>0.3%</td>
</tr>
<tr>
<td>Not stated</td>
<td>30</td>
<td>7.8%</td>
</tr>
<tr>
<td>Total</td>
<td>417</td>
<td>108%</td>
</tr>
</tbody>
</table>

Statements referring to the “TTW structure” specifically were most frequent, followed by references to the “Trees”. These were generally expressed in terms of wonder at the scale of the trees and engineering feat of the TTW structure.
The “Feelings/emotions invoked” category included statements referring to sounds, smells and visual impacts as well as general statements of emotion. For example, “Feeling small”; “A sense of wonder….” and “The peace and tranquillity …” were included in the feelings/emotions invoked category along with statements such as “the damp smell…”; “the cool darkness…” and “the movement of the TTW”. All of these may be grouped as sensory experiences. Most of the responses to this question could be classified in the Hendee et al (1971) appreciative-symbolic category of natural area experience, except perhaps the impressions left by on-site entertainment activities. This category of Hendee et al (1971) would include Shafer’s (1969) earlier identified emotional and aesthetic visitor appreciation categories. Such impacts of the site indicated a connection made between respondents and the site at a more intimate level than appreciation of the scale of the trees or engineering achievements.

The “Scenic view” was also frequently commented on by respondents. At the highest point of the TTW structure, visitors can see over the forest canopy to farm land in the valleys below. The high point of the TTW also invoked fear amongst a minority of respondents as indicated by the “fear of TTW structure” category. Respondents in this category commonly expressed feelings of fear in relation to the swaying motion of the TTW structure while being a long way off the ground. Some respondents commented that they had a fear of heights and intentionally wanted to experience the TTW in order to challenge that fear.

The “Ancient Empire Walk”, “organised activities and entertainment” and the “minimal impact design” made up the smallest proportion of responses to this question. Entertainment included artists, musicians and other demonstration activities employed at the site while organised activities involve children’s art and face painting as well as guided walks and talks during holiday periods. The low profile of the Ancient Empire Walk (AEW) is in contrast to the higher profile TTW structure indicating the dominance of the TTW in terms of the site design.

Perhaps in direct relation to the differing reasons for visitation Repeat visitor and first time visitor groups were also left with significantly different impressions of the site ($X^2 = 11.96, p<0.05$). The repeat visitor group indicated mainly natural aspects of the site (“Trees”, “Scenic view” and “Wildlife”) as being most memorable, collectively making up 48.5% of repeat visitor responses. The second most frequently mentioned aspect by
repat visitors, the TTW structure, was considerably less common (21.2%). First time visitor respondents were relatively evenly divided between natural aspects of the site (collectively 39%) and the TTW structure (34%). This highlights differences between repeat and first time visitors in terms of their perceptions of the site.

The greater focus of the repeat visitor group on natural aspects probably related to familiarity with the structural aspects of the site in conjunction with the low intensity of interpretation creating an absence of supplementary experiences. Repeat visitors are likely to be accustomed to the TTW structure and thus, are less inclined to explore its biophysical and/or engineering nuances. In addition, the low intensity of interpretation means that there are no other experiences available at the site apart from observing the surrounding forest and the experience of first time visitor companions. As the both the TTW structure and forest were new experiences for first time visitors, their attention seems to have been divided between the novelty of the structure and interest in the surrounding forest.

This finding is of interest in terms of the role of the TTW site with a low intensity interpretation strategy. A low level of interpretation may correlate with reduced influence on the part of repeat visitors. Incidental discussion with site staff also indicated that the interpretation that was installed at the site generally remained unchanged for a considerable amount of time. This suggests that there is nothing ‘new’ for repeat visitors to experience on return to the site. In addition, the management agency stated that the TTW structure itself was intended as the central interpretive experience (Field & Gough, 1998). While the TTW structure served as a major component of the experience for first time visitors, repeat visitors appeared to be less interested, returning mainly to expose new visitors to the unique thrill. Thus it appears that the role of the TTW structure in providing a provocative experience is less effective with repeat visitation.

4.1.4 Suggested improvements to TTW site

This was an open-ended question in the preliminary survey requesting that respondents suggest improvements to the site they considered were required. The responses to this question were categorised as detailed in Table 4.4. A “None required” response was counted if the visitor specifically indicated no improvements were needed. Respondents
may suggest more than one type of improvement meaning the frequency of the categories in Table 4.4 add up to more than 100%.

Table 4.4: Preliminary survey suggested improvements to TTW site.

<table>
<thead>
<tr>
<th>Response Category</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>None required</td>
<td>149</td>
<td>38.7%</td>
</tr>
<tr>
<td>More information</td>
<td>92</td>
<td>24.0%</td>
</tr>
<tr>
<td>Alter design of site</td>
<td>43</td>
<td>11.1%</td>
</tr>
<tr>
<td>Provide café / food kiosk</td>
<td>35</td>
<td>9.1%</td>
</tr>
<tr>
<td>Better crowd control</td>
<td>24</td>
<td>6.2%</td>
</tr>
<tr>
<td>Provide picnic / BBQ facilities</td>
<td>8</td>
<td>2.1%</td>
</tr>
<tr>
<td>Improve ablution hygiene</td>
<td>7</td>
<td>1.8%</td>
</tr>
<tr>
<td>Provide night tours</td>
<td>6</td>
<td>1.5%</td>
</tr>
<tr>
<td>Not Stated</td>
<td>68</td>
<td>17.7%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>432</td>
<td>112.2%</td>
</tr>
</tbody>
</table>

The “None required” category demonstrates that the most frequent response to this question was that no improvements were necessary. This indicated the majority of respondents considered that site adequate in terms of their expectations and/or were unable to make suggestions due to a limited frame of reference or limited experience.

“More information” was the next most frequent response. This category primarily consisted of comments that more signs were needed along the walk trails to provide information about the ecology and biology of the forest. A small proportion of comments suggested alternate media such as audio guides, hands-on displays and video presentations in the Tingle Shelter. The fact that this was the most frequent suggestion for improvement (not including the “None required” response) has direct relevance to the low intensity of interpretation on which the site design was based. Respondents seemed aware of this and responded with suggestions for a higher intensity mainly in the form of text based media such as trail side signs. Table 4.5 breaks down the “More information” category of suggested improvements to the site (n=92) into media types referred to in the respondents’ comments.
Table 4.5: Media types mentioned by respondents suggesting the need for more information in the preliminary TTW survey (n=92)

<table>
<thead>
<tr>
<th>Suggested Media</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>More trail-side signs</td>
<td>48</td>
<td>52.2%</td>
</tr>
<tr>
<td>Guide</td>
<td>6</td>
<td>6.5%</td>
</tr>
<tr>
<td>Photographs/pictures</td>
<td>4</td>
<td>4.3%</td>
</tr>
<tr>
<td>Audio</td>
<td>3</td>
<td>2.2%</td>
</tr>
<tr>
<td>Hands-on display</td>
<td>3</td>
<td>2.2%</td>
</tr>
<tr>
<td>Not specified</td>
<td>28</td>
<td>34.8%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>92</td>
<td>100%</td>
</tr>
</tbody>
</table>

It was interesting to note that while a few respondents suggested installation of photographic or hands-on interpretive media, the vast majority of suggestions were based on the installation of additional text based interpretation, particularly in the form of trail-side signs. This usually referred to signs with names and statistics in relation to flora and fauna though there were some suggestions for information relating to indigenous heritage as well as the TTW engineering and construction details. While a few respondents specifically suggested other media types, most of those who did not suggest more signs did not specify any particular media type at all. These respondents simply suggested more information was needed in regard to a particular theme or topic. The demand for more trail-side signs appears to work against the management intention of allowing the experience of the forest speak for itself, the underlying reasoning behind use of a low intensity of interpretation (Field & Gough, 1998).

The “Alter design of site” response category, in Table 4.4, included statements such as “Painting the TTW structure to better blend with the forest...” and making the walks longer. Other references were made to providing a larger car park, situating the car park further away from the walk trails and providing more walking tracks. A minority of visitors suggested food and beverage facilities in the form of a café, kiosk or vending machines. The least frequent responses were suggestions for BBQ or picnic facilities at the site and improved hygiene either through provision of more garbage bins or cleaner toilets.
A few suggestions were made regarding provision of night time tours of the site. Such tours are conducted during holiday periods. Participants must pre-book and have a group size of at least 10. Those respondents suggesting this as an improvement may not have been aware that night tours were already being conducted. This may be because they either had not seen any promotional material with regards to the night tours or that the promotion of such tours was low key.

Interestingly, although repeat visitor respondents demonstrated distinct differences in reasons for visitation and impressions of the site, there were no significant differences relating to suggested improvements to the site. This may be because the focus of repeat visitor respondents was on enabling family and friends to experience the site such that the site experience itself was personally less important. Alternately, people who have chosen to return to the TTW site may be happy with the way in which the site is designed and presented while their counterparts are less likely to return. That is, repeat visitors are willing to show the site to others as they consider it to be a good experience and generally did not significantly differ from the rest of the population in terms of suggested improvements.

4.1.5 Preliminary survey conclusion

The singular experiential nature of the TTW site coupled with a low intensity of interpretation appeared to cater mainly for first time visitors rather than repeat visitors. Repeat visitors already acquainted with the site appear to seek other sources of inspiration. This may be in the form of social interaction, that is, witnessing the reaction of first time visitors accompanied to the site. As the TTW site offers a predominantly exploration, observation and learning experience of the forest, social aspects form a secondary function centred on these activities. Alternately, repeat visitors appear to seek inspiration through concentrating on the natural surroundings, in which case the built aspects of the TTW site are redundant as an enriching aspect of the attraction.

The common suggestion by respondents that more information was needed at the site (mainly in the form of interpretive signs) relates directly to the low key approach to interpretation adopted by the management agency. Respondents were apparently struck by the minimalist interpretation with comments suggesting that a higher intensity than
provided at the TTW site was preferred. This finding formed the basis for the sign trial during the principal survey period. The results of addition of more signs along the TTW structure itself are presented in section 4.6.

The most common responses to the open ended preliminary survey questions provided a guide for the construction of the principal survey multiple choice options. As the principal survey focused on the site specific influences on respondents, only site specific responses in the preliminary survey were used to guide provision of multiple choice options. For example, main reasons given for visiting the site included responses referring to the TTW structure and trees, which were included in the multiple choice version of this question in the principal survey. However, the response in the preliminary survey also included references to recommendations by friends or tourism agencies, advertisements and other non-site specific reasons. These were not included in the multiple choice options. A similar approach was used for other aspects of the principal survey. The results are presented in the following section.

### 4.2 Principal Survey

The intent of the principal survey was to assess whether the site experience measurably influenced attitudes and knowledge of respondents experiencing a low intensity of interpretation. There was no intent of generalising the data to make conclusions about the impacts of the site on the whole visitor population. Thus, a statistically viable number of responses were collected for comparative analysis of survey participants rather than a representative sample of the visitor population. This is also discussed in the methodology chapter’s limitations section 3.9.

The principal survey was carried out in January, February and December of 2001 and in March 2002. Approximately 20 to 30 paired surveys were collected per day depending on the number of visitors to the site and their willingness to participate. While the site opened at 9am, visitors tended to start arriving at approximately 10am and waning at about 2pm. This meant that most data were collected between 10am and 2-3pm each day. In all, 443 individuals were approached with a total of 261 paired surveys completed by visitors to the TTW site. The refusal rate was 41% of those approached. A further 108 post-visit only surveys were completed to test for any reactivity bias resulting from the paired survey method. The refusal rate for the post-visit only surveys was lower than that of the paired survey group, at 31%. This was probably owing to the
lesser time commitment required to complete a single survey after the experience rather
than completing a paired survey both before and after the experience.

4.2.1 Reactivity bias

The possibility that the paired survey instrument itself may act as a factor in influencing
visitor responses was tested by comparing the paired survey group with a post-visit only
group. The results from the post-visit only survey group were compared with the paired
survey completed after the experience using Mann-Whitney U tests for comparison of
independent sets of ordinal data at the 0.05 significance level. The lack of any
significant difference in response to the environmental attitude scale, knowledge scores
and attitude to the site experience between the two groups indicated that the paired
survey methodological design did not significantly influence the data. Results from
comparison of environmental attitude scores, knowledge scores and attitude to the site
experience scores are detailed below.

Knowledge

Knowledge scores were compared between the post-visit only group and the paired
surveys completed after the site experience. The number of “correct”, “incorrect” and
“don’t know” responses were compared using a Mann-Whitney U test for each. Table
4.6 details the test statistics (z score) and p values resulting from the statistical
comparison of each of these scores between the two groups.

Table 4.6: Test statistics resulting from comparison of knowledge scores between post-visit only and
paired surveys at the TTW site

<table>
<thead>
<tr>
<th>Quiz Responses</th>
<th>Mann-Whitney Tests</th>
<th>α = 0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>z score</td>
<td>P value</td>
</tr>
<tr>
<td>Correct</td>
<td>-1.43</td>
<td>0.15</td>
</tr>
<tr>
<td>Incorrect</td>
<td>-1.25</td>
<td>0.21</td>
</tr>
<tr>
<td>Don’t Know</td>
<td>-0.62</td>
<td>0.54</td>
</tr>
</tbody>
</table>

The lack of significant difference between the post-visit only group and paired survey
knowledge scores, as indicated by all p values being greater than the 0.05 significance
level of the test, indicated completion of the paired survey before experience the site did
not significantly bias the knowledge quiz responses after visiting the site.
Environmental Attitude

As with the knowledge scores, environmental attitude response was tested for reactivity bias through comparison of post-visit only data and the data obtained from the paired survey completed after the site experience. Figure 4.1 details the mean responses for each group with error bars representing the standard error of the mean. The graphical representation suggests no difference between the post-visit only and paired survey data.

Table 4.7 details the results of statistical comparison of environmental attitude data from the post-visit only and paired survey groups. Mann-Whitney U tests were used to compare the “Human use”, “Intrinsic ecological value” and “Total” scores between each group. The test statistics (z score) and p values for each of these comparisons are presented.

**Figure 4.1**: Mean environmental attitude scores as compared between the post-visit only and paired surveys after experiencing the TTW site.
Table 4.7: Mann-Whitney test statistics resulting from comparison of post-visit only and paired survey environmental attitude scores after experiencing TTW site.

<table>
<thead>
<tr>
<th>Environmental Attitude Scores</th>
<th>Mann-Whitney Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\alpha = 0.05$</td>
</tr>
<tr>
<td></td>
<td>$z$ score</td>
</tr>
<tr>
<td>Human use</td>
<td>-0.77</td>
</tr>
<tr>
<td>Intrinsic eco value</td>
<td>-1.33</td>
</tr>
<tr>
<td>Total score</td>
<td>-0.52</td>
</tr>
</tbody>
</table>

The results from the statistical comparison of the post-visit only and paired survey groups demonstrate a lack of significant difference in the data. This is indicated by the $p$ values being greater than the 0.05 significance level at which the statistical tests were conducted. Thus, environmental attitude responses in the paired survey completed after the site experience were not significantly influenced by the survey completed before the experience.

*Attitude to Site Experience*

As with the environmental attitude responses and the knowledge quiz, a statistical comparison was made in relation to the attitude to the site experience between the post-visit only group and the paired survey data completed after the site experience. Figure 4.2 illustrates the mean response of each group to the aspects included in the attitude to the site experience question with error bars representing the standard error of the mean. The graphic representation of the data suggested there was no significant difference between the post-visit only and paired survey groups.
Figure 4.2: Comparison of rating of attitude to site experience between paired survey and post-visit only groups at the TTW site

Table 4.8 details the results of statistical comparison of the attitude to the site experience data from the post-visit only and paired survey groups. Mann-Whitney U tests were used to compare each of the aspects included in this component of the survey between the two groups. The test statistics (z score) and p values for each of these comparisons are presented.

Table 4.8: Mann-Whitney U test z-scores and p values of site attitude responses at the \( \alpha = 0.05 \) level

<table>
<thead>
<tr>
<th>Site Attitude Statements</th>
<th>Mann-Whitney Tests ( \alpha = 0.05 )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>z score</td>
</tr>
<tr>
<td>Beauty of forest</td>
<td>-1.06</td>
</tr>
<tr>
<td>Learn about forest</td>
<td>-1.03</td>
</tr>
<tr>
<td>Recreate in forest</td>
<td>-0.50</td>
</tr>
<tr>
<td>Pristine forest</td>
<td>-1.17</td>
</tr>
<tr>
<td>Inspired by forest</td>
<td>-0.86</td>
</tr>
<tr>
<td>Help protect forest</td>
<td>-1.82</td>
</tr>
<tr>
<td>Human enhanced forest</td>
<td>-1.12</td>
</tr>
<tr>
<td>Rejuvenate wellbeing</td>
<td>-1.07</td>
</tr>
<tr>
<td>Spiritual meaning</td>
<td>-1.26</td>
</tr>
</tbody>
</table>

All of the p values were greater than the significance level of 0.05 at which the tests were carried out. This demonstrates that there were no significant differences in the
data as compared between the post-visit only and paired survey groups. This suggests that completion of the paired survey form before the experience of the site did not significantly influence responses the survey after experiencing the site.

The comparison of environmental attitude, knowledge and attitude to the site experience data between the post-visit only group and paired survey forms completed after the site experience confirmed that the paired survey methodology did not result in any significant reactivity bias.

4.2.2 Descriptive statistics

The following section describes the responses to the independent visitor variables. Where appropriate, significant relationships between the data are highlighted. This generally explained some of the patterns and variation in the responses to the survey questions as opposed to any on-site influences. Paired survey data relating to the impact of the site experience are dealt with in subsequent sections of this chapter that address the research questions.

Demographic Variables

Table 4.9 summarises the demographic variables of the paired survey group. Some significant relationships between these variables were evident. These in turn were found to be related to how the site influenced responses to the attitude and knowledge components of the paired survey.
The number of respondents in the principal survey indicating repeat visitation to the TTW site comprised 13%. As with the preliminary survey repeat visitors discussed earlier, most of the repeat visitors to the TTW were returning primarily to show the site to friends or family rather than to experience the site again for themselves. Of those
completing the survey, the 25-39 age group was most frequent followed by the 40-59 group. This result is in approximate keeping with the Australian Bureau of Statistics data where the most frequent age of visitors to national parks in 1996-97 was between 25 and 44 years of age (ABS, 2002). The absence of people less than 15 years of age was due mainly to their adult companions excluding them from completing the survey or a lack of interest as explained in the preliminary survey results. Subsequently, the <15 years age group is not fully represented.

The largest proportion of respondents resided in Western Australia while International visitors comprised the second largest group with interstate residents making up the smallest proportion. While the proportion of respondents residing in WA was approximately equal to the preliminary study results, the relative proportion of interstate and international visitors was reversed. This change was consistent with an unpublished place of residence survey carried out by CALM staff at the TTW where a rise in international visitors and decline in interstate visitors to the site was noted (Burslem, 2001).

The “visiting with” question refers to whom the respondent is accompanied by on their visit to the site and indicated the social context in which the site was experienced. Occasionally, some respondents were visiting with both friends and family and subsequently selected the most appropriate response according to who made up the majority of the group. Those visiting with family may also have partners or spouses, this category was selected only if visiting with a partner or spouse and no other family members. Most respondents were visiting with family or friends while those visiting with partners made up the significant remainder of the respondents. This was similar to the TTW preliminary survey results discussed previously. As with the preliminary survey, the tour group category in the principal survey may be under represented as strict time constraints limited the opportunities for completion of surveys before tour buses departed.

It appeared that females in family groups were more willing to complete surveys forms than males. This was indicated by a significant relationship between social context of visit and gender using Chi-square analysis ($\chi^2 = 11.10$, df = 5, p<0.05). Cramer’s strength of association statistic indicates this to be a moderately strong relationship (Cramer’s V = 0.401). As most visitors were family groups, and most family groups
were comprised of male and female members, the significant relationship between gender and social context suggested that female members were more likely to complete surveys than males when both were given the opportunity.

Visitors were asked to indicate the average number of separate trips they take from home to visit natural areas in an average calendar year (January to December). Having a majority of survey respondents who indicated some level of regular natural area visitation was to be expected when surveying at a natural area attraction. Of interest is the proportion of visitors who indicated they do not usually visit natural areas (8%) but have chosen to visit the TTW site. This group represents a section of the community who are not usually exposed to interpretive messages in the specific context of a natural area experience. The high profile nature of the TTW site coupled with the relative ease of access may be a key factor in attracting those not normally associated with natural area attractions.

4.2.3 Reason for visitation

Visitors were presented with a multiple choice question presenting four reasons for visitation, derived from the preliminary survey. The options related to the most popular site characteristics indicated in the preliminary survey data, of which respondents selected any combination. As well as the four options, an “other” response was included to allow for the opportunity for respondents to write their own specific reason if required (Table 4.10). As respondents were able to select more than one option, the total number of responses was greater than the total number of respondents. The percentages represent the proportion of the actual number of survey participants (n=261).
Table 4.10: Main reasons indicated for visit to TTW Site by principal survey participants.

<table>
<thead>
<tr>
<th>Reason Given for Visitation</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>To experience TTW</td>
<td>195</td>
<td>74.7%</td>
</tr>
<tr>
<td>To experience trees/nature</td>
<td>138</td>
<td>52.9%</td>
</tr>
<tr>
<td>To show TTW to others</td>
<td>25</td>
<td>9.6%</td>
</tr>
<tr>
<td>To show trees/nature to others</td>
<td>16</td>
<td>6.1%</td>
</tr>
<tr>
<td>Other reasons</td>
<td>8</td>
<td>3.1%</td>
</tr>
<tr>
<td>Not Stated</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>382</td>
<td>146%</td>
</tr>
</tbody>
</table>

When prompted to nominate aspects of the site in relation to reasons for visitation, most respondents indicated that the TTW structure was the primary reason. Second to this was the large trees or other natural characteristics of the site. This suggested that the TTW structure itself functioned as the primary feature attracting respondents while the forest formed a significant but secondary aspect amongst respondents. The “Other reasons” category included responses such as “just passing through”; “something to do” or “I was in the area” and suggested an opportunistic visit perhaps out of curiosity rather than being attracted by particular specific features of the site.

### 4.2.4 Interpretive media used by TTW respondents

A multiple choice question was used to ascertain what interpretive media respondents used while at the site (Table 4.11). Selection was made from an inventory of the interpretive media sources provided at the site with an “other” option of adding their own response if desired. The “other” category includes travel guide publications such as the *Lonely Planet* and *Let’s Go*...that have entries about the TTW site in them. Respondents were able to select as many options as they deemed appropriate in the context of their experience of the TTW site. This meant that the number and percentages of responses add up to more than 100% of the number of survey participants (n=261).
Table 4.11: Principal survey interpretive media types used by respondents at the TTW site

<table>
<thead>
<tr>
<th>Medium</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trail-side signs</td>
<td>203</td>
<td>78.1%</td>
</tr>
<tr>
<td>Information display</td>
<td>151</td>
<td>58.1%</td>
</tr>
<tr>
<td>Sales staff</td>
<td>24</td>
<td>9.2%</td>
</tr>
<tr>
<td>Pamphlets</td>
<td>22</td>
<td>8.5%</td>
</tr>
<tr>
<td>None</td>
<td>8</td>
<td>3.1%</td>
</tr>
<tr>
<td>Guide</td>
<td>7</td>
<td>2.7%</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>1.2%</td>
</tr>
<tr>
<td>Not stated</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>418</td>
<td>160.1%</td>
</tr>
</tbody>
</table>

Most respondents indicated they used the trail-side signs available at the site while slightly less indicated use of the information displays. Other sources of information were used in a relatively minor way while a small portion of respondents indicated they did not use any information sources while at the site. The high proportion of information display and trail-side sign use reflects the low key approach to communication adopted by the site. Text based signs and displays were the major medium used for interpretation at the site.

4.2.5 Walk trail participation

Activities at the TTW site were primarily divided into the two distinct walk trails, the TTW and the Ancient Empire Walk (AEW). While visitors were also given the opportunity to participate in an “Under the TTW Walk”, none of the respondents indicated involvement in this activity. Table 4.12 illustrates the proportions of respondents in each category.
Table 4.12: Activities undertaken by respondents while at the TTW site

<table>
<thead>
<tr>
<th>Activity</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTW &amp; AEW</td>
<td>210</td>
<td>80.8%</td>
</tr>
<tr>
<td>TTW only</td>
<td>43</td>
<td>16.5%</td>
</tr>
<tr>
<td>AEW only</td>
<td>5</td>
<td>1.9%</td>
</tr>
<tr>
<td>Not stated</td>
<td>3</td>
<td>1.1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>261</td>
<td>100%</td>
</tr>
</tbody>
</table>

The vast majority of respondents indicated they experienced both the TTW and the AEW (“TTW & AEW”) while a significant number only experienced the TTW and not the AEW (“TTW only”). Few respondents indicated experiencing the AEW and not the TTW (“AEW only”). This may be a function of the TTW being the central attraction at the site, as indicated by the dominance of the structure in the main reason given for visitation. Anecdotal evidence suggested respondents indicating use of the AEW only were generally individuals who were afraid of heights and were visiting with others who wished to experience the TTW.

It is interesting to note that the AEW has no entry fee while the TTW does but the data indicates that the majority of respondents were willing to pay for the TTW experience rather than partake in the free AEW experience alone. The significance of paying for an experience lies in the meaning a natural area visitor draws from the site as discussed in the introduction chapter section 1.2. That is, paying visitors may have higher expectations with regard to the experience and may also tend to treat the natural area as a commodity rather than something to connect with and derive personal meaning from.

4.3 Influence of Low Intensity Interpretation on Attitudes and Knowledge

The TTW site experience, with a low intensity of interpretation, appeared to have a significant influence on respondent attitudes and knowledge. Environmental attitude of paired survey participants significantly changed with regards to increased agreement with ecocentric concepts in the NEP scale. Knowledge about the forest was also significantly increased after the site experience. In terms of the attitude toward the site as a natural area experience, there were significant changes in response to some of the statements; either becoming more applicable to the respondent’s experience or in some cases less applicable.
Several independent variables were significantly associated with environmental attitude and attitudes toward the site experience. Variables such as gender and past experience in natural areas were significantly related to the more emotive perceptions of the site experience as well as anthropocentric components of environmental attitude. There appeared to be no relationship between the various respondent variables and knowledge or change in knowledge. There was also no difference between repeat and first time visitor responses to these aspects. These variables are discussed in turn.

4.3.1 Environmental attitude

Paired survey participants demonstrated predominantly ecocentric attitude responses to the human use and intrinsic ecological value components of the attitude scale. Consequently, the overall environmental attitude was on average, ecocentric. Figure 4.3 illustrates the respective mean responses for the human use and intrinsic ecological value statements as well as the total environmental attitude score. The error bars represent the standard error of the mean. Respondents were significantly more ecocentric in their response to the human use statements than the intrinsic ecological value statements in the survey responses before experiencing the site ($z = -8.68$, $p<0.01$). That is, while respondents appeared to disagree with unabated use of the forest purely for human benefit, they were less inclined to view the forest solely for its intrinsic value.
Figure 4.3: Mean paired survey response to environmental attitude statements before experiencing the TTW site.

Figure 4.4: Mean response to environmental attitude statements after experiencing the TTW site.
Paired tests comparing the mean responses before and after experiencing the TTW site, using Wilcoxon signed ranks at the $\alpha = 0.05$ level, indicated significant mean change in the attitude response to the intrinsic ecological value statements in the responses after the site experience ($z = -2.03; p<0.05$). However, there was no significant change in the attitude response to the human use statements or in the total attitude score. This suggested that the TTW site influenced the respondents environmental attitude in terms of intrinsic ecological value but did not influence attitudes towards the human use of the forest.

The paired survey data enabled calculation of the change between individual pre and post visit responses, allowing analysis of mean change in response based on the mean individual response difference between the paired survey forms. This provided a more accurate assessment of the change in attitude response as it takes into account contrary changes masked by the overall mean differences. Figure 4.5 illustrates the mean change in individual environmental attitude responses.

![Mean Change in Response](image)

**Figure 4.5: Mean individually calculated change in response to attitude statements at the TTW site**

This data suggested that responses to the human use, intrinsic ecological value statements underwent an ecocentric shift after the TTW site experience as did the total environmental attitude. Analysis using a one sample Kolmogorov-Smirnov test
demonstrated that the distributions for the data were normal enabling one sample T-tests to be conducted to assess whether the changes were actually significant (Table 4.13). A single sample T-test (using 0 as the test value) was used to ascertain whether the changes for each of “Intrinsic ecological value”, “Human use” and “Total” environmental attitude score were significantly greater than 0.

Table 4.13: Results of K-S test for normal distribution and a 1 sample T-test of change in environmental attitude response after experiencing the TTW site.

<table>
<thead>
<tr>
<th>Attitude Statements</th>
<th>1 sample K-S</th>
<th>1 sample T-test (test value = 0)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>K-S z value</td>
<td>p value</td>
</tr>
<tr>
<td>Human Use</td>
<td>1.14</td>
<td>0.16</td>
</tr>
<tr>
<td>Intrinsic Ecological Value</td>
<td>1.15</td>
<td>0.14</td>
</tr>
<tr>
<td>Total Attitude Score</td>
<td>1.21</td>
<td>0.11</td>
</tr>
</tbody>
</table>

The results of the T-test indicate that the individually calculated change in scores for the “Human use”, “Intrinsic ecological value” and “Total” environmental attitude scores were significantly greater than zero. Thus it appears that respondents had an ecocentric shift in all three aspects of environmental attitude immediately after experiencing the TTW site.

Past studies have suggested that the most effective means of altering attitudes is to specifically target messages and media at identifiable sub groups within the visitor population (McArthur and Hall, 1993b; Magill, 1995; Ballantyne et al, 1998). The media used at the TTW site is low intensity, fairly generic and does not appear to be targeting anyone in particular. Field & Gough (1998) mentioned that the low intensity use of communication media such as signs and guides allows the TTW site to ‘speak’ for itself. In other words, respondents are encouraged to interact with the site and its natural surroundings in their own terms without the external influence of management attitudes and values inevitably expressed through on-site communicative media. Like specifically targeted communication media, minimal or prudent use of media may also effectively work to encourage exploration, discovery and ultimately a personal interaction with the site (Roggenbuck, 1992; Bramwell and Lane, 1993).

The shift in respondent attitudes towards a greater empathy for the intrinsic value of the forest seems to support the minimal use of media promoted by Roggenbuck (1992),
Bramwell and Lane (1993) and Howard (1998). Therefore, while Ballantyne (1998) and Uzzell (1998) suggest low intensity use of on-site interpretation may raise questions relating to the potential for influencing visitors, this does not appear to be the case in the context of the shift in ecocentric attitudes toward the natural environment at this site.

The following sections examine the respondent variables found to be significantly related to environmental attitude response. Gender appeared to relate to responses to ecocentric concepts while past experience in natural areas related to responses to anthropocentric concepts. Analysis also revealed what appeared to be significant links between aspects of the environmental attitude score and motivation for visitation. Combined analysis reveals no significant interactions between the various respondent variables.

**Gender and Environmental Attitude**

There was no significant difference between responses of males and females to the environmental attitude statements before experiencing the site (Figure 4.6). Both responded significantly more ecocentrically to the human use statements of attitude than the intrinsic ecological value statements.
Figure 4.6: Mean paired survey response to environmental attitude statements before experiencing the TTW site according to gender.

Figure 4.7 illustrates that females had a significantly more ecocentric response to the intrinsic ecological value statements than males after the TTW site experience ($z = -2.66, p<0.01$). However, both males and females demonstrated a significantly greater ecocentric response to the human use statements than the intrinsic ecological value statements ($z = -7.97, p<0.01$). As the responses before the site experience showed no significant difference between male and females, responses of males and females after the site experience appear to be a result of differing influences of the site on the respective genders.
Figure 4.7: Mean paired survey response to environmental attitude statements after the site experience according to gender.

Figure 4.8 illustrates females had a significantly greater change toward the ecocentric end of the attitude scale in response to the “Intrinsic ecological value” statements and the total attitude scores than did males (intrinsic value change $z = -2.07$; total attitude change $z = -2.16$, $p<0.05$). Male respondents exhibited no significant change in response after experiencing the site. This suggested that females were more receptive to appreciation of the intrinsic value of the forest as a natural environment during the TTW site experience.
The gender attitude results may be related to social influences where females had a greater tendency than males to empathise with, or be more receptive to, ecological issues. As intimating in the preliminary survey results, past research has identified a relationship between socio-demographics and environmental attitudes. This work indicated that the tendency of females to have a greater empathy toward the natural environment than males is a socially learned behaviour (Dunlap and Hefferenan, 1975; Arcury, 1990). A greater willingness to express emotional feelings on the part of females may explain the difference with males who are less likely to admit to ‘effeminate’ views such as empathy for natural settings (Xu & Bengston, 1997). The lack of significant difference in response to the anthropocentric, or masculine, view of nature highlights this point.

Several possibilities arise from these considerations; firstly, males may have altered their perceptions of the intrinsic value of nature expressed in the ecocentric statements but were unable or unwilling to admit to such feelings. Or secondly, males may be rendered impermeable to the appreciation of nature, or feminine insights, due to social conditioning cancelling such responses. On the other hand, females may be more prone to social desirability bias and express greater concern for the natural environment based on the premise that this is ‘the right answer’.
Natural Area Visitation and Environmental Attitude

The extent of natural area visitation as indicated by survey participants was found to be significantly related to the environmental attitude response. More specifically, the attitude response to the human use statements before experiencing the TTW site was significantly related to frequency of natural area visitation ($\chi^2 = 11.97$, $p<0.01$).

![Figure 4.9: Response to environmental attitude statements before experiencing the TTW site according to annual natural area visitation frequency.](image)

The primary significant difference relates to the “>12” visitation group demonstrating a significantly greater ecocentric response to the human use attitude statements as compared with the remaining groups (Figure 4.9). Natural area visitation frequency groups below the “>12” category were not significantly different to the “none” group in response to the human use statements. There was no significant difference between any of the groups in the pre-visit response to the intrinsic ecological value attitude statements or the total attitude scores.

The response of the “>12” natural area visitation group to the human use statements was also significantly more ecocentric than the remaining groups after the experience of the site ($\chi^2 = 14.95$, $p<0.01$). There was no significant difference between the groups
in terms of the intrinsic ecological value statements or the total attitude score. This result mirrors the response before experiencing the site (Figure 4.10).

![Relative Response Scale](image)

**Figure 4.10: Post visit response to environmental attitude statements according to annual frequency of natural area visitation.**

In terms of change in response to the environmental attitude statements, the “6-12” and “>12” groups demonstrated a significant ecocentric shift in response to the human use and intrinsic ecological value statements after experiencing the site while the remaining groups had no significant alteration (Figure 4.11). However, statistical examination of the magnitude of change in response reveals no significant difference between the groups mainly due to the variation in response within each group as indicated by the error bars. This may be a product of the division of the survey sample into group too small for statistical relationships to be discerned.
Figure 4.11: Change in response to TTW survey environmental attitude statements according to natural area visitation frequency.

Respondents indicating a greater frequency of annual natural area visitation must have more accumulated experience in natural areas than those indicating a lesser frequency. In order for individuals to voluntarily and repeatedly return to experience natural environments for recreational purposes, as indicated by the annual visitation frequency, those individuals must view such experiences in a positive light (Bixler & Floyd, 1997; Oppermann, 1998). Attitudes toward a given environment are influenced by past experiences with that environment (Maslow, 1968; McGuire, 1985). Thus, it may be assumed that accumulated positive experience in natural areas may have a significant positive influence on attitudes toward the natural environment (Hammit, 1981; Fakeye & Crompton, 1991; McKercher, 1996). Positive attitudes toward the natural environment manifest as an ecocentric attitude (Metzger & McEwen, 1999). Therefore, the members of the more frequent natural area visitation groups are more likely to have stronger ecocentric leanings in their attitudes relative to the less frequent visitation groups.

Analysis of the overall environmental attitude data suggests that respondents underwent a significant ecocentric shift in attitudes toward the intrinsic ecological value of the forest. However, there was no change in attitude toward the human use statements of attitude. When broken down into natural area visitation frequency groups, there appears
to be no significant change in attitude responses in any of the groups. The lack of
significant difference between the groups may be a function of a small sample size
resulting in relatively large variation in responses obscuring difference between the
groups. This is suggested by the relatively large standard error of the mean values in
relation to the magnitude of change.

4.3.2 Knowledge

The paired survey measured the knowledge of respondents before experiencing the
TTW site. That is, the knowledge of the natural surroundings at the TTW site that
respondents brought with them (Figure 4.12). Respondents possessed a significantly
greater level of correct knowledge on arrival at the site as compared with the incorrect
or don’t know responses (incorrect $z = -11.18$; don’t know $z = -8.34$, $p<0.01$).
Similarly, the number of incorrect responses was significantly greater than the number
of don’t know responses ($z = -5.95$, $p<0.01$).

![Figure 4.12: Mean knowledge scores of TTW survey respondents before experiencing the site.](image)

The knowledge scores after experiencing the TTW site revealed a similar pattern to
those before experiencing the site. The number of correct responses was significantly
greater than the number of incorrect or “don’t know” responses ($z = -3.34$, $p <0.001$).
The change in knowledge scores after experiencing the site saw the number of correct responses significantly increased ($z = -9.67$, $p<0.01$) while the number of “don’t know” and incorrect responses significantly decreased (incorrect $z = -4.94$; don’t know $z = -6.97$, $p<0.01$). There was no significant difference in the magnitude of change in the number of incorrect and don’t know responses (Figure 4.14).
The significant increase in knowledge of the respondents surveyed suggested that the low intensity of interpretation at the TTW site was successful in communicating information about the natural surroundings. This was reinforced by the post-visit only group data having no significant difference with the paired data collected after experiencing the site. That is, completing the knowledge quiz before the experience did not significantly influence the knowledge scores after the experience of the site. Thus the increased number of correct responses and decrease in incorrect and “don’t know” responses seems likely to be a result of the site experience.

There was no evidence to suggest any significant relationships between the extent of knowledge gain and the independent variables respondents brought to the site as measured in the survey. Ballantyne et al (1998) found a significant relationship between the reasons for visiting a site, subsequent activities undertaken and the receptiveness to information provision. Respondents who were interested in exploration and learning were more receptive to on-site communication than those seeking other recreational pastimes. All respondents at the TTW site were restricted to taking part in an exploration and site seeing exercise with no opportunities for alternative recreational pursuits. That is, it is a singular event site. Thus, respondents to the site generally arrived with the expectation of an experience based on exploration.

In addition to this, the main interpretive medium for daily on-site communication was through signs and temporary information displays. Text-based interpretation presents a relatively static method of information transferral that does not allow for elaboration or exploration of concepts other than what is directly provided by the medium. Therefore, all respondents were exposed to the same concepts and potential level of detail irrespective of their willingness to explore concepts further. While there was site staff available, they were employed primarily in a product sales capacity and generally did not provide information on the natural aspects of the site. Therefore, the restriction of respondent activities in combination with a low intensity interpretation approach appears to have cancelled the influence of respondents’ intrinsic variables on the extent of mean information transferral.

While the site essentially provided for a generally homogenous visitor experience in the form of exploration with minimal communication, there was scope for variation in the
exploration experience relating to the design of the respective walk trails. Depending on whether respondents chose to experience the canopy level TTW structure alone or in combination with the ground level Ancient Empire walk presented two distinctly different types of exploration experiences that manifested in a significant effect on knowledge gain. This is discussed further in section 4.4.2.

4.3.3 Attitude to the TTW site as a natural area experience

The rating of various aspects of the TTW site experience before actually experiencing the site provided an indication of the attitudes of respondents toward the site’s representation of the natural area. Responses to the statements before the experience were mostly positive but there were significant differences in the magnitude of the positive responses as indicated by the Friedman test ($\chi^2 = 522.54$, $p<0.01$). The concepts of “beauty of forest” and “learn about forest” were rated as strongly applicable indicating these to be the primary component of the experience as perceived by the respondents. “Recreate in forest”, “Pristine forest”; “Inspired by forest” and “Help protect forest” were all rated moderately applicable suggesting that they are less of a priority than the beauty and learning aspects but still important. The “Human enhanced” aspect of the experience and “Rejuvenate wellbeing” were rated the least positively while “spiritual meaning” was given a neutral response indicating respondents considered these aspects to be of little relevance to their experience.

Analysis of the responses after experiencing the site revealed a significant difference with the mean response made before experiencing the site ($\chi^2 = 739.27$, $p<0.01$). The attitude ratings after the site experience illustrate that the respondents considered the site to have provided a positive experience of the “Beauty of the forest”, “Learning” and a “recreation” in the forest setting as well as an opportunity to “help protect the forest”. The “human enhanced” aspect of the site was also positively rated. Being “inspired by the forest”, experiencing a “pristine forest”, and the “rejuvenation of well-being” were rated moderately positively but were lower on the scale than the former aspects. The “spiritual meaning” component was given a neutral rating suggesting this to be irrelevant or not an applicable part of the experience.

Change in response in the paired survey data indicated some significant alterations. There was no significant alteration in response to “beauty of forest” and “learn about forest” aspects suggesting that the site provided for this experience in accordance with
the initial high rating given by the respondent. The initially lower rated “rejuvenate well-being” aspect also remained unchanged after the experience indicating the site had no impact on this aspect of awareness. The “recreate in forest”, “help protect forest” and “human enhanced” aspects of the experience were all significantly increased in rating after the experience. The “pristine forest”, “inspired by forest” and “spiritual meaning” aspects were significantly decreased in rating.

Attitude responses to the experience of the TTW site before experiencing the site were strongly correlated with the response after experiencing the site ($r_s = 0.862$). This relates to the concept that beneficial experiences are the core product of any tourism destination and these are, in turn, determined to a large extent by the attitudes of the tourists themselves (Prentice et al, 1998). That is, the attitude individuals bring to a situation will significantly influence the nature of influence of that situation on their attitudes.

When there is no change in rating of these aspects, as indicated by the survey instrument, this does not necessarily suggest a lack of influence. For example, aesthetic beauty is an expected part of a natural area experience while, arguably, learning is also an expected component of managed natural area experiences (Moscardo, 1998; Rolston, 1998). Given that these aspects were rated strongly positively in both of the paired survey forms, with no significant alteration, suggested that respondents’ expectations were provided for through experiencing the site. Perhaps in this sense, the site may have either re-affirmed or reinforced these attitudes. Measurement of positive influences in attitude toward the site experience may be limited by a high rating in the survey before the experience as the respondent may only provide a response according to the scope offered by the rating scale.

Of interest is the significant increase in the rating of “Recreate in forest”, “Help protect forest” and “Human enhanced forest” aspects of the experience. The significant increase in the recreational component suggested the site positively influenced respondents’ attitudes toward the forest as a recreational experience. This largely appeared to be a function of the site attracting people who did not usually frequent natural areas as demonstrated by Figure 4.18.
The positive change in response to human enhanced elements and helping to protect the forest may relate to the restrictive design of the site. Respondents were primarily left with impressions of the TTW structure after their experience of the site, as indicated in the preliminary survey results. When considered in conjunction with the increased rating of appreciation of the human made aspect of the experience, it would appear that respondents considered the TTW structure had enhanced their experience of the forest. The positive increase in rating of the “help protect the forest” aspect may be related to the human enhancements at the site. Spearman’s Correlation analysis indicated a moderate relationship between ratings of these two components of the experience ($r_s = 0.41$). This represented a positive counter experiential component, to negative aspects such as restrictions on freedom of movement and crowding, associated with confinement to a relatively small area in the forest. Evison (1981) suggested that the physical appearance of a site, in terms of ecological and physical quality, may be as equally important in influencing visitor attitudes toward their experience of natural areas as other forms of communication. As the hardened design of the TTW site has essentially reduced visitor impacts on the Tingle Forest to negligible levels (Blight, 1999), this appeared to function as a positive component of the experience.

The neutral response to the spiritual component of the site experience may be explained by social factors. A study by Xu and Bengston (1997) of national forest values in the U.S. found aesthetic and recreational perceptions of forest interaction were very positive while appreciation of spiritual value in forests received a low response. Similarly, a mail and telephone survey of Tasmanian residents regarding attitudes relating to forests found that while spirituality received some positive responses, aesthetic, cognitive and personal well-being aspects were rated much higher (Hamilton-Smith, 1998). These results are comparable to those obtained in the present study. While Hamilton-Smith (1998) does not discuss the reason for the lower response to spirituality in any detail, Xu and Bengston (1997) attribute the ambiguity towards spirituality to a lack of understanding or misinterpretation of the concept as well as an unwillingness to admit to feelings deemed unsavoury or effeminate in the broader social context. Religious authors such as Collins (1995) and Spong (1998) discuss the increasing alienation of Western Society from organized mainstream religion and its traditional view of spirituality. They suggest that this has resulted in the formation of neutral or negative perceptions of spirituality in the context of such institutions and traditions amongst the current general population. As with the study by Xu and Bengston (1997) this may be a
possible explanation for the generally negative reaction to the “spiritual meaning from nature” statement through misinterpretation of spirituality as having a generic religious meaning. However, as data on religious affiliation, involvement and views were not collected as part of the visitor survey, this hypothesis is pure conjecture.

The significant positive relationship between responses to “rejuvenate well-being” and “spiritual meaning” may provide some explanation of the responses in this survey. The wording of the “rejuvenate wellbeing” statement refers directly to physical and emotional wholeness or health. As the responses to this statement were significantly positively correlated with the “spiritual” concept it seems evident that the spiritual meaning statement was perhaps associated, by respondents, with emotional connection with the environment more than with religious symbolism. Thus, low response to both concepts may be a result of an inability or unwillingness to admit to hold such attitudes toward the forest environment.

While the TTW site appeared to positively reflect aesthetic, cognitive and recreational components of respondent experience of the forest, response to the spiritual and well-being aspects may highlight a difference between the study site and a true wilderness experience. Collins (1995) discussed the intrinsic spirituality of the natural world that forms a subconscious motivating link between humans; nature and the deeper need to emotionally connect with natural environments. The spiritual and wellbeing component of an experience is considered to be of a higher order of fulfilment than the aesthetic and learning dimensions (Maslow, 1968). While these aspects may rely partly on the attitudes and perceptions of the individual, the environmental context also plays a significant role (Maslow, 1968; Manning et al, 1999; Crick-Furman & Prentice, 2000). Collins (1995) mentioned that experiencing isolated wilderness (preferably in a solitary fashion) is necessary in order to truly achieve the spiritual dimension of interaction with nature. The low rating of the spiritual aspect may reflect an inability of developed natural areas such as the TTW site to provide for such an experience. On the other hand, the need for isolated natural area experiences in the absence of built infrastructure would suggest that interpretation is unlikely to influence this aspect of the visitor experience.

As with environmental attitude, gender and frequency of natural area appeared to have a key influence on awareness and appreciation. The main significance of gender
manifested in the response to rejuvenation of wellbeing and spirituality. This corresponds with the greater likelihood of females expressing personal emotions as compared with males. A key influence of the frequency of natural area visitation was the perception of the TTW as a positive recreational experience. Respondents with less experience in natural areas were influenced by the site experience to significantly increase their rating of this component.

**Gender and Site Experience**

Mann-Whitney U tests revealed female and male respondents differed significantly in their response to certain components of the site experience before actually experiencing the site (Figure 4.15). Females responded significantly more positively than males to the “spiritual meaning” component \((z = -2.56, p<0.02)\). Females also rated the “rejuvenate well-being” component of the experience significantly more applicable \((z = -2.01, p<0.05)\). There were no significant differences between gender responses to the remaining site experience aspects prior to visitation.

These results mirror suggestions by Xu & Bengston (1997) regarding the male social stigma attached to admission of emotional responses to natural environments. The higher female rating of the spiritual and rejuvenate wellbeing components suggests males are unwilling or unable to admit to perceived effeminate responses to the expected experience. The differences in response to the spirituality and well-being aspects are highlighted by the lack of gender difference in response to the other aspects that may be deemed less emotional or feminine.

Attitude response after the experience illustrated in Figure 4.16 revealed that females again rated the spirituality aspect significantly higher than did the male respondents \((z = -3.65, p<0.01)\). Females also rated the well-being aspect significantly more positively than did males \((z = -2.27, p<0.05)\).

As with spirituality, this indicated the difference in response between males and females was due to social factors rather than the impact of the site experience. Thus, taking into account the gender socialisation factor influencing response to both spirituality and well-being, the TTW appeared not to positively influence this aspect of the forest experience.
Figure 4.15: Mean attitude response to the TTW site before experiencing the site according to gender.

Figure 4.16: Mean attitude response to the TTW site after experiencing the site according to gender.
Examination of the magnitude of change in response to the various aspects of the site experience indicated no significant gender relationship. Males and females demonstrated similar changes in rating of the respective statements. This suggested the differences evident in the post visit survey are a result of socialisation factors as opposed to interaction between gender and the site (Figure 4.17).

![Figure 4.17: Change in attitude to TTW site according to gender.](image)

**Frequency of natural area visitation and site experience**

Significant differences in the survey response before experiencing the TTW site were evident between the various categories of natural area visitation (Figure 4.18). Ratings of “recreate in forest”; “inspired by forest”; “rejuvenate well-being” and “spiritual meaning” were all significantly different. In all respective cases, a significant difference occurred between the responses of the natural area visitation groups and the “none” group but not between the groups visiting natural areas.

Natural area visitation groups rated the “recreate in nature” aspect positively while the “none” group responded neutrally ($\chi^2 = 16.05$, df = 4, p<0.01). The natural area visitation groups rated the “inspired by forest” aspect significantly more positively than the “none” group before experiencing the site ($\chi^2 = 9.14$, df = 4 p<0.05). The “none”
group responded negatively to the “rejuvenate well-being” aspect while natural area visitation groups were moderately positive ($\chi^2 = 10.81$, df = 4, p<0.05).

The response pattern in relation to the spiritual meaning aspect was slightly different to that of the other aspects of the experience. While overall analysis of the rating of this aspect indicated a significant difference ($\chi^2 = 12.18$, df = 4, p<0.02), there was no significant difference between the responses of the “none” group and the “1-2” group. There was also no significant difference in response between the “6-12” and “>12” groups while the “3-6” group response appeared to bridge the responses of the remaining clusters. Thus the main difference appeared to be between the negative to neutral response of the “none” and “1-2” groups and the slightly positive response of the “6-12” and “>12” groups.

![Figure 4.18: Mean attitude response to the TTW site before experiencing the site according to frequency of natural area visitation.](image)

All groups indicated that the “beauty” and “learning” aspects were the important component of their experience. However, differences in rating of the remaining aspects highlighted above appear to conform to the expected influence of increasing accumulated experiences in natural areas. The low rating of the “recreation” aspect reflects the preferences for such activities in relation to the experience in natural areas.
Respondents who did not regularly visit natural areas presumably do not consider natural settings as primary destinations for recreation. Thus respondents in the “none” category rated this aspect neutrally while the remaining natural area visitation groups responded positively.

The significant link between the response to “spiritual meaning” and “rejuvenate well-being” and the frequency of natural area visitation suggested that responses were determined by the extent of accumulated experiences with natural areas. This relationship is supported by the notion that an accumulation of experience in natural areas results in the individual building a more complex relationship with such places (Maslow, 1968; Williams et al, 1992; Eisenhauer et al, 2000). The phenomenon whereby respondents who do not usually visit natural areas considered the spiritual and well-being aspects to be irrelevant suggested they perhaps had not developed the complexity of interaction with natural settings to the extent where a spiritual dimension was considered relevant. Another possibility might be that such respondents don’t see a connection between spirituality, well-being and experience of natural areas.

The attitude responses after the TTW site experience, as compared between natural area visitation groups, maintained essentially the same relative relationships as in the responses before the site experience. Significant differences were evident in response to the “recreation”, “well-being” and “spiritual aspects” of the site experience (Figure 4.19). The lack of alteration in the relative attitude responses of the various groups suggested past experiences in natural areas influenced the responses to the site experience to a greater extent than the site itself.
The magnitude of change in response as compared between natural area visitation groups essentially followed the pattern of the respective before and after response data (Figure 4.20). The only significant difference in magnitude of change occurred in response to the “recreation in the forest” aspect. The “none” group demonstrated a significantly greater increase in rating of this aspect relative to the natural area visitation groups ($\chi^2 = 9.43$, df = 4, $p<0.05$). This may be a function of the initial low rating of the recreation aspect given by the “none” group owing to natural areas being considered unlikely recreation destinations. There was no significant difference, between groups, in magnitude of change in response to the remaining aspects of the site experience.
It is interesting to note that the “none” group respondents increased their rating of the recreation aspect significantly from a neutral response to positive in the post experience survey. This indicated the site positively influenced attitudes toward the site as a recreational experience despite noncommittal ratings before the experience. Thus, the site may have positively influenced the non-natural area visitors in terms of affording a more positive attitude toward a recreational experience in a setting they otherwise would not consider to be able to offer such an aspect.

### 4.4 Use of Low intensity Media

On-site interpretation at the TTW was conducted primarily through two media types: text based, in the form of on-site signs, and the design of the site itself. On-site signs were comprised of directional signs indicating available facilities and informational signs relating to both the natural and built aspects of the site. The site was originally designed such that most signs were located centrally around the Tingle Shelter area.

The Tingle Shelter staff, while not professionally trained guides, may be counted as a third information source as they provided visitors with information on facilities and
activities available at the site; general information relating to the built aspects of the site (particularly the TTW) and basic information relating to the natural aspects of the site. However, the Tingle Shelter staff did not function as interpretive communicators but primarily act a sales staff for access tickets to the TTW as well as the souvenir shop. Discussion with site staff indicated most visitors interact through requests for directional and ticket information or to purchase goods from the shop.

4.4.1 Walk trail participation

The site offered two distinct walk trail experiences in the form of the TTW and the Ancient Empire ground level walk. The contrast in the design of the two walks provided for two different approaches to interpretation through site design. The TTW presented a confronting experience of the forest that challenges visitors by placing them outside their comfort zone. That is, a flexible, moving structure up to 40m above ground level with apparently very little infrastructure to prevent visitors plummeting to the ground. The AEW presented a passively reflective experience allowing visitors to take in the natural surroundings at their own pace at the more familiar ground level experience of the forest. Most respondents (98%) chose to experience the TTW as it forms the main focus of attraction at the site. Of those that experienced the TTW, a significant proportion also experienced the AEW (83%), leaving approximately 16% of respondents who experienced the TTW but not the AEW. A small group of respondents chose to experience the AEW but not the TTW, however, the minute size of this sample rendered it inappropriate for inclusion in analysis. This therefore created two activity participation groups within the sample population, those who experienced both the TTW and the AEW (TTW-AEW, n=210) versus those who only experienced the TTW (TTW only, n=43).

Knowledge and Walk Trail Participation

A significant difference between TTW only and the TTW-AEW respondents was found in the change in the correct knowledge score after the site experience (z = -2.49, p<0.02). While analysis revealed there was no significant difference between the two groups mean knowledge scores before and after the experience, the significant difference in change suggested the AEW had an additional influence on knowledge acquisition (Figure 4.21).
As respondents choosing to experience both walks generally spent more time at the site than the TTW only group, it may be argued that the TTW-AEW respondents had more time to absorb knowledge. Thus, it may be possible that it is not the experience of the two walks combined that enhanced knowledge to a greater extent than the TTW alone, but rather the increased length of time spent at the site.

If there was a relationship between walk trail participation and knowledge gain, this may lie in the design of the respective walk trails. The AEW presents wider walk tracks with more alcoves for stopping to observe the forest in relation to the TTW with its restrictive space and narrow catwalks. The restrictive space on the TTW and associated crowding may be a factor in the significant difference apparent in knowledge gain. Crowding is a negative perception by visitors who consider that their experience of a site has been obstructed or negatively influenced by overly large numbers of others (Shelby et al, 1988). Perceptions of crowding by the visitor are influenced by factors including the physical proximity of other visitors, freedom of movement and threats to autonomy (McManus, 1998). The threshold levels of these factors may vary according to the social and environmental context, such that visitors will tolerate a certain level of invasion of private space or restriction of movement according to their expectation of the site experience. That is, a wilderness hiker may consider the presence of another lone individual as crowding while a visitor to a national park will tolerate the presence
of perhaps several dozen other individuals or groups (Choi et al, 1976; Shelby et al, 1988; McManus, 1998). Negative attitudes to an experience reduce the receptivity of the individual to the site experience and its associated communicated messages (McManus, 1998).

The TTW effectively presents a narrow one-way channel along which visitors pass, confined by a series of narrow catwalks and small circular platforms. The visitors are physically contained within a narrow space where passing other individuals within close proximity was frequently necessary. This is reminiscent of McManus’ (1998, p40) description of the Stonehenge access pathway in which visitors were subjected to “regimentation and crowding because of the limited … breadth of the walk…”.

Similarly, TTW visitors who wish to stop while walking on the narrow canopy structure are effectively obstructing the main channel of flow as the confined space does not allow for rest points apart from the slightly wider viewing platforms. Thus, as with Stonehenge, this may either discourage visitors from stopping, creating perceived threats to autonomy or; visitors stopping along the walk inevitably come within close proximity of other passing visitors having their personal space invaded. Crowding on the TTW may frequently occur owing to the confined space, large numbers of other visitors and the strictly one-way nature of the trail. Thus, respondents who chose to experience the TTW trail alone may have experienced crowding and therefore, were likely to develop negative attitudes toward the site experience.

In contrast, the AEW is constructed of wider hardened pathways and board walks and forms a secondary experience at the site. The layout of the AEW includes a more convoluted trail, wider platform areas, seating and cul-de-sacs. The width of the trail allows visitors to walk side by side perhaps allowing or encouraging more discussion amongst members of particular groups visiting the site. The AEW design also allows visitors to easily pass without body contact while circular loops and dead ends enable visitors to access to areas with no “through traffic”. While the AEW has some directional signs, unlike the TTW it is not a strictly one-way walk trail, providing greater freedom of movement.

The secondary nature of the experience reduced visitor numbers accessing the AEW. Casual observation of bus tour participants revealed a sole focus on the TTW owing to restricted time spent at the site. The nature of bus tour groups meant a large number of
people (occasionally more than 50) simultaneously accessed the TTW trail, intensifying crowding issues. Most respondents also tended to experience the TTW first then, if motivated, explored the AEW. Thus, the AEW is less susceptible to crowding than the TTW trail given the greater allowance for space, freedom of movement, 16% fewer participants and less obvious physical confinement. The AEW was less likely, than the TTW, to develop negative respondent attitudes and is hence more likely to encourage a positive learning environment.

While the TTW provided a simple one-way loop, the AEW presented a more convoluted trail conducive to exploration. Respondents who experienced the AEW were perhaps encouraged to explore their environment to a greater extent than while on the TTW structure, hence fostering more of a learning environment. Hart (1981) and Hungerford & Volk (1990) stated that problem solving and investigation are important components in encouraging involvement in environmental education and learning. Similarly, Ballantyne et al. (1998) connected the concepts of exploration and learning in their study of visitors to Fraser Island. Fraser Island visitors seeking recreational fulfilment, through activities such as fishing, swimming and four wheel driving, were less receptive to learning than those interested in exploration of the island. This suggested visitors engaged in exploration were also more open to acquisition of knowledge relating to the given environment. Thus, the layout of the AEW may encourage learning through inducing exploration while the channel like experience of the TTW may not. This is supported by the data relating to rating of the site as a learning experience discussed in the proceeding section.

**Attitude to Site Experience and Walk Trail Participation**

A significant relationship was found between the walk trail participation at the site and rating of certain aspects of the site experience (Figure 4.22). Comparison of attitude responses to the TTW site before experiencing it revealed significant differences in rating of “pristine forest” and “rejuvenate well-being” between the TTW only and TTW-AEW groups. The TTW-AEW group rated the “pristine forest” component significantly higher than did the TTW only group before experiencing the site ($\chi^2 = 4.60$, df = 1, $p<0.05$). While both groups rated this aspect positively, the TTW-AEW group demonstrated a more positive response than the TTW only group. Similarly, the TTW-AEW group rated the rejuvenate well-being component significantly more positively than did the TTW only group before the experience ($\chi^2 = 7.82$, df = 1,
p<0.01). While the TTW only group responded neutrally to this concept, the TTW-AEW group responded somewhat positively.

Figure 4.22: Mean attitude response to the TTW site before experiencing the site according to walk trail participation.

The difference in rating of the “pristine forest” and “rejuvenate well-being” aspects before actually experiencing the TTW site suggested that respondents who placed a higher emphasis on these aspects were more likely to choose to experience the AEW as well as the TTW. In contrast, those respondents who placed a lower priority on wellbeing and pristine forests focused mainly on the TTW experience. This may in turn relate back to the type of experience each trail offers. The TTW provided a restrictive but challenging experience while the AEW provided for a more exploratory, less directed experience.

Post visit responses of the two groups once again revealed a significant difference in the rating of the pristine and well-being aspects of the experience (Figure 4.23). The group who chose to experience both the TTW and AEW rated the “experienced pristine forest” aspect significantly more positively than the neutral response of the TTW only group (z = -2.71, p<0.01). Similarly, the TTW-AEW group also rated the “rejuvenate
well-being” aspect significantly more positively than the neutral response of the TTW only group \((z = -2.97, p<0.01)\). The continuity in response to these aspects in the pre and post visit surveys suggested that appreciation of the pristine forest and rejuvenation of well-being were attitudes that respondents brought to the experience rather than the site influencing response to these aspects. In other words, respondents who tended to place a low priority on the experience of the pristine forest and rejuvenation of wellbeing tended not to use the AEW trail, preferring the singular experience of the TTW.

![Figure 4.23: Mean attitude response to the TTW site after experiencing the site according to walk trail participation.](image)

Examination of the magnitude of change in rating of the site experience statements revealed significant differences between the walk trail participation groups (Figure 4.24). The TTW only group demonstrated a significantly larger shift in rating of the “beauty of the forest” aspect of the experience as compared with the TTW-AEW group \((z = -2.47, p<0.02)\). The TTW only group demonstrated a slight negative shift in attitude response while the TTW-AEW group ratings showed no change. A similar result was evident in response to the “learn about the forest” aspect with the TTW only group demonstrating a negative shift while the TTW-AEW group demonstrated a lesser positive increase \((z = -3.08, p<0.01)\). In other words, respondents who only experienced the TTW tended to negatively alter their ratings of the learning and beauty aspects to a
greater extent than those experiencing both the AEW and TTW. This may be associated with the lack of signs along the TTW structure, restricting respondent access to learning about the site.

Figure 4.24: Change attitude response to the TTW site according to walk trail participation.

Differences between the TTW only group and TTW-AEW group apparent in the after the site experience but not before may suggest differing influences on attitudes according to the walk trail participation group. Of particular interest is the significantly lower rating of “learn about the forest” by the TTW only group when compared with the TTW-AEW group response ($z = -3.51, p<0.01$). Both groups rated this aspect approximately equally in the pre-visit survey. The post visit response demonstrated that the TTW only group responded significantly less positively to the learning aspect than did the TTW-AEW group. While the TTW only group demonstrated a slight but insignificant decrease between the before and after paired response to this learning aspect, the TTW-AEW group had a significant positive increase in rating ($z = -2.37, p<0.02$). If combined with the knowledge data discussed earlier, this suggested that the TTW-AEW experience is more likely to positively influence appreciation of the site as a learning experience than the TTW alone. As the AEW has some trail side signs while
the TTW had none, this may explain the lower rating of learning by respondents experiencing the TTW only.

4.4.2 Interpretation media and visitor influence

The types of interpretation media sources available at the TTW site were limited mainly to trail-side signs and information display boards near the Tingle Shelter. Some information was available through the information site staff though this related mainly to the structure of the TTW or merchandise sales related information. Given the low intensity of interpretive media available, comparisons were made between respondents who used the signs and displays and those who did not.

Analysis of data based on whether or not respondents used particular interpretive media indicated that there was no significant difference in knowledge. This in itself may be of interest as it suggests that information obtained through the site staff is unrelated to improving knowledge about the natural surroundings. This may be due to the predominantly sales oriented focus.

The lack of significant difference between respondents who did and did not use the trail-side signs may be a result of survey participants confusing these with the information displays. That is, respondents who indicated use of trail-side signs may have actually used the information displays rather than the signs along the actual trails. Thus, the information display use group and the trail-side sign use group were inter-mingled. Incorporating symbols or pictures into the survey form to graphically differentiate between each possible selection may have remedied this confusion. Combining the information display and trail side sign use groups to form a text based sign use group accounts for over 90% of the respondents. The discrepancy of group size between respondents using these sources and those who did not meant that comparative analysis was inappropriate.

4.4.3 Exploratory trail side interpretive sign trial

In response to the preliminary survey data indicating the primary suggestion for improvement to the TTW site to be trail-side signs, an experimental sign trail was conducted. This involved placing interpretive signs along the TTW structure, originally
designed and built without any trail-side signs. Installation of additional trail-side signs did not significantly impact on respondent knowledge or the rating of the TTW site as a learning experience. That is, more signs along the walk trail did not correlate with greater knowledge gain. This finding relates somewhat to a study of an environmental education program by Howell and Warmbrod (1974) examining the impact of providing a written manual in addition to regular teaching programs. This study found the presence or absence of written communication did not significantly impact on the overall outcome of the existing education program in terms of raising understanding and awareness of environmental issues. Cole et al (1997) also noted that while the presence of communicative media in natural areas impacts positively on respondent knowledge, there is a threshold at which the number of signs has no further impact on respondent knowledge.

Installation of additional signs was significantly related to the number of respondents suggesting that more signs be provided at the TTW site. Prior to the sign trial, respondents often expressed irritation at the lack of trail-side signs and indicated more should be installed. A similar trend was evident in the preliminary survey. This appeared to support the notion that respondents were increasingly expectant of the presence of interpretive and other interpretive media (Moscardo, 1998). Suggestions for more signs significantly decreased after trail-side interpretive signs were installed ($\chi^2 = 9.51$, df = 3, $p<0.05$). The reduction in suggestions for more information provision using signs indicated respondents perceived the experimental trail-side signs to be adequate as an information source. Thus, although the installation of trail-side signs did not appear to influence knowledge, they provided an increased positive perception of information availability. This seems to have occurred through having interpretation ‘on-tap’ along the TTW trail rather than respondents having to recall information previously read at the Tingle Shelter.

*Repeat Visitation and interpretive sign trial*

Repeat visitors to the TTW were the only sub-group, within the data gathered, to demonstrate significant changes in knowledge after the installation of trail-side signs. Repeat visitors to the TTW site comprised 13% of the total sample population. All but two of the repeat visitors were Western Australian residents.
Installation of trail-side signs resulted in a significantly greater positive change in mean knowledge scores of repeat visitors in the sample group, after experiencing the site, compared with the change prior to installation of signs \( z = -2.47, p<0.05 \). The repeat visitor group mean change in knowledge score after signs were installed was also significantly greater than the first time visitor group \( z = -2.01, p<0.05 \). While first time visitors demonstrated a positive change in knowledge as a result of experiencing the site, the addition of trail-side signs did not significantly influence the magnitude of change. Prior to the sign trial there was no significant difference between repeat visitors and first time visitors in terms of pre or post visit mean knowledge scores or change in knowledge scores (Figure 4.25).

This change occurred in conjunction with a significant relationship between repeat visitation and reason given for visitation (\( \chi^2 = 59.7, p<0.01 \)). Of the repeat visitor group, 78% indicated their reason for visitation was to show the site to friends or relatives compared with 5% of first time visitors surveyed. The attraction of the TTW structure and trees figured significantly lower in the reasons for visitation provided by repeat visitors.

First time visitors were mainly visiting to experience the TTW structure and the trees. This indicated that the unique design of the TTW site may effectively attract first time visitors.
visitors while the novelty has diminished in the perceptions of repeat visitors. The significance of this phenomenon may be that the repeat visitor group was seeking new or additional aspects of interest at the site, and hence, paid more attention to the new trail-side interpretive signs. Meanwhile, the first time visitor group was focussed mainly on the experience of the TTW structure and the surrounding forest and therefore did not absorb the trail-side sign information to the same degree as the repeat visitors.

Tourism attractions are generally defined by experiences that are outside the everyday routine of life (Pearce, 1991; Moscardo, 1992; Markwell & Weiler, 1998). While walking on flexible catwalks, through a forest, tens of metres above the ground serves as a unique attraction and attention grabbing focus for first time visitors, repeat visitors appear to be less influenced by the unique design of the site. Rather, respondents appeared to return to the site to allow friends and relatives to experience the thrill of the TTW structure and unique natural surroundings. Thus the relationship between increase of repeat visitors’ knowledge and the installation of trail-side interpretive signs may be a result of these visitors seeking additional stimulation after the physical nuances of the site become familiar.

Significance of Additional Trail-side Signs.

The installation of trail-side signs at the TTW site appeared to perform two main functions. Firstly, it seemed to create the perception of a more favourable experience on the part of the visitor. The absence of trail-side signs, as part of a low intensity interpretation philosophy, to reduce distraction and visual pollution, resulted in negative feedback by respondents despite the presence of large informational sign displays located around the central Tingle Shelter area. The primary theme of the negative response was frustration at being unable to recall information provided at the head of the walk trail when attempting to identify subjects of interest during the experience. This may be related to the lengthy text included in the existing sign displays and the associated span of time required to fully read and absorb the information. Suggestions resulting from this frustration predominantly focussed on the provision of more trail-side signs.

However, it seems that while the trail-side interpretive signs may provide interpretation close at hand that momentarily satisfies the respondent need for knowledge, there is little or no additional impact on the ability to recall concepts or facts shortly afterwards.
Thus this finding appears to compromise between the concept of natural area visitors being leisure consumers largely uninterested in intellectualising their surroundings and visitors actively seeking educational experiences as part of nature-based tourism (McKercher, 1993; Moscardo, 1998; Sharpley, 2000). In other words, a low intensity of interpretation may negatively impact on the satisfaction of visitors regarding the educational aspect of the experience.

4.5 Conclusion

As a natural area site offering a low intensity level of interpretation, the TTW site appeared to influence respondents in a limited manner according to certain independent variables. Significant changes were measured in environmental attitude, knowledge and attitude toward the site experience. The respondent independent variables significantly related to attitude and knowledge responses were: gender; frequency of natural area visitation and walk trail participation. Gender and past experience in natural areas affected environmental attitudes and attitudes toward the site experience while walk trail participation was related more to the knowledge acquisition and attitudes to the site experience.

The TTW structure itself functioned as an effective drawcard to the site, providing an exciting experience of the forest. It appeared that while being an effective marketing tool, the TTW structure did not influence respondents’ attitudes toward the forest in terms of aesthetic beauty or learning. These aspects were fostered by the supplementary (or complementary) experience of the AEW. The inclusion of the AEW and TTW in the site design provided an interesting juxtaposition of the forest experience with the AEW being the more reflective and low key (i.e. low intensity experience) of the two. This seemed to cater for respondents who were seeking to fulfil emotion aspects of their interaction with the forest, such as rejuvenation of wellbeing. In this sense, it appears that the lower intensity experience of the AEW allows the forest to “speak for itself”. In contrast, the TTW structure adds a human made experiential thrill while providing a unique perspective of the forest though the lack of trail-side interpretation appeared to present a negative aspect on the part of the respondents.
5 Penguin Island Survey Results

Penguin Island represents a natural area site with a higher intensity of on-site interpretation when compared with the TTW site. To investigate the influence of this on attitudes and knowledge, surveys were carried out during February, April, November and December 2001. 157 visitors, using the ferry as access, completed paired surveys before and after their visit to the island. This represented a 35% refusal rate based on the number of visitors approached. To test for reactivity bias a result of the paired survey design, 50 visitors completed surveys after visitation only, representing a 21% refusal rate, as part of a post-visit only group. As with the TTW surveys, the lower refusal rate for the post-visit only data probably related to the lesser commitment required by the visitor.

5.1 Reactivity bias

As was discussed in the TTW survey results chapter, the paired survey design may have skewed data collected after the site experience owing to the influence of completing a survey before experiencing the site. Comparative analysis of the post-visit only group and the paired survey completed after the experience at Penguin Island was undertaken to ascertain whether reactivity bias was evident for the knowledge, environmental attitude and attitude to site experience components of the survey. The results are described in turn.

Knowledge

Figure 5.1 illustrates the mean knowledge scores of the post-visit only group and paired survey completed after the experience of Penguin Island. The error bars represent the standard error of the mean. The graph suggests that the groups had similar scores for the “correct”, “incorrect” and “don’t know” responses.
The lack of a statistically significant difference between the paired survey and post-visit only groups was confirmed using the Mann-Whitney U test. Table 5.1 sets out the Mann-Whitney test statistics and p values resulting from the comparison of the “correct”, “incorrect” and “don’t know” scores between the post-visit only group and paired surveys completed after the site experience.

Table 5.1: Test statistics resulting from comparison of knowledge scores of the paired survey and post-visit only groups at Penguin Island.

<table>
<thead>
<tr>
<th>Quiz Responses</th>
<th>Mann-Whitney Tests</th>
<th>( \alpha = 0.05 )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( z ) score</td>
<td>( P ) value</td>
</tr>
<tr>
<td>Correct</td>
<td>-0.84</td>
<td>0.39</td>
</tr>
<tr>
<td>Incorrect</td>
<td>-0.01</td>
<td>0.99</td>
</tr>
<tr>
<td>Don’t Know</td>
<td>-0.94</td>
<td>0.34</td>
</tr>
</tbody>
</table>
Environmental Attitude

As with the knowledge scores, environmental attitude scores were compared between the post-visit only group and paired survey group response data collected after the site experience. Figure 5.2 illustrates the mean scores for the “Human use”, “Intrinsic ecological value” and “Total” attitude for both the post-visit only and paired survey groups. The error bars represent the standard error of the mean. The graph suggests that there was little difference in response between the two groups.

![Graph showing mean environmental attitude responses](image)

**Figure 5.2:** Mean environmental attitude responses of post-visit only and paired survey groups after experiencing Penguin Island.

Statistical comparison of environmental attitude response between the post-visit only group and the paired survey completed after the experience of Penguin Island revealed no significant difference as demonstrated in Table 5.2.
Table 5.2: Test statistics and p values for comparison of environmental attitude responses between post-visit only and paired survey groups at Penguin Island.

<table>
<thead>
<tr>
<th>Environmental Attitude Scores</th>
<th>Mann-Whitney Tests</th>
<th>( \alpha = 0.05 )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>z score</td>
<td>P value</td>
</tr>
<tr>
<td>Human use</td>
<td>-0.31</td>
<td>0.76</td>
</tr>
<tr>
<td>Intrinsic eco value</td>
<td>-0.16</td>
<td>0.85</td>
</tr>
<tr>
<td>Total score</td>
<td>-0.25</td>
<td>0.78</td>
</tr>
</tbody>
</table>

Attitude to Penguin Island site

Finally, attitude responses of the post-visit only and paired survey groups to Penguin Island site were compared to ascertain the presence of reactivity bias in the paired data. Figure 5.3 illustrates the similarities in response between the two groups after experiencing Penguin Island. The error bars represent the standard error of the mean.

Figure 5.3: Mean attitude responses to Penguin Island experience as compared between post-visit only and paired survey groups after experiencing the site.

The lack of significant difference between the post-visit only and paired survey groups was confirmed using Mann-Whitney U tests for each of the rated aspects. Table 5.3 details the test statistics and p values for each aspect. As none of the p values were less
than the 0.05 significance level, no significant difference was evident between the paired and post-visit only survey groups for any of the attitudinal aspects.

Table 5.3: Mann-Whitney test statistics from comparative analysis of post-visit only and paired survey group responses to attitudes to Penguin Island

<table>
<thead>
<tr>
<th>Site Attitude Statements</th>
<th>Mann-Whitney Tests</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>α = 0.05</td>
<td></td>
</tr>
<tr>
<td></td>
<td>z score</td>
<td>P value</td>
</tr>
<tr>
<td>Beauty of Island</td>
<td>-0.72</td>
<td>0.74</td>
</tr>
<tr>
<td>Recreate on Island</td>
<td>-0.46</td>
<td>0.65</td>
</tr>
<tr>
<td>Learn about Island</td>
<td>-0.30</td>
<td>0.76</td>
</tr>
<tr>
<td>Help protect Island</td>
<td>-0.16</td>
<td>0.87</td>
</tr>
<tr>
<td>Inspired by island</td>
<td>-0.10</td>
<td>0.92</td>
</tr>
<tr>
<td>Pristine Island</td>
<td>-0.68</td>
<td>0.50</td>
</tr>
<tr>
<td>Rejuvenate well-being</td>
<td>-0.28</td>
<td>0.78</td>
</tr>
<tr>
<td>Human Enhanced Island</td>
<td>-0.32</td>
<td>0.79</td>
</tr>
<tr>
<td>Spiritual meaning</td>
<td>-0.39</td>
<td>0.70</td>
</tr>
</tbody>
</table>

The lack of significant difference between the post-visit only and paired survey data collected after the site experience suggests an absence of reactivity bias resulting from the paired design.

5.2 Descriptive Statistics

The independent variables brought to the site by respondents may act significantly in terms of how the experience influenced their attitudes and knowledge. Relationships between the independent variables may also create another layer of influence. If influences on attitudes and knowledge after the experience vary between groupings of visitors, this is suggestive of the on-site experience being associated with that influence. For example, if data indicates that respondents undertaking the same experience but with differing levels of annual natural area visitation are influenced in a significantly different manner, this points to factors on-site being related to the differing influences.
Demographic variables

Table 5.4 summarises the demographic variables of the paired survey group surveyed at Penguin Island. Some significant relationships were found between visitor variables that in turn may have influenced responses to the attitude and knowledge components of the survey.

<table>
<thead>
<tr>
<th>Variable</th>
<th>No.</th>
<th>%</th>
<th>Variable</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td>Place of residence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>female</td>
<td>47</td>
<td>43.9%</td>
<td>WA</td>
<td>81</td>
<td>75.7%</td>
</tr>
<tr>
<td>male</td>
<td>60</td>
<td>56.1%</td>
<td>Interstate</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Not stated</td>
<td>-</td>
<td>-</td>
<td>International</td>
<td>26</td>
<td>24.3%</td>
</tr>
<tr>
<td>Total</td>
<td>107</td>
<td>100%</td>
<td>Total</td>
<td>107</td>
<td>100%</td>
</tr>
<tr>
<td>Penguin Island repeat visitation</td>
<td></td>
<td></td>
<td>Penguin Visitor Centre repeat visitation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>First time visit</td>
<td>56</td>
<td>52.3%</td>
<td>First time visit</td>
<td>21</td>
<td>19.6%</td>
</tr>
<tr>
<td>Repeat visit</td>
<td>51</td>
<td>47.7%</td>
<td>Repeat visit</td>
<td>30</td>
<td>28.0%</td>
</tr>
<tr>
<td>Not stated</td>
<td>-</td>
<td>-</td>
<td>Didn’t visit</td>
<td>56</td>
<td>52.3%</td>
</tr>
<tr>
<td>Total</td>
<td>107</td>
<td>100%</td>
<td>Total</td>
<td>107</td>
<td>100%</td>
</tr>
<tr>
<td>Age group (yrs)</td>
<td></td>
<td></td>
<td>Annual natural area visitation rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;15</td>
<td>0</td>
<td></td>
<td>none</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>15-24</td>
<td>15</td>
<td>14.0%</td>
<td>1-2</td>
<td>34</td>
<td>31.8%</td>
</tr>
<tr>
<td>25-39</td>
<td>58</td>
<td>54.2%</td>
<td>3-6</td>
<td>37</td>
<td>34.6%</td>
</tr>
<tr>
<td>40-59</td>
<td>23</td>
<td>21.5%</td>
<td>6-12</td>
<td>24</td>
<td>22.5%</td>
</tr>
<tr>
<td>60+</td>
<td>11</td>
<td>10.3%</td>
<td>&gt;12</td>
<td>12</td>
<td>11.2%</td>
</tr>
<tr>
<td>Not stated</td>
<td>-</td>
<td>-</td>
<td>Not stated</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>107</td>
<td>100%</td>
<td>Total</td>
<td>107</td>
<td>100%</td>
</tr>
<tr>
<td>Visiting with</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Friends</td>
<td>11</td>
<td>10.3%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family</td>
<td>68</td>
<td>63.5%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partner</td>
<td>28</td>
<td>26.2%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spouse</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tour group</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alone</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not stated</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>107</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Males outnumbered females while the 25-39 year old age group comprised the majority of respondents surveyed on the ferry. The proportional age group data collected at
Penguin Island approximates data relating to the most recently available national park visitation and age group proportions collected by the Australian Bureau of Statistics in 1996-97 (ABS, 2002) and past Penguin Island surveys (unpublished).

Most respondents were residents of Western Australia while the remaining proportion were international visitors. Of demographic interest was the absence of interstate residents in the ferry survey data. Examination of the Visitor Comment Book on Penguin Island revealed the vast majority of Island visitors were Western Australian residents or international visitors with no interstate visitors obviously apparent. While the lack of interstate visitors to Penguin Island presents an interesting phenomenon, investigation of the reasons behind this are beyond the scope of this thesis.

The majority of respondents were accompanied by family members as indicated by the “visit with” data. This may be related to the recreational focus of the Penguin Island site in combination with its close proximity to urbanised areas. Penguin Island has traditionally been viewed as a family oriented natural area venue (Dans, 1997). Alternatively, this result may indicate that families are more likely to use the ferry rather than other means of access to the island. Management actively discourages of the sand bar as an alternative mode of access through highlighting the dangers of the crossing and promoting the ferry as a safe means of transport to the island. This safety message may appeal to families with children or elderly members. The only other alternative access to the island is by private boat. While the researcher observed a number of visitors using this means, not all families would have such facilities at their disposal.

Significant relationships were found between social context of visitation (“Visit with” responses) and the gender and place of residence of respondents. Respondents visiting with family tended to be female ($\chi^2 = 43.1$, df = 2, p<0.01) and reside within WA ($\chi^2 = 21.2$, df = 2, p<0.001). The same relational analysis revealed that those respondents visiting with friends were more likely to be male, international visitors. Analysis of strength of association between gender and social context indicates this to be a strong relationship (Cramer’s V = 0.634, p<0.001) while the relationship between place of residence and social context of visitation was moderate (Cramer’s V = 0.445, p<0.01).
All of the repeat visitors to Penguin Island were WA residents. The dominance of local resident visitors reflects the status of the island as a major local recreational venue as mentioned in section 3.2. While the proportion of repeat visitors surveyed was significantly high, conversations with on-site staff and managers suggested this group was under represented by the survey results (Goodlich, 2000). Fraser Island represents a similar environment to Penguin Island in that it offers a range of activities from recreational pursuits to exploration and learning activities in a coastal island environment. Here, Ballantyne et al (1998) found that approximately 66% of visitors surveyed were repeat visitors seeking recreational experiences. The apparent under representation of repeat visitors in this survey may be a function of the mode of access used. Regular visitors familiar with the site may be more likely to access the island via the sand bar or private craft rather than pay for a ferry ticket. Thus, conducting surveys on the ferry probably favours first time visitors.

5.2.1 Reason for visitation

This was a multiple choice question with an “other” option to allow for responses not included in the options provided. The “Penguin Experience” visitor centre was the most frequent reason given for visitation to the island (47% of responses). Recreational activities including swimming and a general need for relaxation comprised the majority of the remaining proportion of reasons given (Table 5.5). Respondents may provide more than one reason meaning the number and percentages add up to more than 100%.

Table 5.5: Reasons indicated for visiting Penguin Island

<table>
<thead>
<tr>
<th>Reason Given for visitation</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>To see penguins</td>
<td>47</td>
<td>43.9%</td>
</tr>
<tr>
<td>Swimming</td>
<td>32</td>
<td>29.9%</td>
</tr>
<tr>
<td>General relaxation</td>
<td>27</td>
<td>25.2%</td>
</tr>
<tr>
<td>To show the island to guests</td>
<td>13</td>
<td>12.1%</td>
</tr>
<tr>
<td>It is a tourist attraction</td>
<td>9</td>
<td>8.4%</td>
</tr>
<tr>
<td>fishing</td>
<td>5</td>
<td>4.7%</td>
</tr>
<tr>
<td><em>Not stated</em></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>133</td>
<td>125%</td>
</tr>
</tbody>
</table>
All of the respondents who indicated the island’s status as a “tourist attraction” also had indicated they wanted “to see penguins” as a main reason for visitation suggesting that these two responses are related (that is, a tourism oriented visit). The “fishing” response group appeared to be a small sub group of the general fishing population visiting the island who chose to access the island by ferry rather than using private boats or the sand bar. Observations of visitors on the island suggested a much larger portion of the visitor population partakes in fishing than is indicated in this survey. Generally, visitors intent on fishing tend to be locals and appear to access the island by other means, primarily the sand bar.

The main reason for visitation was significantly related to repeat visitation ($\chi^2 = 24.02$, df = 5, p<0.01). Comparison of repeat and first time visitor survey respondents indicated that repeat visitors were more likely than first time visitors to indicate general relaxation as a reason for visiting the island. First time visitor respondents were more likely to indicate viewing the penguins as their main reason for visitation. Cramer’s strength of association statistic indicates this to be a moderate relationship (Cramer’s V = 0.476).

Field & Wagar (1973) and Ballantyne et al (1998) commented that the frequency of visitation to a site influences the activities undertaken during the visit whereby repeat visitors are more inclined toward social and general relaxation activities. While first time visitors were more receptive to communication and interpretive activities, repeat visitors sought other recreational pursuits such as relaxation and fishing. This suggests that an accumulated number of previous visits to Penguin Island may reduce the likelihood of visiting the Penguin Experience visitor centre as its familiarity reduces respondent interest. However, having stated this, repeat visitors using the ferry may still choose to visit the Penguin Experience due to the entry fee being included in the cost of the ferry ticket.

5.2.2 Interpretive media used by Penguin Island respondents

A multiple choice question was used to determine what interpretive media respondents used while on Penguin Island. Respondents were able to select more than one option. Of the interpretive media available (detail in section 3.1.2) the touch table was the most commonly used while the information centre staff and rangers were the second most commonly used by respondents (Table 5.6).
Table 5.6: Frequency of interpretation sources used by respondents on Penguin Island.

<table>
<thead>
<tr>
<th>Medium</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Touch table</td>
<td>63</td>
<td>58.9%</td>
</tr>
<tr>
<td>Info desk staff</td>
<td>46</td>
<td>43.0%</td>
</tr>
<tr>
<td>Ranger</td>
<td>42</td>
<td>39.2%</td>
</tr>
<tr>
<td>Pamphlets</td>
<td>32</td>
<td>29.9%</td>
</tr>
<tr>
<td>Signs</td>
<td>31</td>
<td>29.0%</td>
</tr>
<tr>
<td>None</td>
<td>10</td>
<td>9.3%</td>
</tr>
<tr>
<td>Not Stated</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>224</td>
<td>209%</td>
</tr>
</tbody>
</table>

Of the various interpretive media available, 33% of respondents used 2 sources while 29% used 3 sources. This was primarily the touch table in combination with one or two other sources. Categorising media source use by media type demonstrated approximately a quarter of respondents used a combination of all three media types: interpersonal, text based and interactive (Table 5.7).

Table 5.7: Combinations of media types used by survey respondents at Penguin Island.

<table>
<thead>
<tr>
<th>Media Combination Used</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>All three</td>
<td>27</td>
<td>25.2%</td>
</tr>
<tr>
<td>Interpersonal only</td>
<td>23</td>
<td>21.5%</td>
</tr>
<tr>
<td>Interpersonal &amp; interactive</td>
<td>23</td>
<td>21.5%</td>
</tr>
<tr>
<td>Text based &amp; interactive</td>
<td>13</td>
<td>12.1%</td>
</tr>
<tr>
<td>None</td>
<td>10</td>
<td>9.3%</td>
</tr>
<tr>
<td>Text based &amp; interpersonal</td>
<td>7</td>
<td>6.5%</td>
</tr>
<tr>
<td>Text based only</td>
<td>4</td>
<td>3.7%</td>
</tr>
<tr>
<td>Interactive only</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Not stated</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>107</td>
<td>100%</td>
</tr>
</tbody>
</table>

Interpersonal communication alone and used together with interactive media were the second most common combination of sources (21.5% respectively). Use of the combination of text based media and interactive made up 12% of the responses. Interestingly, none of the respondents indicated the use of the interactive medium alone.
This was always used in combination with other media types whereas text based media was used in isolation to a small extent and the interpersonal medium was used solely on a more frequent basis.

When comparative analysis of media use was conducted based on independent variables, frequency of natural area visitation was significantly related to interpretive media type use ($\chi^2 = 62.41$, df = 15, p<0.01). More frequent natural area visitor respondents tended to favour the interpersonal medium while respondents who visited natural areas less frequently tended to use text based interpretive media. For example, of those indicating rangers as a source accessed while at Penguin Island, 86% visited natural areas six or more times per year. Of those indicating the signs as an interpretive medium used at the site, approximately 80% visit natural areas less than six times per year. Strength of association analysis indicated this to be a moderately strong relationship (Cramer’s V = 0.523).

The situation in which respondents who are more frequent visitors to natural areas were more likely than less frequent visitors to approach rangers as an interpersonal source of interpretation suggests a greater willingness to communicate with park rangers. Such respondents may have had past positive experiences talking to park rangers and are thus more willing to repeat such interactions to seek out personalised or more detailed interpretation about aspects of the site. This may in turn link back to the positive relationship between accumulation of experiences in natural areas and development of attitudes toward that environment in general (Hammit, 1981; Fakeye & Crompton, 1991; McKercher, 1996). That is, those with a greater accumulation of experience are likely to have developed a more personalised attitude toward the natural environment and therefore are more likely to require more personalised information to add meaning to those attitudes and knowledge. Interpersonal methods of communication are more likely to be able to fulfil this need than text based communication media (Lipman & Hodgson, 1978). Thus availability of interpersonal interpretation may cater to more frequent natural area visitors as they are able to perhaps obtain personalised information and details not provided by signs and other media sources.

A significant relationship was also found between interpretive medium use and repeat visitation. Of those indicating use of interpretive media sources, repeat visitors were less likely to use a single type of communication medium than first time visitors ($\chi^2 = 28.34$, df = 4, p<0.01; Cramer’s V = 0.515). For example, of the respondents who
indicated use of a single source of interpretation, 95% were first time visitors. Related to this finding, combinations of media type used were also significantly related to repeat visitation ($\chi^2 = 31.27$, df = 6, $p<0.01$). Respondents who were repeat visitors to Penguin Island were more likely than first time visitors to use interactive media in combination with interpersonal or text based interpretive media. The greater use of multiple media types and sources suggested a greater motivation to seek out information. Tilden (1957) commented that motivation to seek out information is an important indicator of an individual who has been provoked to develop understanding and awareness of the surrounding environment. This phenomenon may be a function of repeated visitation in natural areas providing a motivation to build on knowledge and perceptions gained through accumulated experience (Field & Wagar, 1973). Thus, using a greater variety of information sources represents a motivation to seek information that may add to the knowledge previously gained at the site. In terms of provision of a higher intensity of interpretation, a variety of on-site media would seem to cater to the preferences of repeat visitors, an important component of site visitor populations.

5.2.3 Activity participation

A multiple choice question was used to ascertain what activities respondents took part in while on Penguin Island. The three main activities undertaken as indicated by respondents were: the Penguin Experience, the walk trails and swimming (Table 5.8).

<table>
<thead>
<tr>
<th>Activity Undertaken</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penguin Experience</td>
<td>93</td>
<td>86.9%</td>
</tr>
<tr>
<td>Island walks</td>
<td>76</td>
<td>71.0%</td>
</tr>
<tr>
<td>Swimming</td>
<td>36</td>
<td>33.6%</td>
</tr>
<tr>
<td>Other</td>
<td>7</td>
<td>6.5%</td>
</tr>
<tr>
<td><strong>Not stated</strong></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>212</td>
<td>198%</td>
</tr>
</tbody>
</table>

A small minority of “other” responses included “fishing”, “nothing” and “relaxation”. More than 85% of the respondents indicated that they had visited the Penguin Island.
Experience during their stay on the island, mainly a function of the entry fee being intrinsic with the ferry ticket cost. This contrasts with the less than 50% who indicated that viewing the penguins was a main reason for visiting the island as presented in Table 5.5.

5.3 Influence of Higher Intensity Interpretation on Attitudes and Knowledge

Environmental attitude responses significantly changed between the paired surveys completed before and after the experience of Penguin Island. Gender and frequency of natural area visitation were found to be of statistical significance in relation to environmental attitude changes. Knowledge was positively affected after the site visit with reason for visitation significantly related to this change. Attitudes toward Penguin Island as a natural area destination were also significantly influenced by the visit. Frequency of natural area visitation was significantly related to the impact of the site experience on visitor attitudes toward the site. These findings are discussed in turn.

5.3.1 Environmental attitude

The mean responses before experiencing Penguin Island indicated surveyed visitors were generally ecocentric in their attitude toward the environment (Figure 5.4).

![Figure 5.4: Mean paired survey response to environmental attitude statements before experiencing Penguin Island.](image-url)
Paired analysis revealed that respondents were significantly more ecocentric in response to the “Human use” statements than those referring to the “Intrinsic ecological value” of the island ($z = -6.80, p<0.01$). This suggested respondents had positive attitudes toward the need for responsible use of the environment but a less positive response to the concept of nature as having value beyond that measured by usefulness to humans. In other words, it may appear that while respondents are empathetic toward the need for nature conservation, they are still likely to value the area in terms of its benefit to humans rather than for any altruistic reasons.

The mean paired survey responses completed after experiencing Penguin Island indicated no significant difference between attitudes toward the intrinsic value of nature and the human use statements (Figure 5.5). This suggested that these aspects were held in equal regard in terms of concerns for conservation of the island.

Responses to the human use and ecological value statements appeared moderate with a conservation focus. The anthropocentric shift in response to the human use of nature statements may be a function of the island offering recreational activities such as picnicking, swimming and fishing. The conservation focus may then take on a background aspect of the island experience despite the design of the facilities being based on a management objective of minimal ecological disturbance (Dans, 1997)

![Figure 5.5: Mean paired survey environmental attitude response after experiencing Penguin Island.](image-url)
Comparison of mean paired responses to the human use statements before and after experiencing Penguin Island indicated a significant shift toward the anthropocentric end of the scale ($z = -8.39$, $p < 0.01$). That is, respondents appeared less opposed to the concept of the environment valued as a resource for human use after their experience of the island. There was no significant change in response to the intrinsic ecological value statements or the overall total environmental attitude after the experience of the island.

Analysis of the change between the before and after responses of individually paired surveys reinforces the above finding. Figure 5.6 illustrates the mean change of individually paired environmental attitude responses after experiencing Penguin Island.

![Figure 5.6: Mean paired change in response to environmental attitude statements after experiencing Penguin Island.](image)

A one sample Kolmogorov-Smirnov test indicated the data to be normally distributed, thus one sample T-tests were used to determine whether the magnitude of change was significantly greater than zero. Table 5.9 details the test statistics and p values for each of these tests.
Table 5.9: Results of K-S test for normal distribution and a 1 sample T-test of change in environmental attitude response after experiencing Penguin Island.

<table>
<thead>
<tr>
<th>Attitude Statement</th>
<th>1 sample K-S</th>
<th>1 sample T-test (test value = 0)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>K-S z value</td>
<td>p value</td>
</tr>
<tr>
<td>Human use</td>
<td>1.07</td>
<td>0.16</td>
</tr>
<tr>
<td>Intrinsic ecological value</td>
<td>1.24</td>
<td>0.11</td>
</tr>
<tr>
<td>Total attitude score</td>
<td>1.17</td>
<td>0.13</td>
</tr>
</tbody>
</table>

The p-values indicate that the apparent change in the “Intrinsic ecological value” score and the “Total” environmental attitude score were not significantly greater than zero while the change in response to the “Human use” statements was significantly greater than zero. This suggests that while the change in response to the “Intrinsic ecological value and “Total” attitude scores were not significant, the change in response to the “Human use” statements was.

Using the natural environment as a resource for human benefit is often associated with ecological degradation (Dunlap & Liere, 1978; Satterfield & Gregory, 1998). The anthropocentric shift in attitudes towards human use of the natural environment in the context of Penguin Island may be a function of the combination of the being site designed for minimal ecological impact in combination with the active recreational focus of the island. That is, respondents perceive that active recreational use of a natural area such as Penguin Island is possible without causing severe ecological disturbance. Thus, respondents to statements referring to natural areas being resources for human benefit may be somewhat dissociated from ecological destruction as their experience of Penguin Island demonstrated the two concepts are compatible. The influence on respondents, as a result of experiencing Penguin Island, appears to manifest as a responsible use conservation ethic.

The following sections examine the significant relationship between gender and frequency of natural area visitation and the response to the environmental attitude statements. While gender differences in mean environmental attitude were apparent, there was no significant difference between males and females in terms of the magnitude of change in response after experiencing the site. In contrast, frequency of natural area visitation significantly influenced both the mean environmental attitude and
the extent to which the Penguin Island visitor centre impacted on the environmental attitude response. There appeared to be no significant relationship between environmental attitude and the remaining respondent variables measured.

**Gender and Environmental Attitude**

There was no significant difference, in response to the environmental attitude statements, between male and female respondents before experiencing Penguin Island as was found in the TTW paired survey data in section 4.3.1. Figure 5.7 illustrates that there appeared to be greater ecocentric response to the “Human use” statements, as compared with the “Intrinsic ecological value” statements, by both genders immediately before experiencing Penguin Island. This was confirmed through paired statistical analysis of the mean scores for each of the statement groupings by males and females respectively ($z = -3.23, p<0.02$).

![Figure 5.7: Mean environmental attitude response immediately after experiencing Penguin Island according to gender.](image)

Figure 5.8 illustrates the significant difference in gender response to the environmental attitude statements immediately after experiencing Penguin Island. Females were significantly more ecocentric than males in response to the “Intrinsic ecological value” statements after the experience ($z = -4.32, p<0.01$) as was found in the TTW gender response data. There was no significant difference in rating, by males and females, of
the “Human use” statements or the “Total” environmental attitude score. Both genders also demonstrated no post-visit significant difference in respective rating of the intrinsic ecological value and human use statements.

Figure 5.8: Mean environmental attitude response immediately after experiencing Penguin Island according to gender.

Figure 5.9 illustrates the mean change in individually paired environmental attitude responses. Using the K-S test for normal distribution and one sample T-tests as performed previously, results indicated that the change in response to the “Human use” statements was significantly greater than zero (male t = -4.64, female t = -5.28, p<0.001). The change in response to the “Intrinsic ecological value” an “Total” environmental attitude statements was not significantly greater than zero. This suggests that both males and females demonstrated a significant anthropocentric shift in response to the “Human use” statements immediately after experiencing Penguin Island. There was no significant difference in the magnitude of change between males and females.

The response to environmental attitude results according to gender, obtained from Penguin Island, indicated the differences between gender were not related to the context of the natural environment in which attitude were measured. Males demonstrated no significant alterations in response to the statements of intrinsic ecological value or the total environmental attitude score. However, females had a slight ecocentric change
with respect to the intrinsic ecological value statements ($z = -2.01, p<0.05$). While the shift in female response was significantly greater than zero within that gender grouping, there was no statistical difference in magnitude of change between genders owing to the variation in response of individuals within each group.

Despite the moderation of negative responses to human use of the island, females appeared to also be receptive to the ecological value of the island to a greater extent than males. Influencing environmental attitudes seems to have favoured females, as they appeared more willing than males to express ecologically sensitive views after their experience.

**Figure 5.9: Mean change in response to environmental attitude statements at Penguin Island according to gender.**

Despite the moderation of negative responses to human use of the island, females appeared to also be receptive to the ecological value of the island to a greater extent than males. Influencing environmental attitudes seems to have favoured females, as they appeared more willing than males to express ecologically sensitive views after their experience.

**Frequency of Natural Area Visitation and Environmental Attitude**

All of the natural area visitation groups demonstrated a generally ecocentric environmental attitude before experiencing Penguin Island (Figure 5.10). All groups also responded with a greater ecocentric attitude towards the human use statements as compared with the responses to the intrinsic ecological value statements. However, a significant difference in response to the “Human use” statements was evident before experiencing the site, where the most frequent visitation group demonstrated a
significantly more ecocentric response than the less frequent visitation groups ($\chi^2 = 22.78$, df = 3, p<0.01). That is, the less frequent natural area visitation groups empathised more than the most frequent group with the concept of the environment being valued in terms of a resource for human use. The consequence of this is a significant difference in total environmental attitude between the two extreme categories of natural area visitation with the most frequent (>12) group being significantly more ecocentric than the least frequent (1-2) group ($\chi^2 = 17.28$, df = 3, p<0.01). There was no significant difference between grouped responses to the intrinsic ecological value statements.

![Figure 5.10: Mean environmental attitude score before experiencing Penguin Island according to frequency of natural area visitation.](image_url)

The differences in environmental attitude response evident between the various levels of natural area visitation may be attributed to the influence of accumulated past experience and its influence on perceptions of the environment as discussed previously.

The environmental attitude response after experiencing Penguin Island indicated that the difference in response to the “Human use” statements became more accentuated between the “>12” group and the remaining natural area visitation groups (Figure 5.11). As with the paired survey completed before the experience, there was a significant difference between the “>12” natural area visitation group and the remaining groups ($\chi^2$...
while there was no significant difference between the visitation groups ranging from “none” to “6-12”.

The greater difference in response to the “Human use” statements between the “>12” visitation group and the remaining groups was the result of a significant anthropocentric shift in response in all but the most frequent (>12) natural area visitation group (z = -8.39, p<0.01). There was no significant shift in response to the ecocentric statements or in the total attitude scores of any of the groups as explained previously (Figure 5.12).
The lack of a significant change in attitude response by the “>12” group was suggestive of a threshold of accumulated past experience at which environmental attitudes become increasingly stable and less likely to be influenced by a single current experience. This is demonstrated by the anthropocentric significant shift in response to the concept of the environment valued in terms of its usefulness to humans by the three less frequent groups while the “>12” group had no change in response.

Environmental attitudes are heavily influenced by accumulated past experience in natural areas as already discussed in Chapter 2. As individuals acquire more information in regard to natural areas, the associated attitudes are based on a greater wealth of experience effectively resulting in attitudes becoming strongly held and not easily altered by a one-off experience (McGuire, 1985; Ajzen, 1992). Subsequently, the environmental attitude relationship between the groups, after experiencing Penguin Island, remained essentially the same as the responses before experiencing the site. It would appear that respondents less experienced in natural areas are more prone to attitude change in the short term as a result of a one-off experience.
5.3.2 Knowledge

Figure 5.13 illustrates the mean knowledge scores of paired survey respondents before experiencing Penguin Island. While respondents had a mean correct score of more than 50%, the remaining difference was a result of a large proportion of “don’t know” responses as opposed to “incorrect” responses. Thus, respondents were largely aware of their lack of knowledge as indicated by selecting “don’t know” rather than choosing incorrect responses.

![Figure 5.13: Mean knowledge score of paired survey respondents before experiencing Penguin Island.](image)

The relationship between the “correct”, “incorrect” and “don’t know” scores was the same after experiencing the site, except the mean “correct” score was higher while the remaining knowledge scores were slightly lower (Figure 5.14).
Analysis of the mean change in individually paired knowledge scores indicated a significant increase in the number of correct responses ($t = -3.45$, $p<0.02$) and a significant decrease in the number of "don’t know" responses ($t= -2.75$, $p<0.02$). There was no significant change in the number of incorrect responses. Thus the improvement of correct responses, as measured by the quiz, was a result of a significant reduction in the number of “don’t know” responses rather than incorrect responses (Figure 5.15).
Figure 5.15: Mean change in knowledge scores after experiencing Penguin Island.

The significant increase in mean knowledge of respondents after experiencing Penguin Island suggested they were able to access and recall information included in the content of on-site interpretive media. The only respondent variable that appeared to be significantly related to knowledge gain was the main reason for visiting the island. There were no other significant relationships evident between the remaining respondent variables and knowledge.

**Reason for Visitation and Knowledge**

Motive for visitation may be divided into those that are seeking to explore and learn through visiting the “Penguin Experience” visitor centre (PEVC) along with partaking in the island walks and those that are seeking to experience recreational activities such as swimming or relaxation. While less than half stated the PEVC as the main reason for visitation, the vast majority of respondents surveyed (87%) indicated they attended the PEVC while on the island. Thus, while the former group was interested in exploration and gaining knowledge, the recreation group was not, but needless, both groups experienced an activity intended to educate respondents.

Those indicating the PEVC as a main reason for visitation demonstrated a significantly greater increase in correct responses to the knowledge quiz after visitation than those
indicating other reasons despite both groups taking part in the experience while on the island, as illustrated in Figure 5.16 ($z = -3.88$, $p<0.01$).

![Figure 5.16: Mean knowledge scores before experiencing Penguin Island according to main reason for visitation](image)

Comparison of knowledge scores between the group indicating the PEVC as the main reason for visitation and the “other” reasons group indicated significant differences in the number of correct and incorrect responses (Figure 5.17).
It was found that the group indicating the PEVC as the main reason for visitation to Penguin Island had a significantly higher “correct” score than the “other” reasons group ($z = -6.49$, $p<0.001$). The number of incorrect responses by the “PEVC” reason group was significantly lower than that of the “other” reasons group ($z = -6.88$, $p<0.001$). The interest in this finding lies in the circumstance where members of each group visited the PEVC while on the island but those who stated this facility as their main reason for visitation appeared to have a greater gain in knowledge.

Examination of the change in knowledge scores of the “PEVC” and “other” reasons groups indicated both groups significantly decreased the number of “don’t know” responses after the experience with (Figure 5.18).
There was no significant difference in the magnitude of this change between the groups. However, the PEVC group significantly decreased the number of incorrect responses ($t = -3.87, p<0.02$) while the “other” group showed no significant change. This indicated that both groups appeared more confident of the ‘correct’ responses to the knowledge quiz after the experience (indicated by using significantly less “don’t know” responses). This supports the notion that information transferral is reliant on the respondents’ motivation to learn. That is, the PEVC appeared to benefit those who were motivated by its presence to a greater extent than those who made an opportunistic visit while on the island.

Ballantyne et al (1998) noted that visitors to Fraser Island who were not motivated by exploration and learning were considerably less receptive to acquisition of knowledge than their counterparts. In addition, earlier work by authors such as Shafer (1969) and Hendee et al (1971) suggested that visitors to natural areas function within a fairly specific sphere of awareness. That is, visitors may view a natural area as a place for social interaction or a place for meditative contemplation or a place for exploration and learning. While a visitor may fall into more than one of the categories identified by these authors, the type of interaction with the natural area is strongly influenced by how...
the visitor perceives the natural area as an experience (awareness and appreciation). This in turn may exclude the visitor from viewing their experience in a different context, such as social recreation seekers not responding to the concept of natural areas as a learning experience. Thus, the survey respondents who were motivated by activities not directly related to knowledge acquisition, but who opportunistically visited the penguin visitor centre, were less likely to improve their knowledge than those respondents directly motivated to learn about the penguins. This suggests that a high intensity of interpretation will not influence visitors who are unwilling to learn or engage with the communicated messages.

5.3.3 Attitude toward Penguin Island as a natural area experience

Respondents rated most of the experiential aspects of the site positively before their experience of Penguin Island. Aspects such as beauty, recreation and learning were rated as most applicable prior to visitation while responses to human enhancements, well-being and spirituality were less positive. Other aspects including “Experience pristine island”, “Inspired by island” and “Help protect island” were rated moderately positively. Respondents’ attitude toward the island as a natural area, before their experience, was thus primarily in the context of a place of natural beauty in which to recreate and, to a lesser extent, learn within a conservation frame of reference.

Rating of the experiential aspects of the island after the experience indicated that beauty and recreational interactions rated highest while “Help protect island”, reflecting a conservation ethic, was rated third. Other aspects rated after the site experience such as: “Learn about island”, “Inspired by island”, “Human enhanced island” aspect and “Rejuvenate well-being” were rated moderately while “Spiritual meaning” and “Pristine island” concepts were rated near neutral after the experience of Penguin Island.

Examination of the change in paired responses to attitude toward the site immediately after the experience revealed that respondents significantly altered the rating of several aspects of the site experience. “Learn about island” was significantly reduced in rating after visitation (z = -4.93, p<0.01) while “Human enhanced island” was significantly increased in rating (z = -4.44, p<0.01).

The high rating of “Learn about island” before the experience points to an expectation of exposure to interpretive media for educational purposes. However, it appears that the
island experience did not tend to foster this educational aspect. This may relate to the island being perceived as primarily a recreational destination. That is, respondents actively pursue recreational activities such as walking and swimming and so are less likely to absorb educational messages as previously referred to in the study of Fraser Island visitors by Ballantyne et al (1998).

In this vein, it was interesting to note that while the learning aspect was decreased in mean rating, the mean knowledge score of visitors increased. This may point to a discrepancy between the attitude respondents had toward the island as a learning experience and the knowledge absorbed by respondents while on the island. Another explanation may relate to respondents sharing information during completion of the paired survey after the experience. In this way, survey participants may indicate the correct response without having actually learned it while on the island. This scenario has some credibility as survey participants completed the form while seated on the ferry where the space available and seating arrangement required that passengers sat within close proximity of each other. This may have facilitated or encouraged sharing of information during completion of the survey as discussed in the limitations section 3.7.2.

Attitudes toward the experience of Penguin Island as a “Pristine island” and gaining “Spiritual meaning” from the experience were significantly reduced in rating after the site experience (z = -3.50 & -2.70 respectively, p<0.01). The “Pristine island” aspect was reduced from a moderately positive rating to a near neutral rating after the experience. This may possibly be a function of crowding and human development on the island and the near vicinity of the mainland urban areas. The reduction in rating of “Spiritual meaning” may not hold the same importance as the pristine island change as spirituality was initially rated near neutral before visitation as well as after visitation.

The key changes in terms of respondents’ attitudes toward the experience appeared to be an increased rating of “Rejuvenate well-being”, “Help protect island” and the "Human enhanced island” aspects of the experience. As the management of the island promotes conservation in a recreational context, it would appear that respondents are more conscious of this function of the island after their experience. It seems likely that this has occurred through the high intensity use of on-site interpretation along the theme
of conservation and repetition of messages by various sources. For example, the ferry operator’s speech while travelling to the island includes comments regarding appropriate behaviour and the delicate nature of the island and prominent signs indicating the island is a conservation reserve (with symbolic indication of inappropriate behaviour) reinforced this message on arrival while signs located on the exterior of the PEVC devote considerable space to the delicate nature of the island and the importance of conservation. These messages are again repeated during the penguin feeding and ranger presentation at the PEVC. It seems the intensity of this message may have influenced respondent attitudes.

**Frequency of natural area visitation and attitude toward Penguin Island experience**

Significant differences between natural area visitation groups were evident in the attitude response before experiencing the site (Figure 5.19). In all cases, the “6-12” and “>12” groups rated these aspects significantly greater than the “1-2” and “3-6” groups. There were no significant differences between these group pairs. Consequently, the “1-2” and “3-6” pair of visitation groups will be referred to as the <6 groups while the “6-12” and “>12” pair will be referred to as the >6 groups.

![Figure 5.19: Mean attitude response to Penguin Island before experiencing the site according to natural area visitation.](image-url)
A significant difference was apparent in the response to the “Pristine island” aspect before experiencing the site. The >6 visitation groups rated this aspect as significantly more applicable than the <6 visitation groups ($\chi^2 = 28.04, \text{df} = 3, p<0.01$). Similarly, the >6 groups rated the “Help protect island” aspect as significantly more applicable than did the <6 groups ($\chi^2 = 26.78, \text{df} = 3, p<0.02$) with an essentially identical result in response to the “Inspired by island” statement ($\chi^2 = 36.93, \text{df} = 3, p<0.01$).

The significant differences in rating of the aspects of the site before the experience suggested a relationship between past experience in natural areas and attitudes toward Penguin Island as a natural area experience. The ratings of “Help protect island” before the experience suggested the more frequent natural area respondents surveyed held stronger positive attitudes toward this as an aspect of their experience. Similarly, the “Inspired by island” and “Pristine island” aspects suggested that the more frequent visitation groups had a stronger positive attitude toward Penguin Island in the context of these aspects relative to the less frequent natural area visitors.

The pattern of differences between the visitation groups, after experiencing the island, in response to the “Help protect island”; “Inspired by island” and “Pristine island” remained the same (Figure 5.20). This pointed to accumulated experience in natural areas having an influence on attitudes toward these aspects to a greater extent than the site experience itself.

Figure 5.20: Mean attitude response to Penguin Island experience after experiencing the site according to frequency of natural area visitation
Examination of the magnitudes of change in rating of the various site experience aspects revealed a significant difference in response to the “Human enhanced island” statement ($\chi^2 = 24.76$, df =3 , p<0.01). All but the “>12” visitation group demonstrated a significant increase in the rating of this component in the post visit survey data. This indicated the less frequent visitor groups responded positively to the built aspects of the site experience while the “>12” group did not alter their attitude (Figure 5.21).

![Figure 5.21: Change in attitude toward Penguin Island experience according to frequency of natural area visitation.](image)

While the “>12” group demonstrated no significant alteration in rating of the “Human enhanced island” statement, the remaining less frequent visitation groups demonstrated a significant increase in rating. That is, the “>12” group remained neutral towards this aspect after their experience while the remaining groups altered their response from near neutral to moderately positive. This suggested that the group of respondents with the highest level of accumulated experience in natural areas did not place a high priority on the built aspects while the less frequent natural area visitors appeared to be positively influenced in terms of attitude toward the built aspects of the site. This result complemented the findings of Bixler and Floyd (1997) who commented that those with a lesser positive appreciation for natural areas are more likely to prefer human modified environments.
5.4 Influence of Activities Undertaken at Penguin Island

On-site communication with respondents may take place through the activities available and the interpretation media presented such as signs and displays (Evison, 1981). Activity participation on Penguin Island was significantly related to environmental attitude and awareness and appreciation of the site. Information media used was significantly related to knowledge acquisition but not attitudes or awareness. The findings are discussed in turn.

Penguin Island offers a range of activities including active recreational pursuits, observational and exploration activities and educational experiences. The three most common activities indicated in the visitor survey data were the PEVC, the island walk trail and swimming (which also included snorkelling). As the vast majority of respondents indicated they visited the PEVC, this acted as a constant across all data groupings. The main variation in the activities undertaken by respondents surveyed was between the island walk trails (observation and exploration) and swimming (active recreational). Responses were therefore analysed accordingly. Three groups were identified as defined in Table 5.10.

<table>
<thead>
<tr>
<th>Activity Grouping</th>
<th>Description</th>
<th>No. (% of sample)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swim</td>
<td>respondents who indicated swimming but not walking</td>
<td>n = 31 (29%)</td>
</tr>
<tr>
<td>Swim &amp; walk</td>
<td>respondents who indicated participation in both activities</td>
<td>n = 20 (19%)</td>
</tr>
<tr>
<td>Walk</td>
<td>respondents who indicated walking but not swimming</td>
<td>n = 55 (52%)</td>
</tr>
</tbody>
</table>

Significant differences between the activity groups were found in response to the environmental attitude statements and the attitude toward the experience of Penguin Island statements. There were no significant differences in response to the knowledge aspects of the survey data between the groups. Activity participation was significantly related to frequency of natural area visitation but no other respondent variables. It was
surmised that the relationship between activities and environmental attitude was a function of natural area visitation frequency.

5.4.1 Activities and environmental attitude

Analysis of environmental attitude before experiencing the Penguin Island indicated a significant difference between the “Walk” group and the two swimming groups. There was no significant difference between the “Swim” and “Swim & walk” group (Figure 5.22). While all groups demonstrated apparently ecocentric attitude responses, respondents who indicated involvement in swimming seemed to be more ecocentric in their attitude before experiencing the site than those who did not swim ($\chi^2 = 10.79$, df = 2, $p<0.01$).

![Figure 5.22: Mean environmental attitude response according to activity participation before experiencing Penguin Island.](image)

The difference between the “walk” group and the two other groups that involved swimming was apparently due to a significant difference in response to the statements referring to aspects of human use of the environment where those who swam were significantly more ecocentric in response than those who did not ($\chi^2 = 18.89$, df = 2, $p<0.01$). The difference in response to the “Human use” statements suggested that
respondents who were more strongly ecocentric in terms of the view of the environment as a resource for human exploitation tended to choose swimming as an activity while on the island whereas less ecocentric individuals were more likely to choose the walk trails alone as an activity. There was no significant difference in response, between the swimming and non-swimming groups, to the statements of “Intrinsic ecological value”

Studies such as that of Theodori et al (1998) and Nord et al (1998) reiterate earlier work from the 1970’s stating a significant relationship between environmental attitude and choice of natural area activities. These studies found that ecocentric attitudes were more associated with what were referred to as non-consumptive activities such as hiking, wildlife watching and skiing while those with little or no ecocentric leanings tended towards consumptive activities such as hunting and fishing. Further to this, a study examining environmental attitudes and recreational preferences in the U.S. found a significant relationship between varying degrees of ecocentric attitude and respective recreational preferences. Cordell et al (2002) found that people who were more ecocentric toward concepts of human interaction with the natural environment were likely to prefer swimming (among other activities) as a recreational pastime while people who were less ecocentric mainly preferred hiking (or walking). Both groups were found to value nature for its intrinsic worth equally. Cordell et al (2002) did not discuss the possible reasons for this relationship as the study was primarily concerned with demographic categorisation. An earlier study by Hendee et al (1971) had proposed a number of categorised groups of recreational activities and their significance in terms of interaction with the environment. Among the five categories suggested, swimming was placed under the heading of “active-expressive” recreation. This appears to relate to a greater willingness to interact with the natural environment (Hendee et al, 1971, p31). On the other hand, walking was placed in the “appreciative – symbolic” category that has a focus on viewing scenery and wildlife in a passive manner (Hendee et al, 1971, p29).

This finding was reflected in the Penguin Island attitudinal results where the “Walk” group was seemingly less ecocentric than the “Swim” and “Swim & walk” groups. It thus appears that individuals with relatively strong ecocentric tendencies were more likely to engage in active interaction with the natural environment, such as swimming, while those less inclined toward the ecocentric paradigm apparently engaged in more passive recreational activities, such as walk trails.
The relationship evident between a greater likelihood of interactive recreation and the ecocentric paradigm may be a function of accumulated experience in natural environments affording a greater motivation for interactive recreational pursuits. Accumulated experiences in natural settings are understood to positively enhance ecocentric attitudes through development of a personal connection with natural environments, which also build on familiarity and comfort in natural surroundings (Fakeye & Crompton, 1991; McKercher, 1996). Logical extrapolation of this argument suggests that the stronger ecocentric attitudes of the swimming groups (“Swim”, “Swim & walk”) before experiencing the island suggested a more positive attitude toward the Penguin Island environment, associated with a general familiarity and comfort in being in a natural setting, than the “Walk” group.

This was supported in the Penguin Island survey data by the significantly strong relationship found between frequency of natural area visitation and involvement in the activity of swimming while on the island ($\chi^2 = 37.77$, df = 6, p<0.01). More frequent natural area visitors appeared more likely to partake in swimming than the less frequent visitation groups. For example while 68% of respondents in the >6 natural area visitor groups took part in swimming activities, only 37% of the < 6 groups did the same while on Penguin Island. Cramer’s strength of association statistic shows this to be a moderately strong relationship (Cramer’s V = 0.420).

The greater willingness to swim may metaphorically represent the urge to immerse oneself in the natural environment, and interact at a more intimate level. This could be seen as an expression of the stronger ecocentric attitude of swimmers relative to non-swimmers, who might prefer a distant (more passive) mode of recreation. This supports the notion of a greater accumulation of experience in natural areas equating with greater ecocentric tendencies in environmental attitude that appeared to be subsequently expressed as a willingness for more interactive behaviour. It follows that, at a site offering a variety of activities, the choice of activities undertaken may be influenced by the visitor rather than the variety of activities influencing the visitor.

The post visit response reiterated that the relationship of environmental attitudes between the respective groups remain essentially the same as the pre-visit responses (Figure 5.23).
Figure 5.23: Mean environmental attitude response after experiencing Penguin Island according to activity participation on Penguin Island

All groups demonstrated a significant anthropocentric alteration in attitude to the human use of the natural environment (swim $z = -4.52$; swim/walk $z = -3.87$; walk $z = -6.04$, $p<0.01$). However, the walk only group demonstrated a significantly greater anthropocentric shift than the groups who swam ($\chi^2 = 10.11$, df = 2, $p<0.01$). There was no significant change in rating of the intrinsic ecological value of nature attitude statements or in the total attitude score (Figure 5.27).

The significantly greater anthropocentric shift in attitude toward “Human use” of the environment by the “Walk” group may be an indication that the attitudes respondents bring with them determine the activities they choose which in turn reinforce their perceptions of the natural environment. In other words, the activities did not influence respondent attitudes so much as the attitudes respondents brought influenced activity choice.
Thus it may be hypothesised that a site offering a variety of activities as part of a policy of high intensity on-site interpretation simply allows the visitor to select those activities best suited to their attitudes rather than significantly influencing attitudes of the visitor. However, while the survey data suggested this scenario, providing a variety of activities may also encourage visitors who are willing to try ‘something new’ to step outside their comfort zone, perhaps influencing the attitudes they have toward the site by experiencing it in a new way. Choice of activity at Penguin Island is left entirely to the discretion of the visitor, perhaps rendering the above conjecture less likely than at a site actively encouraging involvement in new experiences.
5.4.2 Activities and attitude toward Penguin Island experience

A significant relationship was evident between the attitudes toward Penguin Island before experiencing it and the activities subsequently undertaken while on the island (Figure 5.28). Significant differences occurred in the rating of “Recreate on island” ($\chi^2 = 9.47$, df = 2, p<0.01); “Learn about island” ($\chi^2 = 12.57$, df = 2, p<0.01) and “Human enhanced island” ($\chi^2 = 8.96$, df = 2, p<0.05). The differences were between those either choosing to swim or those choosing to walk. Significant differences also occurred in the rating of: “Inspired by island” ($\chi^2 = 16.98$, df = 2, p<0.01); and “Pristine island” ($\chi^2 = 11.14$, df = 2, p<0.02). Differences in rating of these aspects occurred between respondents undertaking a single main activity and those involved in multiple activities.

![Figure 5.25: Mean attitude response to Penguin Island before the experience according to activity participation.](image)

The relationship between recreational pursuits and mode of interaction with the environment as described by Hendee et al (1971) may explain the relationship between prior attitudes toward the experience of Penguin Island and the subsequent activities chosen by respondents. As discussed in relation to general environmental attitudes, the activity of walking relates to aesthetic-appreciative interactions with the natural
environment while swimming correlates with active-expressive interactions (Hendee et al, 1971). Therefore, respondents who expressed an attitude toward Penguin Island as a place to learn about nature and appreciate the built facilities would tend to be individuals who prefer walk trails to swimming. Respondents who emphasised recreation to a greater extent would be more likely to take part in swimming activities than those with a lesser emphasis.

The relationship between activity participation and prior attitudes regarding “Pristine island” and “Inspired by island” appeared to relate to the diversity of activities rather than the choice of activities undertaken. That is, while there was no significant difference between the “Walk” group and the ”Swim” group responses, both of these respective groups were significantly different to the “Swim & walk” group response (swim z = -2.027, p<0.05; walk z = -2.13, p<0.05). This difference may relate to the link between natural area activity preferences and environmental attitude. Hendee et al (1971) had previously associated recreational activities with the type of interaction that occurs between the individual and natural settings. The way in which people interact with a natural setting is significantly influenced by their past experience in such settings where more experience is associated with ecocentric attitudes and behaviour (Hammit, 1981; Fakeye & Crompton, 1991; McKercher, 1996). In addition, Cordell et al (2002) described a link between attitude to the environment and recreation choice whereby ecocentric individuals are more likely to prefer a wider variety of activities than those who have anthropocentric tendencies.

While the direct correlation between rating of the “Pristine island” and “Inspired by island” statements was not significant, this may be a function of the limits of the five point rating system. Other variables within the data set point to a link between activity choice, the rating of these statements and environmental attitude. The environmental attitude results show that the “Swim & walk” group was slightly more ecocentric than the remaining groups although the difference as compared with the “Swim” group was not statistically significant. In addition, the more frequent natural area visitation groups (also associated with a more ecocentric attitude) rated the “Pristine island” and “Inspired by island” aspects significantly higher than the less frequent groups.

There was also a significant relationship between frequency of natural area visitation and activity participation ($\chi^2 = 37.77$, df = 6, p<0.01). Of those who participated in
both swimming and walking (“swim & walk”), the majority (60%) visited natural area >6 times per annum. This may explain the link between the activities undertaken and rating of the ‘pristine’ and ‘inspired’ statements according to environmental attitude. That is, respondents with a greater accumulation of past experience on natural areas were more likely to participate in a wider range of activities offered by the site.

This is supported by the ratings of attitude toward Penguin Island after experiencing the site retaining the same statistical relationships between the activity groups as in the survey completed before experiencing the island (Figure 5.29).

![Figure 5.26: Mean attitude response to Penguin Island after experiencing the site according to activity participation.](image)

Examination of the change in ratings revealed significant differences between the activity groups with regard to the “Learn about island” and “Human enhanced island” aspects of the experience were evident in the data collected after the experience (Figure 5.30). While all groups significantly reduced their rating of the “Learn about island” aspect of the experience, the “Swim” group had a significantly greater reduction than the “Walk” group. The “Swim” group and “Walk” group increased their rating of the “Human enhanced” aspect of the experience to a greater extent than the “Swim & walk” group.
The significant difference in alteration of rating of the “Learn about island” may be a function of the relationship between respondent attitudes and their chosen activities. According to Hendee et al (1971), activities in natural areas may be grouped into categories representing the mode of interaction between the individual and the environment. Swimming was categorised into the active-expressive category while walking was categorised as appreciative-symbolic. Ballantyne et al (1998) discussed the link between the main activities carried out by respondents and their willingness to learn about the natural environment. Those involved in more active recreational activities were, by default, less inclined to learn new information than those involved in exploratory (observational) activities. These findings link back to Hendee et al (1971) and may explain the significantly greater decline in rating of the “learn about island” statement by the swimming group when compared with the walking group. The “Appreciative-symbolic” category involved “…appreciation of features of the natural environment…” (Hendee et al, 1971, p29) while the “active expressive” category focused more on active participation rather than appreciation. If these categories are linked to the findings of Ballantyne et al (1998), it may be concluded that individuals involved in the active pastime of swimming are less likely to place importance on learning than those involved in the more exploratory activity of walking. This is suggested by swimmers who significantly reduced the rating of their perception of the
island as a learning experience to a greater extent than the walkers. Thus the range and manner of activities provided by the site influenced visitor attitudes toward learning. Learning in this sense was probably perceived in terms of structured provision of interpretation (signs, talks) and was considered less important by those involved in active recreational pursuits.

5.5 Conclusion

As a natural area site offering a range of on-site interpretation in the form of experiences and media, Penguin Island appears to have significantly influenced respondents in conjunction with certain visitor variables. Significant positive changes were measured in environmental attitude, knowledge and attitude toward the site experience. The primary variables related to influences on attitudes and knowledge were gender; frequency of natural area visitation and activity participation. Gender and past experience in natural areas affected environmental attitudes and attitudes to the site experience while activity participation was related more to the knowledge acquisition and attitudes to the site experience components. The independent variables affecting the site influence on Penguin Island respondents were similar to those of the TTW.

The interpersonal and interactive media at Penguin Island were the most popular as indicated by the higher frequency of use by respondents. This finding reflects Falk and Dierkings’ (1992) comment that visitors tend to spend most of their time looking, smelling, touching and listening, not reading. The availability of a wide range of interpretive media appeared to result in respondents selecting their preferred media type rather than encouraging a more diverse selection of interpretive media experiences. Availability of active recreational type activities at the site, such as swimming, seemed to result in respondents who participated in these activities being less receptive to the learning aspect of their experience. This seemed to be the case even though respondents who visited the island to swim also visited the “Penguin Experience” visitor centre with its intensive use of interpersonal, interactive and text based interpretation.

This means that for effective interpretation to reach all visitors to Penguin Island, messages need to be specifically targeted at individuals and groups involved in active recreational activities on site and who are not likely to be readily receptive to interpretation as mentioned by Ballantyne et al (1998). Alternatively, site design could be manipulated to encourage a ‘learning environment’ through restriction or control of
the range of recreational activities available to create a focus on on-site interpretation. Such an approach may be possible on a small site such as Penguin Island and desirable owing to its delicate ecology and high conservation value. However, imposing such a prescriptive management approach contrary to the long social history of the site, as a natural area used for active recreational pursuits, may prove difficult given the likelihood of visitor resistance to the change.
6 Comparative Influence of High and Low Intensity On-site Interpretation

The TTW site and Penguin Island represent two similar natural area sites with a respective low intensity and high intensity use of on-site interpretation. This is both in regard to the interpretive media used at the sites and the number and type of activities available to visitors. While there were differences in intensity of on-site interpretation, influences on knowledge and attitudes were evident in the data collected from the respective sites as presented and discussed in Chapters 4 and 5. Visitor variables in combination with the particular character of the site experiences coloured these influences.

This chapter compares and contrasts the survey results from the TTW and Penguin Island sites, with their respective low and high intensity of on-site interpretation. The comparative discussion is followed by an overall conclusion for the research presented in this thesis.

6.1 Survey Respondent Demographics

Both paired survey samples (TTW and Penguin Island) demonstrated demographic data, including age groups, social groups and gender that were comparable to the broader natural area visitor population in Australia as identified by the ABS (2002). However, there were marked differences in the categories of natural area visitation frequency and repeat visitation between the TTW and Penguin Island samples.

Penguin Island had a much higher proportion of repeat visitor respondents (47%) as compared with the TTW (13%). The significance of this difference was confirmed by a Chi-square analysis that indicated a significant relationship between the proportion of repeat and first time visitor respondents and the site ($\chi^2 = 50.95, \text{df} = 1, p <0.001$). This was of interest as repeat visitation was a significant factor related to the respondent experience of the site. While first time visitor respondents at both sites were primarily there for the particular activities and experiences offered, repeat visitors had markedly different responses. Repeat visitors to the TTW site were primarily there showing others (54%) while Penguin Island repeat visitor respondents (79%) were primarily
there to experience the island again for themselves with a much smaller proportion bringing others to the site ($\chi^2 = 13.41, df = 1, p<0.001$).

Differences in the level of repeat visitation and the reasons for returning may be explained by the activities available at each site. Penguin Island affords the opportunity for a number of recreational pastimes such as fishing, swimming and picnicking and is close to urban areas, thus being easily accessible. In relation to the categories identified by Hendee et al (1971), Penguin Island offers all of the experiences including: appreciative-symbolic (viewing scenery and wildlife); extractive-symbolic (fishing); passive free play (picnicking); sociable learning through the “Penguin Experience” visitor centre (PEVC) and active-expressive (swimming, boating). On the other hand, the TTW site is remote from major urban areas and restricts visitors to a limited range, mainly appreciative-symbolic activities through passive observation and exploration of the natural area with elements of sociable learning provided by signs and information staff.

Authors such as Fakeye and Crompton (1992) and Ballantyne et al (1998) noted that repeat visitors were more interested in socialisation and active recreation in natural areas rather than exploration and observation. Given this, it is logical that a site that does not cater specifically for socialisation or active recreational activities will have a lower rate of repeat visitation than one that does, such as Penguin Island. This is reinforced by the phenomenon of repeat visitors to the TTW site being motivated by social factors (bringing family and friends to experience it) rather than specifically wanting to explore the site again for themselves. Thus, in order to cultivate on-going repeat visitation, it is necessary for a natural area to provide for a range of activities that include opportunities for socially based interactions.

The frequency of visitation to natural areas as estimated by respondents also revealed a key difference between the two sites. The TTW site survey sample included a minority of visitors who had indicated they did not usually visit natural areas (8% of responses). Penguin Island survey respondents all indicated they had some level of regular annual natural area experience, that is, there were none who indicated they did not usually visit natural areas. Excluding the “none” category of annual natural area visitation from site comparisons revealed there was no significant difference between the frequency of estimated natural area visitation and site of visitation. Thus the primary difference
between the sites was that the TTW attracted some respondents who did not usually visit natural areas while Penguin Island did not.

As noted in the limitations section (3.9) the Penguin Island sample was not representative of the total population as it was taken solely from visitors using the ferry as access. Thus, care must be taken if extrapolating these results to the broader visitor population. Given the limitations of the survey sample, frequency of natural area visitation made an interesting point of difference between the survey samples at each site. This was determined to be a function of the location and focus of the respective sites. While the TTW site is marketed with an emphasis placed on its unique engineering structure in a natural area setting, Penguin Island provides primarily for a nature-based recreational experience. A 1992 management plan, for Penguin Island and the surrounding Shoalwater Islands Marine Park, highlighted the natural aspects that attracted visitors and recommended development of the island as a venue for passive, nature based recreational pursuits in this context (Orr & Pobar, 1992). The development of the TTW structure was significantly influenced by the success of similar engineered structures in other locations in terms of attracting tourists and generating a sustainable revenue base (Winfield, 1996). That is, while the TTW site markets a built structure, in combination with natural aspects, as a central motivation for visitation, Penguin Island relies solely on natural aspects (mainly marine wildlife and beaches). Thus, individuals not usually inclined to visit natural areas may be attracted by the unique built aspects of the TTW while the natural aspects of Penguin Island are not seen as attractive (Bixler & Floyd, 1997).

The emphasis at the TTW site on a built facility as a vehicle for a natural area experience attracted people not normally inclined to visit natural areas, and who were therefore not usually exposed to interpretation in the context of a natural area setting. In this way, the TTW may be viewed as a means of accessing a new audience not readily accessible to CALM and the interpretive messages communicated in a natural area context. Such a phenomenon broadens the audience exposed to the agency’s interpretation rather than simply ‘preaching to the converted’ or communicating with visitors familiar with CALM’s conservation focussed messages. This opportunity was not evident in the Penguin Island survey sample as all indicated some level of natural area visitation.
The absence of interstate visitors and people who do not usually visit natural areas at Penguin Island were the main points of difference between the two site survey samples. Thus, these groups were removed from the TTW data prior to statistical comparison with the Penguin Island data. This ensured that the visitor samples were comparable in terms of independent variables with no ‘additional variables’ in the TTW data that may skew the results of analysis. After removal of the “interstate” resident group and “none” natural area visitation frequency group from the TTW data, n = 188. The following sections compare and contrast the environmental attitude, knowledge and attitude to site experience results from Penguin Island and the TTW sites using the modified sample.

### 6.2 Environmental Attitude

Consideration of the change in environmental attitude measured by the paired survey offered a more meaningful insight than the actual respondent environmental attitude scores as measured before and after the experiences at TTW and Penguin Island. The survey data at both Penguin Island and TTW collected before the respective site experiences demonstrated an ecocentric attitude of respondents toward the environment as did the survey data collected after the experience. The pattern in response to the statements at the two sites suggested respondents were relatively more ecocentric in response to “Human use” of natural areas than when responding to the “Intrinsic ecological value” of natural areas. The disparity in response to the “Human use” statements as compared with the “Intrinsic ecological value” statements was markedly less after the site experiences than before the experiences at both sites. However, while the before and after experience environmental attitude data were similar for the respective sites, the manner of change in response was quite distinct.

The paired survey data enabled changes to be calculated at the individual respondent level as opposed to simply deducting the sample population mean taken after the experience from that taken before. Examining the mean individual change in environmental attitude revealed that respondents were influenced significantly differently by the respective sites in relation to the “Intrinsic ecological value” \( (z = -2.97, \ p<0.01) \) and “Human use” statements \( (z = -2.60, \ p<0.01) \). The difference in the change in response to “Total” environmental attitude evident in Figure 6.1 was also significant according to the Mann-Whitney Test \( (z = 2.40, \ p<0.02) \).
It was postulated that the difference may have been due to the much higher proportion of repeat visitors to Penguin Island as compared with the TTW. Repeat visitors may express different attitudes to first time visitors given the different context and purpose of their visit. However, no significant relationship was found between repeat visitation and environmental attitude as measured within each site survey sample and between the two site samples.

The interest in the different influence of each site on environmental attitude lies in the fact that both the TTW site and Penguin Island promote a strong conservation message to visitors in terms of the physical design and on-site interpretation messages. In accordance with these messages, the measured change in environmental attitude response of the TTW sample indicated an increased ecocentric response across all three components (“Human use”, “Intrinsic ecological value”, “Total” attitude score). On the other hand, the Penguin Island survey data demonstrated a significant anthropocentric shift in response to the “Human use” of natural areas as measured by the environmental attitude scale. The comparison of environmental attitude change between the TTW site and Penguin Island suggest a diametrically opposite survey response after experiencing the respective sites despite the similar emphasis on natural area conservation. This is particularly interesting when considering that Penguin Island has a much more intensive
investment in on-site interpretation, with an ecological conservation theme than the TTW site while the TTW site is highly developed. As the visitor demographics included in analysis and response data collected before the experience were not significantly different between the sites, the difference in measured change in environmental attitude was likely to be related to the different experiences afforded by the sites.

Evison (1981) argued that the character of managed natural areas, and the manner of interaction between people and nature they promote, influenced visitor environmental attitudes to an equal or greater extent than the media installed at a given site. Field & Gough (1998, p39, 40) suggested a similar idea when discussing the visitor experience of the tree top fire lookouts in the southwest forests of Western Australia. Display shelters in the area provide interpretation and information relating to the natural and social history of the sites but the actual experience of climbing to the top of the tree gives visitors a “feel” for the dangers and exertions of the forester’s job. Howard (1998) also commented on the importance of the actual experience visitors take part in as a significant aspect influencing the success of interpretation and other forms of communication. That is, immersion in an experience shapes the manner in which on-site interpretation influences the visitor.

Ultimately, the TTW presents a natural area in the context of a ‘look but don’t touch’ manner, effectively a ‘tree museum’. This effect was created by containing visitors within built structures that act as a physical barrier between the people and the natural area attraction. The ecocentric shift toward “Intrinsic ecological value” concepts at the TTW site appears to be in contrast to the highly developed character of the site with its overt engineering infrastructure that appeals to people not usually attracted to natural area experiences. However, the large economic and engineering investment in a built facility located in a geographically isolated forest of rare trees may have heightened the sense that the ecosystem it represents must be of value. Thus the structure seemed to convey perhaps more of a preservation (rather than conservation) message in terms of the intrinsic value of the forest. That is, the Tingle Forest at the TTW site is presented as a valuable ecological specimen preserved for passive appreciation of its intrinsic value rather than its utilitarian worth to humanity.
On the other hand, Penguin Island functioned within a recreational context, in which visitors actively interacted with the natural area. Visitors are able to literally immerse themselves in the environment at Penguin Island owing to the primarily aquatic based activities available. Hence, the influence on attitudes at this site appeared to manifest as ‘conservation through responsible use’ of the natural environment. Therefore, while media may be used to disseminate messages relating to certain themes and concepts, the context of the site experience creates the paradigm in which the messages are interpreted or placed. This seems to be the case despite the intensity of interpretation used. Consequently, the character of the site design (and activities offered) may be of more importance in influencing attitudes than on-site interpretation.

6.2.1 Environmental attitude and frequency of natural area visitation

The measured environmental attitudes of respondents at each site were significantly, but moderately, correlated with the level of annual natural area visitation. Respondents who were more frequent natural area visitors tended to have more strongly held ecocentric environmental attitudes than the less frequent visitors. This relationship appeared to extend to the magnitude of change in environmental attitude after experiencing the sites. A striking point of difference in environmental attitude response to the respective sites was the changes in regard to the “Human use” statements (Figure 6.2). The ecocentric shift in response of TTW survey participants was greatest with the most frequent natural area visitors. In contrast, the significant anthropocentric shift in response to the human use statements at Penguin Island was greatest with the less frequent natural area visitors while the most frequent visitors demonstrated no change.
Figure 6.2: Mean change in response to human use attitude statements based on individually paired changes at each site.

When comparing the two sites, there was no significant difference in mean individual change in response to the “Human use” environmental attitude statements between the “1-2” and “3-6” TTW groups and the “>12” Penguin Island group. Comparison of each respective group response between sites indicated a significant difference based on Mann-Whitney tests at $\alpha = 0.05$ (Table 6.1).

Table 6.1: Comparison of change in response to human use statements categorised by natural area visitation frequency

<table>
<thead>
<tr>
<th>Frequency of annual natural area visitation</th>
<th>Mann-Whitney U Test</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>z score</td>
<td>p value</td>
</tr>
<tr>
<td>1-2</td>
<td>-2.13</td>
<td>0.03</td>
</tr>
<tr>
<td>3-6</td>
<td>-2.06</td>
<td>0.04</td>
</tr>
<tr>
<td>6-12</td>
<td>-2.18</td>
<td>0.03</td>
</tr>
<tr>
<td>&gt;12</td>
<td>-2.21</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Strongly held attitudes are more difficult to influence and are thus less likely to alter in the short term as a result of exposure to a single experience (McGuire, 1985). This is
especially so if the influencing factor is contrary to the attitude held by the individual. Therefore, the salient ecocentric attitudes of the most frequent natural area visitation group were less likely to be influenced than the less definite attitudes of the infrequent natural area visitors immediately after the site experience. This effect was possibly amplified at Penguin Island owing to the apparent anthropocentric conservation ethic that was ideologically contrary to the mean environmental attitude held by frequent natural area visitors. Thus while past experience in natural areas significantly influenced expression of environmental attitudes, there seems to be a relationship whereby the character of the site experience determines the magnitude of change. This concept is supported by authors such as Tilden (1957), Emmons (1997) and Bowers (2000) who emphasised the importance of situational context as part of any environmental education or interpretation experience. This may also relate to the “discounting cue” effect discussed by Watts and McGuire (1964) and Gruder et al (1978) were the immediate influence of a communicated message is heavily effect by the character of the source. Where the attitudinal stance of a source was perceived to be in opposition to the attitude held by the audience, the audience would discount the information. Extrapolating this to the context of communication generated by a site experience (as an equivalent to the context of attitude related to a source of communication), it may be surmised that where an experience creates a context that is in opposition to attitudes held by visitors, communicated messages may be discounted and thus have little immediate positive influence on the respective visitor.

6.3 Knowledge

Measurement of knowledge in this thesis was based on the ability of respondents to recall facts included in the on-site interpretive media. Knowledge was measured using a quiz style format, as explained in sections 1.4.3 and 3.3.3. The respondents selected either true, false or don’t know in response to a series of factual statements based on interpretive media designed by site management.

Comparison of the influence of the TTW site and Penguin Island on knowledge acquisition indicated no significant difference in terms of the number of correct responses before or after the experience. Calculation of the mean change in individually paired knowledge scores indicated that each site had a positive influence with a mean “Correct” score change of approximately +1.5 (Figure 6.3).
This is interesting given the contrast in intensity of interpretation between each site, though the higher intensity of interpretation at Penguin Island may be somewhat counteracted by a greater focus on a variety of active recreational activities. However, the survey results demonstrated that the majority of respondents experienced the PEVC and all ferry users were provided with a commentary about the island by the operator. Thus Penguin Island visitors were exposed to more intensive interpretation than those at the TTW even if they did not visit the PEVC or access the numerous other sources of interpretation available on the island. The findings therefore suggest that knowledge gain (at least as measured by a fact quiz) is not entirely reliant on the intensity of interpretation an individual is exposed to. It would seem that measurement of knowledge gain is more a measure of efficiency of media design rather than a measure of extent of influence of the interpretive messages. Therefore, measurement of knowledge gain is only important if information transferral is the objective of the on-site media assessment.

The character of the site experience influenced the reasons for visitation, and this in turn influenced visitor receptiveness to knowledge acquisition. This was highlighted by the phenomenon whereby all surveyed Penguin Island visitors experienced the PEVC.
irrespective of their main reasons for visitation. This scenario was a result of including the price of entry to the interpretive centre in the ferry crossing ticket as described in Chapter 3 (section 3.1.2). Thus, a superficial homogeneity of experience was created where all respondents were exposed to the same interpretive activity at some point during their experience. However, those visiting the island specifically for learning and exploration had a greater knowledge gain than those visiting for other recreational pursuits.

Authors such as Hendee et al (1971) and Ballantyne et al (1998) identified relationships between the receptivity to learning and visitor reasons for visiting natural areas. They categorised groups specifically relating to learning and exploration along with other types of recreational activities. The authors found that those interested in recreation were not receptive to learning, a notion supported by the findings of this thesis. Respondents visiting Penguin Island who for reasons relating to active recreational pursuits were less inclined toward knowledge gain than those specifically seeking a learning experience. This was despite both groups being exposed to at least two interpersonal interpretive activities, the ‘most powerful’ form of interpretation in terms of influencing visitors (see Chapter 2 section 2.6.3; also Hall and McArthur, 1998, p176). This suggests that a natural area site that offers a range of activities, in addition to interpretation, will effectively influence only those that are specifically interested in learning irrespective of whether all visitors are exposed to interpretive media.

The TTW site offers a low intensity but homogenous experience in terms of the limited activities and interpretation available at the site. Given the limited scope of activities available at the site, respondents’ reasons for visitation were similarly limited in range. Reasons for visitation of TTW respondents were primarily exploration and learning based. Thus the variation in reasons given for visitation to the TTW site was not associated with influences on the extent (or lack of) knowledge gain.

This suggested that a natural area offering a singular (or homogenous) experience will effectively transfer knowledge of the natural area in the short term, even with a low intensity of interpretation, because the limited activities available limit the reasons for visitation. A site such as Penguin Island that offers a broad range of activities, some of which contravene receptiveness to on-site interpretation, will only influence the knowledge of those visiting for the specific reason of learning. That is, the TTW
arguably could positively influence the knowledge gain for a greater proportion of the visitor population, than Penguin Island, owing to the specific exploration and learning based activity it offers that limit the reasons for going to the site.

Interestingly, while the TTW site limits activities (and thus reasons for visiting) to learning and exploration, the two styles of walk trail offered by the TTW site was significantly related to the influence on respondents’ knowledge. The more regimented, narrow and strictly one-way nature of the TTW walk trail was less conducive to knowledge gain than the AEW, which offered more space and freedom of movement. The AEW design, with its wider boardwalks and meandering course and choice of direction, may have reduced the visitor perceptions of crowding during the walk trail experience.

Casual observations made, and personal experiences of the researcher, during survey periods indicated crowding may be a problem on the TTW structure during peak visitation times. Crowding became especially evident when coach tour buses arrived at the site (approximately 10 per day during peak times) with groups of up to 50 people attempting to access the TTW simultaneously. The crowding was a product of large numbers of visitors in combination with the narrow catwalks (about 1m wide) and limited space on the viewing platforms on the TTW. The limited space for movement meant visitors wishing to continue along the walk trail must either push past others in the confined space or wait for those in front to move on. Additionally, those wishing to pause and observe the surrounding forest must either tolerate a stream of visitors brushing past or feel obliged to move on. The close proximity of others and the loss of autonomy through the inconvenience created when pausing on the catwalks are key components that function to create feelings of crowding (McManus 1998). Crowding then generates stress and negative feelings in visitors. Tilden (1957), Evison (1981) and Hammit (1981), among others highlighted the importance of providing positive natural area experiences to promote visitor engagement (including learning). From this, it may be surmised that an experience associated with crowding, such as the TTW trail, reduces the likelihood of positively influencing visitor knowledge.

Aside from the variation in experience between the AEW and the TTW, the limited natural area experience combined with low intensity interpretation appeared to be as effective in knowledge transferral as the combination of a broad range of activities and a
higher intensity of interpretation. If a site offers a single type of experience, visitors
will expect this and respond accordingly. If the site offers a range of experiences, the
visiting population will be divided amongst those wishing to learn and explore and
those wishing to participate in other activities. The use of innovative media, or
inclusion of the cost of interpretive activities in the entry fee, may encourage all visitors
to take part but those motivated by learning benefit to a greater extent than those not. A
site offering a singular experience seemingly does not need to rely as much on
innovative media to attract attention compared to a site offering a range of experiences.
Therefore, a site offering a range of experiences requires investment in a broad range of
media to achieve knowledge transferral objectives while a site with a limited or singular
range of activities does not.

Knowledge gain and environmental attitude were not significantly related. This result
confirms the findings of earlier studies such as Burrus-Bammel (1978) and Howard
(2000). All respondents, at both of the sites, who used on-site media demonstrated an
increase in knowledge irrespective of any attitudinal change. Measurement of
knowledge gain is more a measure of efficiency of media design rather than a measure
of extent of influence of the interpretive messages. Therefore, measurement of
knowledge gain is only important if information transferral is the objective of the on-
site media assessment. However, on-site interpretation, in aiming to create meaning for
the visitors’ experience, also involves influencing attitudes. If attempting to assess this
aspect of the influence of on-site interpretation on visitors, it is thus not necessary to
measure the level of factual knowledge gained.

The following section discusses the influence of Penguin Island and the TTW site on
respondent attitudes to the respective sites. For the purposes of comparison, the
statements that make up the attitude to site experience component of the survey have
been altered during analysis from referring to the natural area site specifically (e.g.
“Beauty of island”/“Beauty of forest”) to a more generic statement (e.g. “Beauty of
site”). “Site” is intended to represent the natural area experiences of the TTW and
Penguin Island specifically.
6.4 Attitude to Site Experience

A fundamental experiential difference between the TTW and Penguin Island exists in the variety of activities available. This appeared to influence respondent attitudes toward the respective sites in some ways but not others. Respondents at both sites rated the “Beauty of site” as an important aspect of their experience. Respondents at both sites also rated the “Help protect site” aspect moderately and seemed to increase this rating after their experience. This perhaps relates to comments by Heimstra and McFarling (1974) who hypothesised that people visit natural areas to “reconnect” with nature and escape the relative monotony of urban living.

There were three aspects rated significantly differently in the responses to each site before the experience that reflected on the particular character of what each site offered. Rating of “Recreate at site” was rated significantly higher by Penguin Island respondents relative to TTW respondents ($z = -5.22$, $p<0.001$). This highlighted an apparent difference between the two sites as natural area destinations where the respondent attitude toward Penguin Island was as a recreational destination while TTW was less so. Similarly, TTW respondents rated the “Pristine site” aspect significantly higher than Penguin Island respondents ($z = -2.43$, $p<0.02$). This seemed to reflect on the passive observation based experience at TTW, centred on admiration of the forest (tree museum), while Penguin offers active recreation in a natural area context perhaps meaning pristine nature is not as high a priority.

TTW respondents rated “Beauty of site” as significantly more applicable than Penguin Island respondents before the experience. This again suggested the aesthetics of the natural surroundings are more important for TTW respondents than those at Penguin Island ($z = -2.28$, $p<0.05$). The focus of the TTW site on observation and exploration of the forest contrasted with Penguin Island’s more active range of experiences, which in turn affected visitor attitudes toward the site as an experience.

It was interesting to note that change in the visitor rating of the “Learn about site” aspect of the experience was either increased or remained consistently high in the TTW survey results while Penguin Island data indicated a significant greater decline in rating after the visit ($z = 4.46$, $p<0.001$; Figure 6.4). This result is of interest when considered in the context of the respective intensities of on-site interpretive media used. Penguin Island’s relatively high intensity of interpretation seems not to have encouraged
attitudes toward the site as a learning experience, but rather attitudes were significantly reduced in this context after the experience.

It seems that the context of the visit, which forms the major difference between the two sites, has influenced visitor perceptions of the learning aspect of the site experience. This may also relate back to the differences in opinion between Moscardo and Woods (2001) and McKercher (1993). McKercher (1993) stated that natural area visitors were simply leisure consumers and are not seeking intellectual enlightenment. Moscardo and Woods (2001) later asserted that visitors to natural area sites were increasingly expecting educational style experiences, as was evident in the popularity of on-site interpretation such as that offered by the Skyrail in Queensland, Australia.

This study suggests that the context of the site may influence the priority of learning about the natural ecology of the area in question. For example, Moscardo and Woods’ (1998) opinion that natural area visitors were increasingly actively seeking knowledge through educational experiences was based on research at the Skyrail. The Skyrail is a high profile, passive observation experience comprised of a ride in a cable car over the canopy of a tropical forest with several stops incorporating boardwalks through the forest and interpretation centres. In other words, the Skyrail offers a somewhat similar experience to the TTW except on a much larger scale with more infrastructure and on-site interpretation. The reason for visiting the Skyrail must therefore be primarily limited to learning and exploration, as with the TTW. Thus, most of the visitors to Skyrail would probably be interested in accessing interpretation to learn about the forest, which was reflected in the observation of Moscardo and Woods (1998) that natural area visitors were increasingly and actively seeking educational experiences.

This may not be so for other natural area destinations that afford experiences alternate to, or other than, those related to learning and exploration. That is, the “leisure consumer” claim by McKercher (1993) could be supported by data collected from Penguin Island where a significant number of visitors visit the island for reasons other than education owing to the diversity of activities offered. Even when exposed to on-site interpretation, the reason for visiting appeared to override the receptivity to interpretation. Thus, the character of the site may determine whether it is visited primarily by “leisure consumers” or those actively seeking a learning experience.
Respondents at both sites decreased their rating of the “Pristine site” component. This may reflect the small size of each site coupled with the large number of visitors confined to specific areas. Confinement of visitors to small areas coupled with large visitor numbers might often impinge upon enjoyment of the natural aspects of the natural area (Morgan & Lok, 2000). It was interesting to note that the rating of the “Pristine site” aspect was not significantly correlated with any other aspects of the experience at either site. This suggested that while the character of the sites did not positively influence attitudes in terms of experiencing a pristine natural area, this was not associated with other aspects of the experience such as “Beauty of site” and “Inspired by site”. Thus the rating of “Pristine site” before the experience may reflect an underlying urge to get back to nature, as mentioned by Heimstra and McFarling (1974) among others, while the reality of the experience does not afford this opportunity, but does not negatively impact on other aspects of the experience.

It seems that the experiential context of the site had a greater influence on respondents than the intensity of interpretation. This was demonstrated by the attitudes to each site as a learning experience being statistically the same before the experience. This was followed by a significant reduction in rating of Penguin Island, with its intense on-site interpretation, as a learning experience while the attitude in this regard to the low

Figure 6.4: Mean individually calculated change in paired survey ratings of attitude to experience of TTW and Penguin Island.
intensity TTW site remained unchanged after the experience. The relationship between interpretive media used and the influence on respondents is discussed in the following section.

A point of interest for the site managers and CALM might be the apparent decline in the rating of approximately half the site attributes measured. The instance where the rating of these attributes was reduced independently at both sites may be of concern in relation to achieving the objectives of the on-site interpretation. Problems may arise if the design of the site and the experience it offers does not complement the on-site interpretation. The relationship between the influence of the site on the respondents and the design of the site is discussed in section 6.6

6.5 Diversity of Media and Visitor Influence

Various respondent types preferred differing media or combinations of media as demonstrated at Penguin Island. Media preferences relate to preferred methods of acquiring information, which, in turn, may generate a greater efficiency of message transferral. While the TTW site used only one main type of media (text based) this should theoretically restrict the influence on the visitor population, as it would exclude those who prefer other forms of interpretation. This appears to have been compensated for in the character and design of the site. All visitors to the site participated in the same activities generally in the same sequence as determined by the one-way TTW walk trail loop followed by the lower profile AEW loop. While visitors bring their own meaning to a site, this is subsequently influenced by the manner in which the site is experienced. In contrast, paying visitors who take part in swimming or fishing at Penguin Island may form a different view of the island in relation to those who simply undertake the walk trails or picnic on the island. The TTW effectively determines that all visitors to the site partake in the same walks in the same sequence. The museum like experience of the TTW therefore may encourage a greater receptivity to the signs while the recreational variety of Penguin Island requires varied media to encourage engagement by visitors.

The adoption of a multimedia approach at Penguin Island appeared to primarily cater to the preferences of respondents in selecting media they found most attractive or useful. This mirrors the sign trial at the TTW where addition of signs along the TTW did not
significantly influence attitudes or knowledge but did result in fewer suggestions for more signs and information. Similarly, the differences in attitude and knowledge influences of the various types of media used at Penguin Island was more related to the type of respondent using that resource rather than any intrinsic advantage of a particular mode of communication. While the Touch Tables were universally popular, the extent to which respondents engaged with more detailed information sources depended on variables such as repeat visitation, social group and past experience in natural areas. Thus, as with the addition of trail-side signs at the TTW, provision of various media at Penguin Island appeared to be more related to visitor satisfaction rather than extent of influence within the context of this survey. The use of a broad range of media at Penguin Island may operate to some extent in attracting those who would otherwise show no interest but as non-paying visitors were not surveyed, this lies outside the bounds of this thesis.

While most visitors surveyed at Penguin Island accessed some form of on-site media, the main focus of the site was as a recreational destination. In this sense, Penguin Island represents a destination primarily designed for McKercher’s (1993) “leisure consumers”. The TTW is essentially comprised of observational activities within the confines of strictly defined one-way walk trails, placing the focus of the site into a largely learning context. This correlates with the Sky Rail experience, described by Moscardo and Woods (1998) in which visitors travel along a one-way path experiencing interpretive and other media in a sequential manner and maintaining a largely passive observational role that encourages the attendance of those ‘actively seeking educational experiences’. The extent to which on-site interpretive media is used by visitors appears to be intimately linked to the design (hence experiential) focus of the site where installation of a high intensity of interpretive media in itself does not equate with a higher level of use by, or greater influence on, the visitor population as a whole.

6.6 Site Design and Influence

The responsiveness to on-site environmental interpretation is related to the main reasons for visitation and the main reason for visitation is, in turn, influenced by the site design and activities available. As demonstrated by this research, the same conservation message, presented in different experiential contexts may have entirely different outcomes in terms of influence on the respondent. Therefore, site design and the
character and extent of influence on individuals is fundamentally linked to natural area site design. Authors such as Evison (1981) and McArthur and Hall (1993b) highlighted the significant influence of site design to the visitor experience. It is thus logical that planning of natural area sites, must incorporate any intended educational agenda from the conceptual stages, rather than adding them at a later stage. That is, the type of activity determined by the site design is as much a part of the educational experience as the medium and intensity of interpretation.

This concept may appear straightforward, but when placed in the context of natural area management in Australia, certain complexities become evident. To use a specific natural area management agency example, the two sites used in this research have been public natural area destinations for many decades prior to the establishment of the department of CALM. Penguin Island and the TTW have a long tradition of visitation that revolves around particular styles of experience specific to each site, which arguably did not include conservation as a primary goal. This point is highlighted by the collapse of an iconic tree in the Tingle Forest near the contemporary TTW site that was a direct result of visitor impacts (Winfield, 1996). Similarly, Penguin Island was severely ecologically and physically degraded by its long history of recreational use prior to the infrastructure modifications installed by CALM in the mid 1990s (Orr & Pobar, 1992; Dans, 1996-97). Thus, the agency effectively inherited the social history of these natural areas, which did not include an effective conservation ethic, upon which the legislative mandate requires a strong conservation ethic to be applied (CALM, 1996a; CALM, 2000).

As CALM is a custodian of the public estate, their management approach must theoretically reflect the public interest. This is demonstrated by the management plan for the ecologically sensitive Shoal Water Islands Marine Park that includes Penguin Island emphasising the strong recreational tradition of visitor use of the island (Orr & Pobar, 1992). The built facilities and management style were thus designed to incorporate this tradition. From this it is apparent that site design may be influenced by visitor demand. If this demand does not include an educational agenda, as suggested by the leisure consumer concept of McKercher (1993), attempts to impose such objectives will be strongly flavoured by the design dictated by the social history of the site.
The TTW site is an example in which the character of the experience was dramatically altered to cater for urgent action to ensure ecological conservation (Winfield, 1996). Where visitors once roamed freely through the Tingle Forest, they are now strictly confined to predetermined pathways. Despite this, the fundamental reason for visiting the area to experience the forest and see the trees has not been changed. Rather, CALM has taken the experience and refined it. The exploration and learning tradition of the experience had been preserved and opportunistically lends itself to the conservation messages put in place by CALM relatively recently. Therefore, while the natural area site design and experience influences the manner in which visitors interpret educational communication, site design and experience is itself influenced by the history of visitation.

6.7 Conclusion

This thesis set out to determine the immediate influence of varying intensities of casual on-site interpretation on surveyed visitors at two natural area sites, the TTW site and Penguin Island. This was framed in the context of measurement of environmental attitudes, knowledge and attitude to the site experience. The attitude and knowledge components form a core part of the intended sphere of influence of environmental interpretation on visitors to natural areas.

Assessment of this aspect of casual interpretation at natural area sites has been highlighted as a significant gap in management agency evaluation of the success (or otherwise) of casual on-site interpretive media. Most management agency assessments of natural area sites focuses primarily on economic and environmental management and marketing related concerns (e.g. visitor satisfaction). This is despite many agencies in Australia and New Zealand having natural area site objectives relating to influencing attitudes and knowledge through use of interpretive media to add meaning or “enrich” the experience of the visitor. This thesis has provided a foundation for addressing this gap in assessment of casual on-site interpretation.

Measurement of the influence of interpretation on visitor attitudes and knowledge immediately before and after a site experience enabled a direct link to be made between the measured influences and the specific site and its associated interpretive media. The ability to directly link influences on visitor attitudes and knowledge to a specific natural
area experience affords natural area managers the opportunity to gain an insight into the effectiveness of the interpretation methods used at the site in this context. Evaluation of the influence of on-site interpretation using mail-back surveys and other delayed response methods cannot be directly linked to a particular site owing to the possibility of the respondents being exposed to other influencing factors in the intervening time. Being able to link specific on-site interpretation to particular influences on visitors may function to aid the management agency in the evaluation of the nature of success, or otherwise, of the interpretive media used.

Both the TTW and Penguin Island sites were found to influence respondents in different ways. However, the differences related directly to the character of the site experience and visitor variables more so than the intensity of on-site interpretation. Frequency of natural area visitation was found to be a significant factor in relation to the influence of the site as was the reason given for visitation and the type of activities undertaken. The latter variables are directly related to the activities (and therefore, experience) the sites offer.

It seems that the influence of on-site interpretation does not rely on investment in a high intensity or variety of on-site interpretation but is more determined by the context of the site experience and the type of visitors it attracts. The TTW offers a low intensity of primarily text based on-site interpretation coupled with a restriction of activities to a passive observational experience of the forest. The site has a distinctive walk trail in the form of the TTW structure that functions as a draw card for a range of visitors, including individuals who are not usually inclined to visit natural areas. The TTW site influenced respondents in terms of encouraging a more ecocentric view of the human use of the surrounding forest. This was perhaps a function of the museum style experience where visitors observe the natural attraction from behind physical barriers, giving the impression of a forest that should not be touched by people, a preserved specimen. It seemed that this was a function of the experiential context of the site more than the influence of the conservation messages in the on-site interpretation alone.

The effect of experiential context was highlighted when comparing the TTW site with Penguin Island, a site with a much higher intensity of on-site interpretation communicating a strong conservation message to visitors. In contrast with the limited activities offered at the TTW site, the diverse range of recreational activities offered by
Penguin Island flavoured the influence of the site experience on respondents. This was evident in the anthropocentric shift in attitudes toward the human use of the environment despite the intensive use of on-site interpretation focussed on conservation of the natural area as an important breeding ground for marine fauna. It seems that the conservation message was received in the context of active recreational use of natural areas.

In terms of the experience offered by the TTW, Penguin Island and other natural area destinations in WA, CALM has inherited the social history along with the responsibility for management. The social history flavours the context of the site experience and the meaning visitors take from the conservation messages communicated through on-site interpretation. That is, Penguin Island has a long history as a destination for active recreation while the TTW site is located in an area with a long history as a place to admire the large trees. Installation of interpretation on-site, irrespective of the intensity and the type of conservation messages, will be significantly affected by the history of use.

6.7.1 Recommendations for natural area managers

The main message for site managers rising from this research is based on the relationship between the activities a site offers and the objectives of interpretation. On-site interpretive media design should be incorporated into the total site design at the planning stage rather than as a post hoc add-on as is commonly practiced. This will ensure that the presentation of the on-site interpretation will meld with the site design and activities through careful consideration of what is most appropriate for the specific site.

The intensity of interpretation needs to be balanced with the issue of visitor satisfaction. While low intensity interpretation appeared to significantly influence respondents, it caused some angst amongst a significant proportion of respondents at the TTW site. A low intensity of on-site interpretation led to dissatisfaction with the availability of information about the site. Addition of trail-side signs reduced the concern expressed by respondents about the lack of accessible information. This suggests that the type and level of interpretation should take into account what is expected by visitors when designing an experience in order to address satisfaction.
Finally, assessment of the extent of influence of casual on-site interpretation on attitudes is complex and the development of a simple tool to do this may be difficult to achieve. Although this research was based on a survey instrument intended as a rapid and relatively simple method of attitude assessment, considerable time and specialised knowledge was required to collect and analyse the data. This may mean that use of on-site staff in the assessment of interpretation in this sense may not be a practical option owing to lack of time and expertise.

6.7.2 Further research

The research presented in this thesis has highlighted several areas for future research to shed further light on the relationship between visitors and natural area experiences. Examination of the relationship between experiential context, visitor attitudes toward the learning aspect afforded by the site and the actual extent of knowledge gain by the visitor using more in-depth methods such as discussion groups and personal interviews may provide a more detailed insight. While this would afford greater understanding of the influence of the site on visitors, the methodology may prove difficult to apply in a manner that allows before and after measurement of attitudes and knowledge without a significant reactivity bias. Self reporting of changes in knowledge and attitudes after an experience may not be fully reliable owing to the tendency for survey participants to provide ‘the correct answer’.

This research indicated that crowding may have a detrimental effect on the receptiveness of visitors to on-site interpretation. This was assumed to rise from generation of negative feelings that in turn, create a poor learning environment. Further research into the relationship between crowding and influence of on-site interpretation at natural area destinations may be warranted. In relation to this, investigating the factors behind how visitors perceive a site as a learning experience versus how much they actually learn may be of interest in terms of site design and interpretation.

This thesis was based on surveying visitors exposed to a given level of on-site interpretation within a particular experiential context. Investigation of the intensity of on-site interpretation natural area visitors expect in varying experiential contexts may assist in identifying appropriate intensities and types of on-site interpretive media for
given sites. This could include experiences such as dive trails that combine interpretation with an intensive activity.

Another avenue for further study lies in the relationship between influence on natural area visitors and on-site interpretation. This thesis focussed on the quantity of interpretation but did not consider the relationship between the quality of interpretation and influence on the visitor. Such research may first require the development of a tool for assessing the quality of interpretation at a site, then a method for relating quality with influence on visitors.

There are a variety of other potential areas of more detailed research in relation to visitor characteristics and the influence of on-site interpretation. This might include demographics, motivations, types of activities, group size and recreation activities available. While some of these aspects were considered in this thesis, this was in the form of very basic data or speculation.

Finally, investigation of the influence of a range of given intensities of interpretation on visitors within a particular experiential context may shed further light on the subject matter within this thesis. For example, investigating the influence of a site that has a limited range of activities but with a high intensity of interpretation, such as the Skyrail in Queensland, relative to a site such as the TTW. Alternately, the same study could be conducted on a site with a broad range of activities combined with a low intensity of interpretation.

This thesis has explored the influence of different intensities of natural area on-site interpretation on attitudes and knowledge. Some clear lessons for natural area managers have been highlighted in terms of the relationship between site design and interpretive design. The complexity of the factors involved, including: site design and available activities; past experience of visitors in natural areas; and intensity and diversity of on-site interpretation provide opportunities for further research and exploration of the relationship between natural area sites and influence on visitor attitudes.
7 References


ANZECC (1999) *Best Practice in Park Interpretation and Education*. Department of Natural Resources and Environment, Victoria, February 1999.


