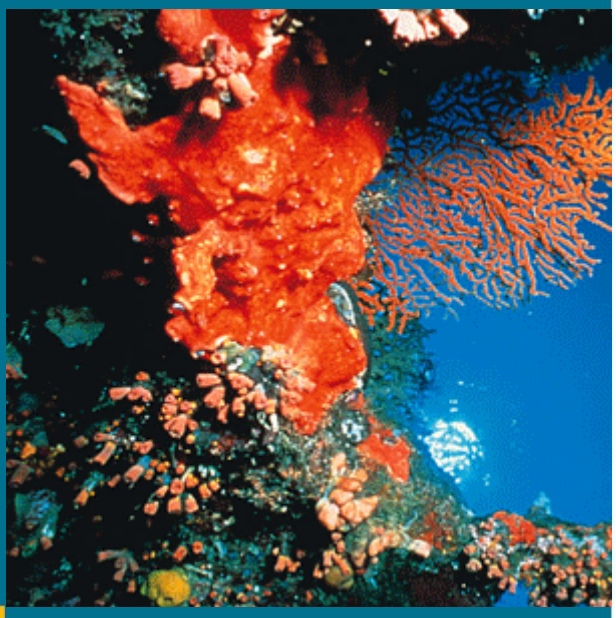
people place heritage

CONTEXT

DEFINING THE AESTHETIC VALUES OF THE GREAT BARRIER REEF

Final Report

February 2013



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Report Register

This report register documents the development and issue of the report entitled *Defining the aesthetic values of the Great Barrier Reef: Report 1 Methodology* undertaken by Context Pty Ltd in accordance with our internal quality management system.

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EXECUTIVE SUMMARY

Overview

The Great Barrier Reef was declared a marine park in 1975, with the passing of Commonwealth legislation that also established the Great Barrier Reef Marine Park Authority (GBRMPA). In 1981 the Great Barrier Reef was added to the World Heritage List in recognition of its Outstanding Universal Value (OUV). Throughout this report the abbreviation GBR means the Great Barrier Reef World Heritage Area.

In 2012, a monitoring mission established under the auspices of the World Heritage Committee visited the Great Barrier Reef to assess the state of conservation of the Great Barrier Reef World Heritage property and to contribute to the strategic assessment process (see Appendix 1). The mission report noted that the aesthetic values of the property are less well understood than other aspects of the property and recommended that 'further work is needed in relation to identifying and documenting the attributes related to the aesthetic values of the property' (IUCN 2012: 36). Their finding is consistent with the Lucas et al (1997) review of the OUV of the GBR, which noted the gap in knowledge of the aesthetic values of the GBR. (The Lucas et al report is discussed further in *Section 4.1*.)

In response to the recommendations of the monitoring mission and the World Heritage Committee, the Australian Government has undertaken a number of actions. One has been to commission this project to consider the aesthetic values of the Great Barrier Reef World Heritage Area.

This project was commissioned by the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) in June 2012 and completed in December 2012, with the final report submitted in February 2013. The consultant team was led by Context Pty Ltd, and comprised Ms Chris Johnston, Dr Anita Smith, John Dyke and Jessie Briggs.

Aims

1. Identify, define and assess the aesthetic values of the Great Barrier Reef World Heritage Area (GBR) in relation to the aesthetic component of Criterion vii - *containing superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance* - by expanding the understanding of the relatively brief statements of aesthetic value in the Retrospective Statement of Outstanding Universal Value (RSoOUV); this is contained in Appendix 2
2. Define, and where possible map the attributes that embody these values
3. Consider the potential impacts of a set of defined actions on the attributes associated with the defined aesthetic values (sensitivity analysis)

Project structure

The core work in the project involved developing a draft methodology, then after review, refining and applying it.

There were two elements to the methodology

1. Assessing aesthetic values
2. Sensitivity and impact assessment.

The project was delivered through a series of three reports, and this final report reflects the thinking and steps taken in undertaking the project, and the original structure of project reporting. *Section 1.3* includes a diagram which shows the main steps in the project.

This Executive Summary provides a guide to the report.

Framing the assessment – Section 2

A key starting point for this project was to consider how aesthetic values are considered in the World Heritage system in relation to Criterion vii.

This section starts by describing the World Heritage system and the development of the current Criterion vii which addresses aesthetic value *(Section 2.1.1 – 2.1.2)*.

We then examine 23 properties inscribed under Criterion vii since 2003, selecting this period to reflect major revisions to the Operation Guidelines. Of these 23 places, 17 are terrestrial and 6 primarily marine. *Section 2.1.3* discusses how the aesthetic values of these properties are established, and Appendix 3 provides a description of their values under Criterion vii.

In *Section 2.1.4* we look at how threats to and impacts on 'aesthetic values or natural beauty' have been considered in both the nomination process and in relevant State of Conservation Reports.

From this examination we note:

- Statements of OUV that address Criterion vii rarely make a clear or specific distinction between the two elements of the criterion – 'superlative natural phenomena' and 'natural beauty or aesthetic value'. Further, the relation between these two elements of the criterion is not defined, even though they exist together within the one criterion.
- There is guidance in relation to 'superlative natural phenomena' but there are no systematic methodologies for, or approaches to, the assessment of aesthetic importance or natural beauty in the World Heritage system.
- The values under Criterion viii, ix or x always lead the arguments for outstanding universal value of a property rather than those of Criterion vii, and the attributes of aesthetic values are almost always only those identified under the other natural criteria - that is Criterion viii, ix or x.
- Justification of aesthetic values and natural beauty in Statements of Outstanding Universal Value relies on the rhetorical power of description of the attributes.
- The aesthetic values are almost always limited to visual aspects of the property and its attributes and for terrestrial properties are described in terms of scenic beauty.
- Threats and impacts to the attributes of OUV in relation to Criterion vii are those defined for the other natural values criteria (Criterion viii, ix or x) as the attributes for aesthetic values are derived from those for other natural values. This is rarely explicit in SoOUV or IUCN evaluations.

This means that aesthetic values of a World Heritage listed property, including the GBR, that are not underpinned by the attributes of other natural values are not likely to be considered as of OUV. This reinforces the need for an approach to assessing aesthetic values in the World Heritage system that is not dependent on the attributes of other values.

In considering marine properties, we observed that such places are described – and experienced – at a variety of scales or through distinct lenses – underwater, at water level and panoramic. This became on important element in our aesthetic values assessment method.

In parallel with examining the World Heritage approach to aesthetic values, we looked at practice in the interrelated disciplines of landscape assessment and cultural heritage assessment, as both include consideration of aesthetic values (*Section 2.2*). Our focus was primarily on Australian practice. We examined the emergence of interest in the visual or seen landscape in the 1960s and 70s, and presented a framework that compared four types of methods still in current use: the descriptive inventory, and three types of public perception models (psycho-social, psychological, phenomenological). We noted that the approach used to assess aesthetic values for Australia's National Heritage List (NHL) has adopted a phenomenological model.

We then explored a select number of approaches to defining experiential preferences as this has emerged in our thinking as an aspect worthy of consideration. We examined the Recreation Opportunity Spectrum, a model designed to understand how the physical attributes of a place create (or deny) experiential opportunities. The ROS approach has been applied to high visitor use areas in the GBR. We also briefly examined two UK approaches - landscape character analysis (Swanwick et al 2002) and the *Experiencing landscapes* approach (the Research Box et al 2009) – in relation to experiential aspects of place.

In outlining Australian definitions, criteria and indicators used in cultural heritage assessments (*Section 2.2.4*), we reflected on the importance of 'response' to place, including emotional response as reflected in the 'inspirational landscape indicators' (Context 2003) and the data sources that are being used to derive evidence of such response.

Finally, the approach to impact assessment on National Heritage List values was examined, looking at the example of the West Kimberley.

From our examination of landscape and heritage practice, we concluded that the method developed for this project should:

- adopt a broad definition of aesthetic value – that is one that encompasses response to place - and a reversion to narrower 'visual' and seen landscapes approaches should be avoided
- address experiential preferences
- be able to be applied at a variety of scales, recognising that the present project is focusing on the GBRWHA as a whole, but that subsequent projects may seek to look at the values and impacts on those values for a specific part of the GBR
- link the assessment of values to the consideration of impacts on those values
- use the types and range of data sources, based on the NHL approach to the assessment of aesthetic values, and where possible employ a range of analytical techniques, such as narrative in examining historical appreciations, content analysis for images and so on.

The work described above enabled us to form an initial approach to the methodology. The processes we used to refine it and the framework we established is described in the next section.

Shaping a method – Section 3

Having completed our literature review, we presented our initial thoughts on our methodology to a GBRMPA workshop in August 2012. The methodology was refined and then presented as *Report 1 – Methodology* to a peer review workshop of DSEWPaC officers later in August and also provided to GBRMPA for review and comment. Report 1 included a draft of *Sections 2 and 3* of this Final Report.

A further workshop at GBRMPA in October 2012 confirmed the method for aesthetic values assessment, further examined the idea of recognising experiential as well as environmental attributes of aesthetic value, and worked through the steps in sensitivity and impact assessment component of the methodology.

Section 3, describes the methodological framework achieved. It was further developed and refined when it was subsequently applied, and this is reflected in *Sections 4 and 5* of the Final Report.

The method outlined is in two parts:

Developing a methodology to assess aesthetic values *(Section 3.2)*

Step 1 – Defining the scope and framework

Step 2 – Defining aesthetic values

Develop a methodology to assess sensitivity and impacts *(Section 3.3)*

Developing a methodology to assess aesthetic values *(Section 3.2)*

Because our work involved developing a methodology, we needed to define key concepts, frames of references relevant to the GBR, scope the available data sources and consider our approach to mapping. This is described in Step 1 *(Section 3.2.1)*. These elements would normally form part of a project 'scoping' stage. The adoption of a set of key defining concepts – particularly the definition of aesthetic value and attributes - would assist any future work.

A frame of reference for the GBR was developed in consultation with GBRMPA staff. It reflects and responds to the nature of this place – its scale, dynamism, settings, layering of cultural and natural values and the ways people experience the place. Further GBRMPA sought the development of principles to guide the recognition of aesthetic values, and these respond to the social and biophysical nature of the place. Development of such frames of reference can assist in understanding a place, and potentially in comparative assessments, and added an interesting component to the methodology.

Initially, we expected to be able to map the environmental attributes associated with aesthetic values using GIS layers. As our work progressed, we recognised the complexity of this task within the scope of our budget and the timeframe for the work. We therefore moved to the idea of conceptual mapping.

In Step 2 (*Section 3.2.2*) we defined the tasks involved in defining aesthetic values for the GBR in relation to the RSoOUV. This involved:

- Establishing a typology for both environmental and experiential attributes, the former drawing on the knowledge of GBRMPA (see Tables 3.1 and 3.2).
- Identifying, sourcing and analysing a range of data sources seeking evidence of aesthetic values and their attributes. Our work was limited to using existing data and no new research was possible. Review of the available data resulted in a narrowing of our focus (data sources and their relevance to particular communities or cultural groups is shown in Table 3.3). In particular there was limited data on the perceptions of Indigenous traditional owners, and we are therefore recommending this as a future project.
- Recognising that the RSoOUV refers to some specific places, and that there were likely to be other places that exemplify the aesthetic values of the GBR, we examined a variety of data sources to compile a list of 'special places' (see Appendix 4). This list was drawn on in our analysis (*Section 4.4.3*) but offers the potential for further development and use.
- Analysing the evidence of values against RSoOUV was a significant task, involving a number of steps:
    - analysing the evidence in relation to RSoOUV
    - defining the qualities of each environmental and experiential attribute that, from our analysis, were considered to enhance aesthetic value
    - providing an extended description of each aspect of OUV based on RSoOUV
    - providing conceptual mapping that presents and illustrates the aesthetic values and attributes, and where these are located across the World Heritage property.

The outcomes of Steps 1 and 2 are represented in *Section 4 Aesthetic values of the Great Barrier Reef World Heritage Area*, and are described further below.

Develop a methodology to assess sensitivity and impacts *(Section 3.3)*

The second part of the methodology needed to consider the sensitivity of aesthetic values to detrimental impacts (*Section 3.3*). To do this we examined a number of existing approaches including the GBR Outlook Report methodology and the Vulnerability Assessments for species, groups of species and habitats being developed by GBRMPA (*Section 3.3.1*). We also looked at the 'comprehensive strategic assessment' model being developed by the

Commonwealth and Queensland governments to consider the effects of an impact on a value. The comprehensive strategic assessment is described in the fact sheet in Appendix 1.

The step by step approach developed from these existing methods is shown in *Section 3.3.2* and its application is described in *Section 5*.

Aesthetic values of the Great Barrier Reef World Heritage Area - Section 4

Section 4 demonstrates the application of the aesthetic values assessment methodology to the GBR, using the RSoOUV as the basis. Our second project report - Report 2 – comprised *Sections 1 to 4* of the present report.

From the literature review, we concluded that aesthetic response can therefore be said to be linked to the characteristics of an environment and culturally or personally derived preferences. Aesthetic value or aesthetic significance is therefore defined in this project as including sensory, experiential and emotional response to place. Aesthetic value is more than visual and, reflecting the review and findings in *Section 2*, the present project used this broader conceptualisation.

In examining the nature of environmental attributes, we recognised that these may have qualities that enhance their aesthetic appeal. And similarly, the conditions under which the environment is experienced will also influence perceptions, and therefore aesthetic appreciation.

There is a great range and diversity of data available on the GBR, and essentially four types of data were examined:

- direct expressions of aesthetic values revealed through images and videos taken, selected and posted on-line by individuals (including professional photographs and videos)
- reported research on perceptions, expectations and satisfiers, mostly focused on visitors to the GBR, plus limited data from 'experts' and reef communities
- mediated expressions of aesthetic values in tourist posters, promotional materials and websites, with images sampled covering a period of nearly one hundred years
- consultation data from a recent series of workshops held by GBRMPA that explored why communities along the GBR coast value the GBR.

This data is held in many different places: the primary sources used included materials published on-line, publications and images sourced from the GBRMPA library or obtained from GBRMPA staff, and project reports resulting from academic research and consultancies. As might be anticipated, each of the data sources presented its own opportunities and challenges, requiring careful consideration of analytical techniques. Much of the data was directed to purposes other than understanding aesthetic values and therefore required interpretation.

We started by briefly examining previous assessments of the aesthetic values of the GBR (*Section 4.2*), before providing a detailed examination of the available data. Because of the range of data, and its relevance to different 'communities' and connections to the GBR, we presented the data in *Section 4.3* in a series of sections as follows:

- historical perspectives and images (4.3.1)
- contemporary images (4.3.2)
- selling the Reef – examining how tourism sells the Reef (4.3.3)
- visitor perceptions (4.3.4)
- reef community perceptions (4.3.5)
- expert perceptions (4.3.6).

Each area of evidence is concluded with a summary table.

Some 'visitor hotspots' within the GBR are represented by extensive data, especially images and tourism research. We argue that the aesthetic values and associated attributes that are valued in one part of the GBR will be equally valued if experienced in another part of the GBR, whether currently visited or not.

The most significant data gaps relates to the communities and cultural groups (including Traditional Owners) who live along the GBR coast. *Section 4.4* summarises the evidence from all the data sources examined against the elements of RSoOUV. Four summary tables which were a key part of our analysis process have been included in Appendix 5. These tables present the range of evidence examined against each component of the RSoOUV, and also note the relevant lens or lenses, list exemplar places and identify the environmental and experiential attributes.

Two further tables in *Section 4.4.2* (Tables 4.19 and 4.20) further define the qualities of each environmental and experiential attribute that, from our analysis, was considered to enhance aesthetic value.

Section 4.4.3 presents the results of our analysis, in the form of an extended description of the aesthetic values that comprise each aspect of OUV in relation to the RSoOUV, and provides conceptual mapping that presents and illustrates the aesthetic values and attributes, and where these are located across the World Heritage property.

The conceptual mapping approach enabled the attributes and their location to be illustrated, establishing a basis for the development of map layers suited to GIS mapping. This was further tested in the case study approach (see below). The resources and time available for the present project did not allow for the development of GIS mapping, and GBRMPA was concerned that the use of GIS mapping at this stage in the development of this methodology may imply that the aesthetic aspects of OUV can be precisely and geographically defined.

An example of the 'extended descriptions of OUV in relation to the RSoOUV' and the associated conceptual mapping is provided below.

Retrospective Statement of Outstanding Universal Value (Criterion vii)
Criterion vii: contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance

1.2 From the air, the vast mosaic patterns of reefs, islands and coral cays produce and unparalleled aerial panorama of seascapes comprising diverse shapes and sizes.

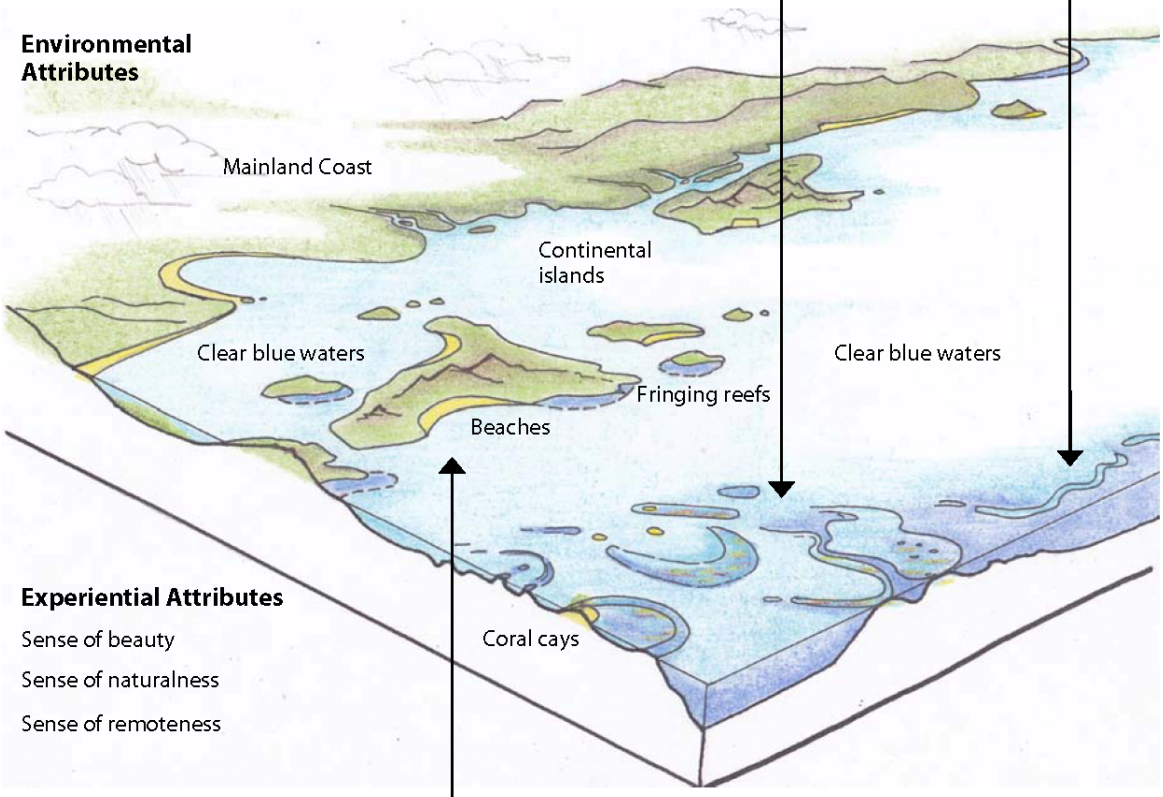
Extent	Extended description of OUV (see Section 4.3 and Tables 4.15 to 4.18).	Lens	Environmental Attributes	Experiential Attributes	Exemplar Places (Places from App 3 Special Places list are shown as *)
Reef	1.2.1 The exceptional natural beauty of the property is associated with the contrasting colours and shapes of reefs, cays and water that form often vast, abstract and mosaic patterns when viewed from above.	P	Coral reefs Coral cays Continental islands Water	Beauty Naturalness Remoteness	Capricorn Bunker Group* Swains Reef* Ribbon Reefs*
Islands	1.2.2 The exceptional natural beauty of the property is associated with contrasting colours and forms of green islands, coastlines, sweeping white sands, fringing reefs and patterns of blue waters that are visible from above.	P	Continental islands Beaches Coral cays Water	Beauty Naturalness Remoteness	Flinders Group* Lizard Island* Whitsunday Islands* Keppel Islands*

Statement of Values (RSoOUV)

1.2 From the air, the vast mosaic patterns of reefs, islands and coral cays produce an unparalleled aerial panorama of seascapes comprising diverse shapes and sizes.

1.2.1 Aesthetic Value

The exceptional natural beauty of the property is associated with the contrasting colours and shapes of reefs, cays and water that form often vast, abstract and mosaic patterns when viewed from above.



1.2.2 Aesthetic Value

The exceptional natural beauty of the property is associated with contrasting colours and forms of green islands, coastlines, sweeping white sands, fringing reefs and patterns of blue waters that are visible from above.

Environmental and Experiential Attributes

The qualities that enhance the environmental and experiential attributes labelled on the concept diagram are outlined in preceding tables 4.19 and 4.20

Applying the sensitivity and impact assessment method – Section 5

The sensitivity and impact assessment method defined in *Section 3* was further refined through the process of applying it to the GBR. The refined method involved three steps, compared to the seven steps outlined in *Section 3.3.2*. These were:

3. Define the risk or exposure
4. Assess the sensitivity
5. Determine the potential impact.

This three step approach came from a further review of the methods being applied in the comprehensive strategic assessment and the GBRMPA approach as described in the Outlook Report (2009) and the vulnerability assessments. The main challenge was to align these existing methods so as to take advantage of available data.

Each step involved definition of the concepts and a description of the process to be applied. This can be found in *Section 5.2.1*. Step 3 combines Risk/Exposure and Sensitivity.

Using the environmental sensitivity statements developed by GBRMPA for their vulnerability assessments (Table 5.3), we prepared a parallel table for experiential attributes (Table 5.4).

Then using data from the Outlook Report (2009), we examined a series of activities that might impact on the aesthetic values:

- Climate change/Extreme weather
- Marine tourism (resorts, marinas, cruise ships and reef-based)
- Shipping
- Commercial fishing
- Recreational fishing
- Recreation (other than fishing)
- Agriculture
- Traditional use of marine resources
- Urban development
- Industrial development (including ports)
- Scientific studies
- Defence
- Aquaculture
- Shark Control Program.

For each we described the activity and impacts resulting from the activity, and presented the available data on risk, scale and the environmental and experiential attributes most likely to be impacted by the activity in the form of a table. We also summarised the risk for the activity as a whole and the impacted attributes.

Where the project team made a judgement about likelihood, consequence and resultant risk, this is indicated in blue text and with a single asterisk; generally this was done by estimating the likely risk drawing on similar activity/ impacts. Where it was not possible to estimate the risk, this is shown in brown text as 'not known' and with a double asterisk.

Table 5.5: Climate Change & Extreme Weather Activity Analysis Table

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	Overall			
CLIMATE CHANGE/EXTREME WEATHER							
Ocean acidification	Impact on species, habitat, biodiversity	Almost certain	Catastrophic	Very High	Reef Wide	May impact on: Reef as entity Expect to impact on all attributes to some extent: Coral reefs Coral cays Water Birds Marine animals: fish	Likely to impact on: Beauty Naturalness Inspiration
Rising sea level		Likely	Catastrophic	Very High	Reef Wide		
Increased air and sea temperature		Almost certain	Catastrophic	Very High	Reef Wide		
Altered ocean currents (connectivity ramifications for larvae and food sources)		Unlikely	Major	Medium	Reef Wide		
UVB increase		Not known**	Not known**	Not known**	Not known**		
Increasing variability (rainfall)_altered salinity/conductivity		Not known**	Not known**	Not known**	Not known**		
Climate change induced alteration of terrestrial ecosystems/habitats		Not known**	Not known**	Not known**	Not known**		
Climate change induced altered cyclone activity	Impact on a physical features: reef, lagoon	Possible	Moderate	Medium	Local	Expect to impact on all attributes to some extent: Coral reefs Coral cays Water Lagoon floors Seagrass meadows	Likely to impact on: Beauty Naturalness
Changes to erosion and deposition of sand cays	Impact on species, habitat, biodiversity	Likely	Major	High	Reef Wide		
Climate change induced flood events		Almost certain	Moderate	High	Reef Wide		

In *Section 5.3.3* the sensitivity of environmental and experiential attributes are then assessed for each activity. Our focus was on applying the sensitivity assessment method to the experiential attributes. For the environmental attributes, we drew on data available from GBRMPA's vulnerability assessments (currently underway) and used three examples - two species (one in-shore species and one open water species) and one habitat.

Finally the potential impact of each activity is assessed for the experiential attributes only.

As GBRMPA develops their vulnerability assessments further, it should be possible to establish sensitivity levels for all the environmental attributes relevant to aesthetic aspects of RSoOUV, and to undertake potential impact assessment for environmental attributes. Expansion of their approach is required to enable morphological and non-biological attributes to be considered, for example sandy beaches and bays.

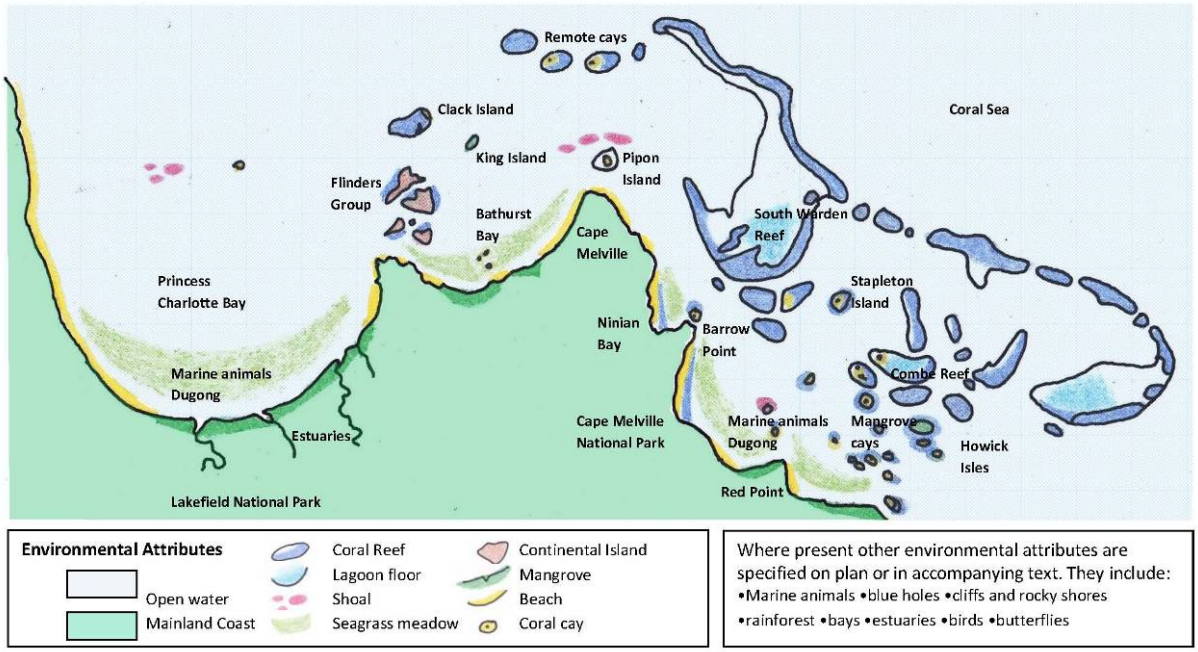
To explain the process further, *Section 5.4* works through a hypothetical example.

Case studies – Section 6

To further illustrate the application of the methodology, the project team proposed to prepare two case studies, using real data and locations with the GBR. Our original intention was to ground truth the sensitivity analysis only. In *Section 6* we explain the steps taken to identify case studies and then to establish the data needed to apply the method. Limitations of project resources meant that only one case study was completed.

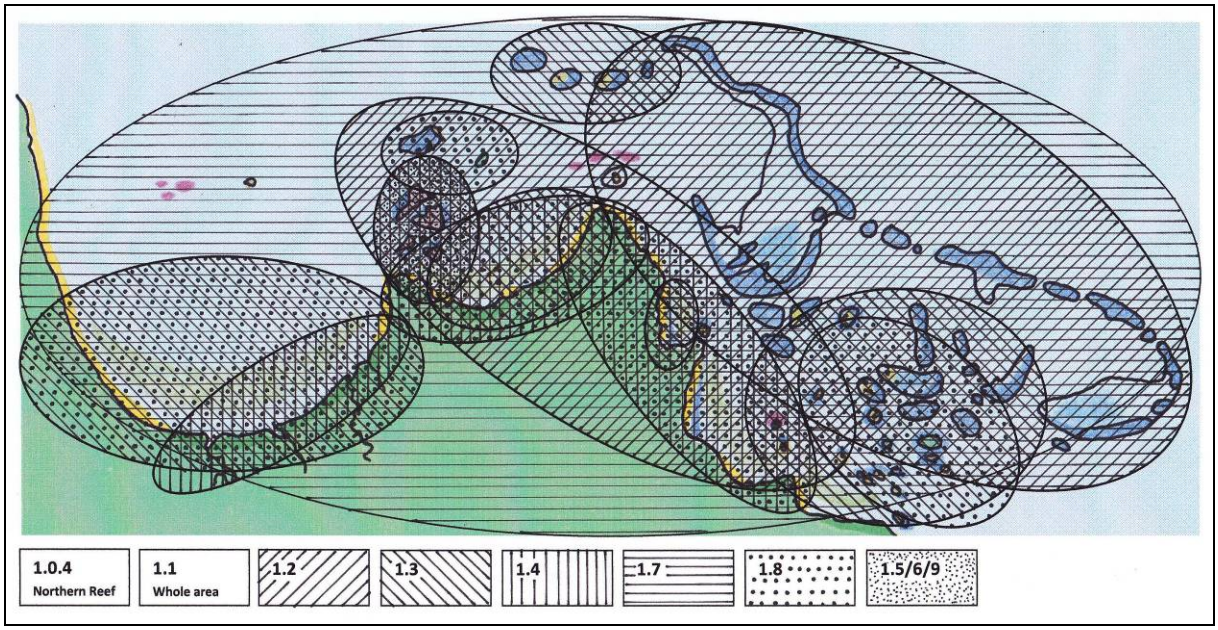
The case study presented is Princess Charlotte Bay – Cape Melville area, located in the far north of the GBRWHA. It encompasses a broad sweep of reef, continental islands, coral cays, coastal headlands, wide sweeping bays and mangroves.

Environmental attributes



A series of conceptual maps are used to sketch out the environmental attributes and each aspect of RSoOUV, as well as to present a composite map, and a similar approach is taken to experiential attributes.

Composite map of RSoOUV aesthetic values



Then, based on a hypothetical new activity – a port and an eco-tourism resort – the sensitivity and potential impact is assessed. The environmental attributes are limited to those considered in *Section 5*.

The case study approach proved to be a valuable step, enabling a practical application of the methodology, and demonstrating its potential. The case study approach demonstrated that we were able to move from conceptual mapping of the types of environmental and experiential

attributes to 'indicative' mapping, indicating that GIS mapping of values and attributes would be possible.

We found that the experiential attributes proved more difficult to define than the environmental attributes, a result of the available data, and that while the experiential attributes will be present throughout the property they will vary in nature and importance and may be severely impacted in some areas by human interventions. This is a significant finding. The sensitivity table (Table 5.4) developed for the experiential attributes illustrates this point.

Engaging communities in defining aesthetic values – Section 7

Part of our brief was to consider how communities should be involved in defining aesthetic values and their attributes. From our work - the literature review and analysis of existing data – we note that aesthetic response is linked to the characteristics or attributes of an environment and culturally or personally derived preferences. In terms of the World Heritage system we note that there is evidence that practices are changing. For example the 2012 Operational Guidelines make a number of references to the role of communities, especially local communities and traditional societies, and stress the benefits of involving local communities in all aspects of the World Heritage process including ongoing protection and management. We conclude that this provides a mandate for community engagement in the general assessment of aesthetic values, including for the GBR.

Going further in *Section 7.3,* we discuss the concept of the diversity of community-held values and the importance of finding approaches that enable both the aggregation of values and the recognition of differences. Much of the research undertaken in the past on the GBR has focused on the needs, expectations and satisfiers for visitors, and has not yet examined values more broadly. We consider that community assessment of aesthetic values needs to start with identifying the range of communities with knowledge of or attachment to the GBR, especially those who have experienced the GBR. Methods designed to draw out more deeply-felt values will be needed to complement current processes such as community workshops.

Traditional Owners and Indigenous communities are increasingly recognised in the World Heritage system, and their participation is strongly advocated. Their values were not adequately considered in the present project because of the complexities and time involved in doing the needed research and consultation, compared to our limited budget. However the importance of gaining their input is recognised by GBRMPA, DSEWPaC and the project team.

Under Criterion ix, the RSoOUV recognises the strong and continuing links of Aboriginal and Torres Strait Islander peoples with their sea-country and their interaction with the environment, there is no reference to Indigenous values in relation to Criterion vii. This is recommended as an area for further work.

In *Section 8.3.3* we make a number of observations arising from our consideration of the benefits of engaging communities in defining aesthetic values. To understand aesthetic values involves research into community-held values, and this can be done through indirect and direct means, both having value. In brief, we conclude that community engagement is essential.

Methods designed to more deeply understand aesthetic values are favoured, while recognising that these may be more time-consuming and costly. The importance of understanding the aesthetic values held by Traditional Owner and Indigenous communities is reflected in our recommendations.

Findings, conclusions and recommendations – Section 8

Our key findings in relation to the development and application of the methodology – covered in Section 8 of the report – have been are included above. Here we summarise key findings in relation to aesthetic values. Recommendations then follow.

The aesthetic values of the GBR

First, in *Section 8.3.1*, we conclude that aesthetic values can be investigated and assessed, and should not be assumed. We note the potential for using a range of types of data.

Our work confirms and supports all of the 'aesthetic values' described in the RSoOUV, and that these values all have attributes that are both environmental and experiential. However not all of the experiential attributes are reflected in the RSoOUV. Further our work has provided an extended understanding of the aesthetic values in the RSoOUV through elaboration of their environmental and experiential attributes (see *Section 4.4.3)*.

The RSoUV emphasises the visual aspect of aesthetics, and our view and the data examined suggests that this is a limited and limiting perspective; a far broader appreciation than just the visual is revealed through the present project.

We note that both environmental and experiential attributes are spread throughout the property, but the strength or extent of their qualities is variable.

The lenses offered a valuable way to consider the ways in which the values of the GBR are evident at different scales, and this provide relevant in the assessment of values and in considering sensitivity and potential impacts.

The RSoOUV highlights the aesthetic values of some specific locations (e.g. Whitsunday Islands and Hinchinbrook Island) however our analysis indicates strongly that these are not the only parts of the GBR where this value exists. The 'extended descriptions of OUV' address this observation and demonstrates that the aesthetic values associated with the exemplar places mentioned in the RSoOUV are in fact far more widespread across the property.

Aesthetic values as applied in the World Heritage system

In Section 8.3.2, we note that the understanding of aesthetic values requires a discourse that is distinctly different from that applied to scientific values. This is an important consideration given that in World Heritage practice, aesthetic values tend to be reliant on the evidence and attributes assessed in relation to Criteria viii, ix and x, simply with the addition of a rhetorical qualitative description of the attribute to make the argument for its aesthetic qualities.

Another observation is that the qualities of the attributes that enhance aesthetic values may not be, and in fact are unlikely to be, the same qualities that enhance scientific values. The example we give is that the scientific values may relate to reef biodiversity but the environmental attributes of aesthetic values may be diversity in form, colour and patterns of animals, plants and water plus the experiential attributes.

These differences have implications for the management of both the environmental and experiential attributes of aesthetic values.

Recommendations

We make six recommendations in *Section 8.4.* In summary these are:

Recommendation 1: Workshop with GBRMPA to develop an action plan: Bring together key officers from GBRMPA and DSEWPaC and the project team to review the methodology used, the results obtained and the future directions indicated in our findings. Through discussion, an action plan could be formulated so that the results and findings can be implemented.

Recommendation 2: Broad community engagement on aesthetic values: GBRMPA, in partnership with relevant research institutions, develop a program of research to better document all aesthetic values associated with the GBR to assist with managing these values and assessing impacts.

Recommendation 3: Indigenous engagement on aesthetic values: Investigate Indigenous understandings of aesthetic value preferably through processes that enable Traditional Owner and Indigenous communities to explore, document and share their perspectives on aesthetic values and attributes.

Recommendation 4: IUCN thematic study on aesthetic values and Criterion vii: Thematic studies are global and regional studies of sites types, themes and values that assist in the selection of potential sites for World Heritage nomination and in their evaluation. It is recommended that IUCN commission a thematic study to enable assessment, evaluation, comparative analysis and thresholds to be developed for aesthetic values that recognise both environmental and experiential attributes.

Recommendation 5: Experiential attributes and management planning: Further consideration of the experiential attributes of aesthetic values is needed in relation to management planning and zoning is needed. Further work is also needed on environmental attributes to enable the full impact assessment process to be completed.

Recommendation 6: Making use of this report: The report brings together a very rich and detailed body of valuable information, and appears to be the first study to specifically address these issues in a World Heritage property and to recognise both the environmental and experiential attributes of aesthetic values. Specific recommendations are made as to how the work contained in the report could be drawn upon and developed.

1 INTRODUCTION

1.1 Background

The Great Barrier Reef was declared a marine park in 1975, with the passing of Commonwealth legislation that also established the Great Barrier Reef Marine Park Authority (GBRMPA). In 1981 the Great Barrier Reef was added to the World Heritage List in recognition of its Outstanding Universal Value (OUV).

In 2012, a monitoring mission established under the auspices of the World Heritage Committee visited the Great Barrier Reef to assess the state of conservation of the Great Barrier Reef World Heritage property and to contribute to the strategic assessment process. The Great Barrier Reef Strategic Assessment Fact Sheet is included as Appendix 1, and the term comprehensive strategic assessment is used throughout this report.

The mission report noted that the aesthetic values of the property are less well understood than other aspects of the property and recommended that 'further work is needed in relation to identifying and documenting the attributes related to the aesthetic values of the property' (IUCN 2012: 36). Their finding is consistent with the Lucas et al (1997) review of the OUV of the GBR, which noted the gap in knowledge of the aesthetic values of the GBR. (The Lucas et al report is discussed further in Section 4.1.)

In response to the recommendations of the monitoring mission and the World Heritage Committee, the Australian Government has undertaken a number of actions. One has been to commission a project designed to consider the aesthetic values of the Great Barrier Reef World Heritage Area. The aim of this project has been to expand the understanding of the relatively brief statements of values in the Retrospective Statement of Outstanding Universal Value (RSoOUV), to provide detailed information on the attributes of those values – environmental and experiential - and to map their extent, providing an evidential basis for assessment and management of aesthetic values across the property. Throughout this report the abbreviation GBR means the Great Barrier Reef World Heritage Area.

1.2 Purpose

The purpose of this project is to:

6. Identify, define and assess the aesthetic values of the Great Barrier Reef World Heritage Area (GBR) in relation to the aesthetic component of Criterion vii:

   containing superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance

7. Define, and where possible map the attributes that embody these values

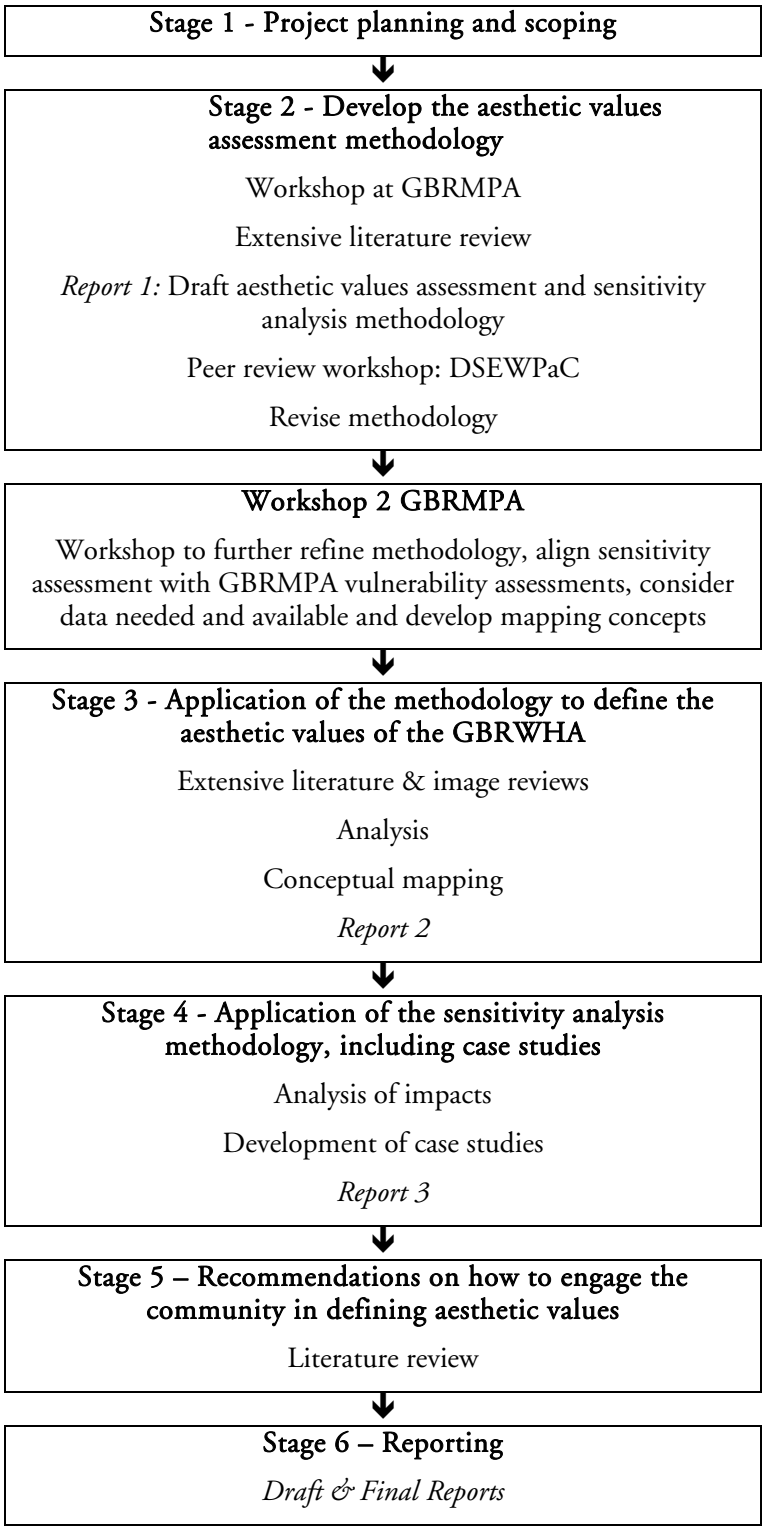
8. Consider the potential impacts of a set of defined actions on the attributes associated with the defined aesthetic values (sensitivity analysis)

This meant developing, refining and applying a methodology designed to define these aesthetic values in the light of the proposed Retrospective Statement of Outstanding Universal Value (RSoOUV), referred to in Annex VI in the Mission Report (IUCN 2012) (Appendix 2). It also involved considering how best to map the attributes, resulting in a move away from the anticipated GIS-based mapping to conceptual mapping; this is explained in Section 3.2.2, Step 2-8.

1.3 Project plan

The project was undertaken in a series of stages, as illustrated below. The methodology was progressively refined during the first stages of the project, with the consultants working closely with DSEWPaC and GBRMPA, and gaining input from the Queensland Heritage Office at

several points. The project was undertaken in parallel with the development of the strategic assessment approach by the Queensland and Australian Governments.



It is important to appreciate the challenges and limitations of the brief. First, there is no established methodology for assessing aesthetic values under Criterion vii. IUCN has commissioned a project to examine this question, however that project has not yet reported. A preliminary report - IUCN Study on Criterion vii (30 May 2012) - provided to the project team indicated the scope of the IUCN project, but provided no guidance on method. Section 2.1 of this report therefore examines the approaches taken to the consideration of aesthetic

values in the past by examining the available documentation of a range of World Heritage List properties. Section 2.2 then examines aesthetic values in relation to landscape and heritage practice.

The timeframe and budget available for the project both limited its scope to a desk-top assessment. No field work was undertaken. The closest the project team got to the GBR was the GBRMPA office in Townsville.

While the initial scope was only for a single workshop at GBRMPA, a second workshop was proposed in response to the success of the first, which enabled the project team to explore and test initial ideas about the methodology and data sources. The second workshop was designed to refine the methodology further, aligning the sensitivity analysis with the vulnerability assessment approaches being applied by GBRMPA, and to explore how best to ensure the aesthetic values assessment was of ongoing value to GBRMPA.

1.4 Project team

The project was undertaken by a collaborative consultant team, lead by Chris Johnston (Context Pty Ltd) with Dr Anita Smith and John Dyke.

1.5 Acknowledgements

The project was guided by DSEWPaC officers Rachael Sanderson and Jane Ambrose, and Niahm Kearney assisted with the review of the draft report.

A number of GBRMPA officers contributed through their active participation in two workshops and by assisting the project team with access to information and past studies. In particular the following contributors are gratefully acknowledged: Jon Day, Margaret Gooch, Laurence McCook, Hayley Gorsuch, Kirstin Dobbs, Chris Briggs, Cherie Molloy, Nicole Robbins, Josh Gibson, and Melissa Bos.

For assistance with access to past studies, we acknowledge Dr Shelley Greer (JCU), Professor Natalie Stoeckl (JCU), Dr Julie Carmody and Juliana Doupe (CRC Reef Research Centre).

2 FRAMING THE ASSESSMENT OF AESTHETIC VALUES

2.1 Aesthetic values in the World Heritage system

2.1.1 Introduction

This section presents a review of the use of Criterion vii in the World Heritage system. The aim of the review is to identify current approaches to the recognition and evaluation of aesthetic values as outstanding universal value, the attributes of these values and how these approaches have evolved since inscription of the GBR on the World Heritage List in 1981. The implications of this review for development of an approach and methodology for the current project are discussed in Section 2.1.5.

The World Heritage system, through the inscription of properties on the World Heritage List, recognises outstanding universal value. Aesthetic values of a property may be recognised as of outstanding universal value through inscription of the property on Criterion vii, one of four criteria (vii – x) for inscription of properties with natural values. The 2011 Operational Guidelines to World Heritage Convention (UNESCO 2011 Paragraph 77) define the properties inscribed under Criterion vii as:

> *containing superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance*

Alongside the presence of values, properties inscribed on natural criteria must also satisfy conditions of integrity. In relation to Criterion vii, properties

> *should be of Outstanding Universal Value and include areas that are essential for maintaining the beauty of the property. For example, a property whose scenic value depends on a waterfall, would meet the conditions of integrity if it includes adjacent catchment and downstream areas that are integrally linked to the maintenance of the aesthetic qualities of the property (Paragraph 92)*

Under this current definition, the 2012 Retrospective Statement of Outstanding Universal Value of the Great Barrier Reef defines the values of the property under Criterion vii as:

> *The GBR is of superlative natural beauty above and below the water, and provides some of the most spectacular scenery on earth. It is one of a few living structures visible from space, appearing as a complex string of reefal structures along Australia's northeast coast.*
>
> *From the air, the vast mosaic patterns of reefs, islands and coral cays produce an unparalleled aerial panorama of seascapes comprising diverse shapes and sizes. The Whitsunday Islands provide a magnificent vista of green vegetated islands and spectacular sandy beaches spread over azure waters. This contrasts with the vast mangrove forests in Hinchinbrook Channel, and the rugged vegetated mountains and lush rainforest gullies that are periodically cloud-covered on Hinchinbrook Island.*
>
> *On many of the cays there are spectacular and globally important breeding colonies of seabirds and marine turtles, and Raine Island is the world's largest green turtle breeding area. On some continental islands, large aggregations of over-wintering butterflies periodically occur.*
>
> *Beneath the ocean surface, there is an abundance and diversity of shapes, sizes and colours; for example, spectacular coral assemblages of hard and soft corals, and thousands of species of reef fish provide a myriad of brilliant colours, shapes and sizes. The internationally renowned Cod Hole near Lizard Island is one of many significant tourist attractions. Other superlative natural phenomena include the annual coral spawning, migrating whales, nesting turtles, and significant spawning aggregations of many fish species.*

In 1981 when the Great Barrier Reef was inscribed on the World Heritage List what is now Criterion vii in the Operational Guidelines to the World Heritage Convention was known as

Natural Criterion iii. Amalgamation of the six Cultural and four Natural Criteria in 2005 created a list of 10 World Heritage criteria in which Natural Criterion iii became Criterion vii.

The aim of the present survey of aesthetic values in the World Heritage system is, through review of properties inscribed on the World Heritage List under Criterion vii, to identify how within the World Heritage system:

- aesthetic values are articulated as outstanding universal value;
- the attributes that are used as evidence to support the presence of those values and for their reaching a threshold of outstanding universal value;
- the conditions of integrity that are required for the maintenance of outstanding universal value in relation to Criterion vii values and
- threats or impacts to aesthetic values are identified, assessed and managed.

Although a total of 127 properties (six of which are transboundary properties) have been inscribed on Criterion vii, the focus of this review is properties that have been inscribed under Criterion vii since 2003. Over the past decade and in particular since the major revisions to the Operational Guidelines in 2005 (UNESCO 2005) far greater detail and complexity in arguments for outstanding universal value has been required in the nomination dossier than in previous decades. This has been accompanied by substantially more detailed and consistent reporting of the evaluation of nominations by the advisory bodies, specifically IUCN in relation to natural criteria. Taken together this provides a systematic body of data on which to investigate current practice in the use of Criterion vii and in particular aesthetic values in the World Heritage system.

Several sources have been used in collating the information discussed in this review. These include the Statements of Outstanding Universal Value for inscribed properties; IUCN evaluations of individual properties; World Heritage Committee decisions in regard to nominations and State of Conservation reports.

Since 2003, twenty three properties have been inscribed on the World Heritage List under Criterion vii, three of these on Criterion vii alone. Six of these properties are marine sites or have a substantial marine component, making them of particular relevance to investigation of the aesthetic values of the Great Barrier Reef.

2.1.2 Changing approaches in the recognition of aesthetic values in the World Heritage system

In 1981 Natural Criterion iii was defined in the Operational Guidelines (UNESCO 1977 Paragraph 11) as:

> *contain unique, rare or superlative natural phenomena, formations or features or areas of exceptional natural beauty, such as superlative examples of the most important ecosystems to man, natural features, (for instance, rivers, mountains, waterfalls), spectacles presented by great concentrations of animals, sweeping vistas covered by natural vegetation and exceptional combinations of natural and cultural elements;*

Aesthetic values were not specifically recognised in this early definition however two clearly distinct components of the values under this criterion are evident that is, superlative natural phenomena and areas of exceptional natural beauty. Both are specifically identified with attributes that characterise natural values considered under other criteria such as ecosystems, and features of the landscape. This distinction between superlative natural phenomena and natural beauty was reinforced in the requirements for demonstrating integrity of the property under Natural Criterion iii through the presence of

> *those ecosystem components required for the continuity of the species or of the objects to be conserved. This will vary according to individual cases; for example, the protected area of a waterfall would include all, or as much as possible, of the supporting upstream watershed; or a*

> *coral reef area would be provided with control over siltation or pollution through the stream flow or ocean currents which provide its nutrients (UNESCO 1977 Paragraph 12)*

In this early statement, amelioration of threat to the values under Criterion vii is clearly related to the protection and conservation of attributes of natural (scientific) values in general.

As Lucas et al (1997:34) note the nomination for the Great Barrier Reef was, like other nominations of the time, broad and general. The primary focus was the coral reef ecosystems of the area, with only passing mention of other marine and terrestrial components of the area. The nomination made the following claims in support of the outstanding universal value of the property under Natural Criteria i – iv (now Criteria vii – x):

> *The Great Barrier Reef is by far the largest single collection of coral reefs in the world. Biologically the Great Barrier Reef supports the most diverse ecosystem known to man. Its enormous diversity is thought to reflect the maturity of an ecosystem which has evolved over millions of years on the north east Continental Shelf of Australia.*
>
> *The Great Barrier Reef provides some of the most spectacular scenery on earth and is of exceptional natural beauty. The Great Barrier Reef provides major feeding grounds for large populations of the endangered species Dugong dugon and contains nesting grounds of world significance for the endangered turtle species green turtle (Chelonia mydas) and loggerhead turtle (Caretta caretta) (Government of Australia 1980).*

Since inscription of the Great Barrier Reef the definition, interpretation and evaluation of what became Criterion vii has along with that of the other criteria evolved especially in the complexity and detail required to justify inscription. Key elements of the current Criterion vii were however present in 1981.

The word aesthetic first appears in the definition of Natural Criterion iii in 1994:

> *(iii) contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance (UNESCO 1994 Paragraph 44a)*

This much abbreviated definition, notably with references to other kinds of natural values removed, appears with the following statement of conditions of integrity:

> *The sites should be of outstanding aesthetic value and include areas that are essential for maintaining the beauty of the site; for example, a site whose scenic values depend on a waterfall should include adjacent catchment and downstream areas that are integrally linked to maintenance of the aesthetic qualities of the site (UNESCO 1994 Paragraph 44b).*

The definition of Natural Criterion iii has remained unchanged since 1994 (becoming Criterion vii in 2005) albeit within the context of increasing complexity in the evaluation of values especially through the requirements for comparative analysis. The conditions of integrity have however been modified with removal of the phrase 'outstanding aesthetic value' leaving reference only to the 'aesthetic qualities' of the property.Although the understanding of superlative natural phenomenon as a biological event or a unique or outstanding natural feature appears to have remained consistent over the last 30 years, this is not the case for exceptional natural beauty or aesthetic importance. The increasingly quantitative and rigorous assessment of natural values against other criteria has been accompanied by increasing scepticism around the potential for objective assessment of natural beauty or aesthetic importance.

The motive behind the inclusion of aesthetic importance in the definition of Criterion iii in 1994 is unclear and until recently there has been little if any guidance on how this second part of the Criterion vii is understood as being of, or contributing to, outstanding universal value especially given the references only to 'aesthetic importance' and 'aesthetic qualities' alongside 'exceptional natural beauty' in the Operational Guidelines (UNESCO 2011).

Following this in 2006, IUCN noted that aesthetics is 'a personal and emotionally based response (not just visual but including a range of senses and associative responses) and therefore the concept is rooted in a community/culture'. They further noted that the application of

Criterion vii had been mainly descriptive and often using a 'eurocentric' approach and that there was a need to provide better guidance on its application (2006:9).

The recent UNESCO manual Preparing World Heritage Nominations, Second Edition, provides the following guidance on the interpretation and assessment of Criterion vii:

> *Two distinct ideas are embodied in Criterion vii. The first, 'superlative natural phenomena', can often be objectively measured and assessed (e.g. deepest canyon, highest mountain, largest cave system, highest waterfall, etc.).*
>
> *The second concept, that of 'exceptional natural beauty and aesthetic importance', is harder to assess. . . There are many intellectual approaches to concepts of the beauty and aesthetics of natural areas. While no one approach is recommended, adopting one or more recognized approaches is essential. Merely asserting these qualities without a robust supporting argument is insufficient. The application of this criterion should not be confused with the recognition of the aesthetics of cultural properties and cultural landscapes that is currently expressed through the use of the cultural criteria. In addition, the nature of this criterion is that the types of properties that are proposed for inscription will have comparable sites distributed on a worldwide, rather than regional basis, so standards applied under this criterion are expected to meet a global standard of proof.*
>
> *Evaluation in relation to this aspect is based on comparison with properties previously inscribed by the World Heritage Committee under this criterion and, to the extent possible it also involves a comparison of measurable indicators of scenic value. The comparison with properties already listed under this criterion, and the World Heritage Committee and IUCN past practice in its use are also further important elements in considering its appropriateness (UNESCO 2011b:40).*
>
> *In the case of criterion (vii), exceptional natural beauty and aesthetic importance must be supported by clear evidence and rigorous intellectual analysis. Merely asserting that a property has exceptional natural beauty and providing attractive photographs is inadequate (UNESCO 2011b:60).*

Criterion vii is considered to differ from the other three natural criteria which emphasise the scientific values of geology (Criterion viii), ecosystems (Criterion ix) and biodiversity (Criterion x) in that the assessment of exceptional natural beauty or aesthetic importance is considered potentially subjective and qualitative rather than quantitative and comparable.

In a recent paper James Thorsall described properties nominated under Criterion vii as needing to have a 'wow factor' and a 'high capacity to surprise' (2012:12). He notes that

> *the beauty of sites listed under Criterion vii cannot be measured or classified and they cannot be empirically compared to similar sites. There is no standard classification system as there is for example for geological sites . . . similarly there is no way to quantify 'aesthetic values' in the way that rare and endemic species and diversity of habitats in biological sites are quantified.*

Although in the Operational Guidelines (and according to the text of the Convention [IUCN 2005]) Criterion vii should carry the same weight as any other criterion the current recommendations of IUCN and the existing practice of the Committee are not to inscribe properties on Criterion vii alone of the natural criteria. This is likely to reflect the perception of subjectivity in assessment of values under Criterion vii. (Contrary to this, a small number of properties have been inscribed on Criterion vii alone. These are discussed below).

In the past decade three properties have been inscribed on Criterion vii alone of the natural criteria (a further 6 since 1978). In each case the property was nominated on more than one natural criterion but only the values under Criterion vii were found to be of outstanding universal value.

Badman et al. (2008:12) noted

> *the overall trend with time has been to see a decrease in the use of criterion vii within inscriptions. In the view of IUCN this is partly because this criterion is most strongly associated with the iconic sites [including the Great Barrier reef] that were the early preoccupation of the*

> *Convention. Such sites have established a general level of value that is difficult to match, and thus comparative analysis is more likely to conclude that existing properties on the World Heritage List exceed a new nomination in their demonstration of this value.*

However it is also the case that the requirements for nominations and the rigour of evaluations have greatly increased especially since the early 1990s perhaps making what are considered subjective values a less secure pathway for inscription.

2.1.3 Review of properties inscribed under Criterion vii (2003 – 2012)

The 23 properties inscribed under Criterion vii since 2003 are listed in Appendix 3. These include terrestrial (17) and marine or primarily marine (6) properties located in Europe, South America, Asia, Africa, the Middle East and the Pacific including two Australian properties – Purnululu National Park and Ningaloo Coast. Given the clear differences between the values and attributes of marine and terrestrial properties, theses are discussed separately below.

Aesthetic values or natural beauty in terrestrial properties

In the 17 terrestrial properties there is a strong correlation between the use of Criterion vii, the aesthetic values of the property and Criterion viii, geological and/or geomorphological values. Criterion viii is defined as:

> *be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features (UNESCO 2011 Paragraph 77)*

Fourteen of the 17 terrestrial properties were nominated on both Criterion vii and Criterion viii and of these twelve were inscribed on both criteria. In the remaining two properties the values under Criterion viii were not found to be of outstanding universal value.

The natural beauty or aesthetic values of all these properties reflect their outstanding geological values and are most commonly expressed as descriptions of landscape features, usually of great scale, for example 'rugged and dramatic landscape of striking beauty, dominated by two towering volcanoes' (the Pitons, cirques and ramparts of Reunion Island) or geological formations that underpin the entire landscape, for example 'one of the world's most spectacular examples of humid tropical to subtropical karst landscapes' (South China Karst).

In each case the description of aesthetic values or natural beauty is a description of the features of the property that reflect its geological values under Criterion viii and are commonly referred to as 'scenic values', in other words the aesthetic values or natural beauty are equated with an appreciation of the landscape or landscape features.

Only three terrestrial properties inscribed on Criterion vii were not also nominated on Criterion viii. These are the Tropical Rainforest Heritage of Sumatra, the Kenya Lakes System and Putorana Plateau, Russia. All have been inscribed on Criterion vii and Criterion ix, defined as:

> *be outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals;*

The aesthetic values or natural beauty describe the attributes of values recognised under Criterion ix. For example the outstanding universal values of the Kenya Lakes System under criterion vii are described as 'exceptional range of geological and biological processes of exceptional natural beauty, including falls, geysers, hot springs, open waters and marshes, forests and open grasslands concentrated in a relatively small area and set among the landscape backdrop of the Great Rift Valley'. Similarly, under Criterion vii 'the combination of the spectacularly beautiful Lake Gunung Tujuh (the highest lake in southeast Asia), the magnificence of the giant Mount Kerinci volcano, numerous small volcanic, coastal and glacial lakes in natural forested settings, fumaroles belching smoke from forested mountains and numerous waterfalls and cave systems in lush rainforest settings, emphasise the outstanding beauty of the Tropical Rainforest Heritage of Sumatra'.

Aesthetic values or natural beauty in marine properties

In the past decade six marine or partially marine properties have been in inscribed on Criterion vii. The Malpelo Fauna and Flora Sanctuary, Mexico; The Lagoons of New Caledonia; Phoenix Islands Protected Area, Kiribati; Ningaloo Reef, Australia; Rock Islands Southern Lagoon, Palau are all marine properties albeit with a small terrestrial component while the Islands and Protected Areas of the Gulf of California is a serial property of islands and their surrounding marine habitats. All except Ningaloo Reef are inscribed on Criterion ix for their marine ecosystems and four of the properties are also inscribed on Criterion x. The outstanding universal value of all the properties primarily relate to marine fauna and reef systems and this is reflected also in their aesthetic values for example 'considered to be some of the most beautiful reef systems in the world due to their wide variety of shapes and forms within a comparatively small area (Lagoons of New Caledonia) and ' . . aesthetically outstanding coral reef features . . . together with the spectacle of huge concentrations of seabirds on remote atolls, makes of this property a truly kaleidoscopic natural "oceanscape" exhibiting exceptional natural beauty of global significance' (Phoenix Islands Protected Area, Kiribati)

The contrast between the sea and the adjacent coastline is recognised as contributing to the outstanding universal value under Criterion vii in Ningaloo Coast, Australia: 'The lush and colourful underwater scenery provides a stark and spectacular contrast with the arid and rugged land'; the Islands and Protected Areas of the Gulf of California, Mexico, expressed in the contrast between the rugged and arid landscape and the blue waters abundant with marine life; in the Rock Islands, Palau: 'The maze of dome-shaped and green Rock Islands seemingly floating in the turquoise lagoon surrounded by coral reef is of exceptional aesthetic beauty' and in the Lagoons of New Caledonia: 'The richness and diversity of landscapes and coastal backdrops gives a distinctive aesthetic appeal of exceptional quality'.

In regard to inclusion of terrestrial attributes under Criterion vii the Rock Islands, Palau, and Lagoons of New Caledonia differ from the previous two properties in that the terrestrial elements of the properties are not attributes of the outstanding universal value under the other criteria on which they were inscribed (although they may provide habitat for bird species which contribute to the outstanding universal value). They are specifically identified as having aesthetic value under Criterion vii.

The Retrospective Statement of Outstanding Universal Value for the Great Barrier Reef also describes aesthetic values of specific terrestrial locations (Whitsunday Islands, Hinchinbrook Island) presumably although not explicitly as examples of terrestrial landforms and characteristics which are identified in the general description of attributes ('diversity of reef and island morphologies') of outstanding universal value under other criteria.

Superlative natural phenomena

Although the definition of Criterion vii clearly identifies two distinct components – superlative natural phenomena and natural beauty or aesthetic values, these components are not commonly differentiated in the statement of values against Criterion vii except where a specific feature or biological phenomenon such as aggregations of individual species can be quantitatively assessed as of greater significance against similar features or phenomena. For example in the South China Karst 'the stone forests of Shilin are considered superlative natural phenomena and the world reference site for this type of feature' or the Monarch Butterfly Biosphere Reserve, Mexico, 'the overwintering concentration of the monarch butterfly in the property is the most dramatic manifestation of the phenomenon of insect migration . . . The property protects 8 of these colonies and an estimated 70% of the total overwintering population of the monarch butterfly's eastern population'.

More commonly the distinction is less clear with values statements referring to multiple attributes within the property as comprising superlative or outstanding phenomena or as being of natural beauty or aesthetic value. For example in the West Norwegian Fjords,

outstanding natural beauty is derived from their narrow and steep-sided crystalline rock walls that rise up to 1400 m direct from the Norwegian Sea and extend 500 m below sea level. . . . There is a great range of supporting natural phenomena, both terrestrial and marine such as submarine moraines and marine mammals . . .

The attributes of the outstanding universal value under Criterion vii

The IUCN meeting in Germany in 2005 (IUCN 2006:9) to discuss the evaluation process for World Heritage nominations concluded that in relation to Criterion vii, the indicators and approach to assessment of values could include:

- a descriptive landscape analysis (based on factors such as scale, colour, contrast, diversity of form etc);
- an analysis of other cultural perspectives, covering aspects such as: (a) local appreciation of aesthetics as documented by cultural manifestations, e.g. storytelling, mythology, spirituality, literature, music/art, symbols of power, wealth; (b) determining whether local value has translated into an element of national/regional identity; (c) determining whether perceptions/appreciations of aesthetic values have transcended national boundaries, or developed independently within any given region; and
- an assessment of "case law" and comparative analysis.

However given that the aesthetic values or natural beauty of those properties inscribed on Criterion vii in the past decade reflect or elaborate the values of the property under other natural criteria, the attributes of the aesthetic values under Criterion vii are in most cases those that provide tangible evidence for values under the other natural criteria. In other words values under Criterion vii are not expressed in attributes that are distinct from those discussed under other criteria but rather focus on specific attributes (commonly described as superlative natural phenomena) or the visual appreciation of the attributes as a whole, their scenic value. However although the attributes are common to more than one of the natural criteria the language used to describe these attributes differs between criteria.

The description of attributes as evidence for aesthetic values or natural beauty under Criterion vii tends to be rhetorical or romanticised and generally evocative of the experience of the place although this very rarely explicit in the values statement. The same attributes of values under other natural criteria are simply noted or systematically and sometimes quantitatively described. For example the values and their attributes in the Putorana Plateau, Russia are described as follows:

Criterion vii: A vast and diverse landscape of striking beauty. Its superlative natural features include an extensive area of layered basalt traps that has been dissected by dozens of deep canyons; countless cold water rivers and creeks with thousands of waterfalls; more than 25,000 lakes characterized by a fjord-like formation that is associated with a large variation in the relief. The immense arctic and boreal landscapes remain intact with carpets of lichens and forest that are unusual at such northern latitudes.

Criterion ix: the property displays a comprehensive set of ecological and biological processes associated with its diverse arctic and subarctic ecosystems. Its bio-geographical location, on the border of the tundra and taiga biomes and at the transition between Western and Eastern Siberian floras, makes the property one of only a few centres of plant species richness in the Arctic. The combination of landscape diversity, remoteness, naturalness and degree of protection are extraordinary. In addition, the property may provide valuable evidence on the impacts of climate change to large-scale natural arctic ecosystems if proper monitoring and research take place.

The language of description of attributes of aesthetic values or natural beauty supports the argument for the existence of those values. This is also the case albeit to a lesser degree for superlative natural phenomena where the quantitative assessment commonly provides the key argument for the outstanding nature of the values. The following descriptors are those that are commonly used in statements of values under Criterion vii:

- Diversity (forms, animals, shapes, colours, features, scales)
- Combination, mosaic (landforms, features)
- Abundance (animals, fish, birds, butterflies, waterfalls, particular features)
- Contrast, juxtaposition (forms, features, colours)
- Dramatic, striking, impact
- Changing (seasons, weather, light)
- Scale, height, visibility (especially mountains)
- Majestic, massive
- Deep, steep, rising, falling, towering
- Scenic
- Spectacular, spectacle, iconic
- Wild, wilderness, rugged
- 'Free from human influence'.

Aesthetic value can be an experience of the environment derived from visual or non-visual elements including a sense of place, sound or smell (Australian Heritage Commission 1993) however in most of the 23 properties inscribed on Criterion vii, the aesthetic values are described as visual, many referring to the 'scenic value' of the property or parts thereof. In only two properties do the statements of values explicitly refer to the experience of the place. These are the 'experience of nature' in the Kenya Lake System and the 'powerful aesthetic experience' of Purnululu National Park, Australia. In only one property, the Ilulissat Icefjord, Denmark, the aesthetic values explicitly move beyond the visual to other sensory perceptions, being associated with the dramatic sounds produced by the moving ice, described as a memorable natural spectacle.

Although not referred to in the statement of outstanding universal value for the property, sound – or quietness – has also been identified as an attribute of the experience of the place in Mount Sanqingshan National Park, China. The State of Conservation report for the property (IUCN 2008) describes the use of loudhailers for tourist groups as having an impact on the ability of visitors to experience the property. This is discussed below.

The conditions of integrity for Criterion vii values

Although the conditions of integrity in relation to Criterion vii, states that properties should include areas that are essential for maintaining the beauty of the property (UNESCO 2011 Paragraph 92) the statements of integrity of the 23 properties rarely refer to aesthetic values or specify what areas of the property should be included to maintain them. Rather the emphasis is justifying that the extent of the property is sufficient to maintain the values under other natural criteria, again reflecting the primary scientific values for which the property has been inscribed. Where the statement of integrity does specifically refer to the aesthetic values of the property the elements or areas required to meet the conditions of integrity are not explicit in the Statement of Outstanding Universal Value, for example in the Lagoons of New Caledonia:

> *the serial property comprises six marine clusters which are also protected by marine and terrestrial buffer zones that are not part of the inscribed property. It includes all the key areas that are essential for maintaining its natural beauty and the long term conservation of its remarkable reef diversity, and it is of sufficient size to maintain associated biological and ecological processes. The property still displays intact ecosystems with top predators, and a large number and diversity of large fish.*

The conditions of integrity for aesthetic values are not further elaborated in the IUCN evaluation report for the Lagoons of New Caledonia.

It is notable however that in several of the marine sites the integrity of the aesthetic values is linked albeit implicitly to the turbidity or clarity of the water and therefore the ability to appreciate these values.

Assessment and evaluation of aesthetic values in World Heritage properties

Although an assessment of aesthetic values to identify those of outstanding universal value and their attributes or for the purposes of managing them may have been undertaken for properties nominated on Criterion vii, it has not been possible to ascertain this from the information available through the World Heritage Centre's web site. The descriptions of values against Criterion vii provided in the nomination dossiers (where available) do not indicate whether this is the case. The evaluations of Criterion vii reported by IUCN do not provide an indication of the aesthetic values of the property per se but only those values that may be considered to reach a threshold of outstanding universal value.

The IUCN guidance on demonstrating outstanding universal value against Criterion vii and the emphasis in their evaluations of properties nominated under this Criterion suggest current approaches to assessment of aesthetic values. As reported above, IUCN clearly distinguishes between the two elements of Criterion vii in their evaluation of properties nominated under this Criterion such that claims for the outstanding universal value of natural phenomena can be objectively measured and assessed whereas natural beauty or aesthetic importance is considered more difficult to assess and requires intellectual rigour. While not advocating a specific approach to the assessment of natural beauty or aesthetic importance, IUCN suggests (and evaluates) two distinct approaches. Comparative analysis should be used to demonstrate whether the natural beauty or aesthetic importance of a property is different from or of greater quality to that of similar kinds of properties already inscribed on the World Heritage List and more generally. Secondly IUCN considers evidence for international recognition or appreciation of the aesthetic values or natural beauty of a place to support arguments for outstanding universal value.

A typological approach to comparative analysis is evident from the IUCN evaluations of nominations of properties such that the 'type' of property for example volcanic landscapes or lake systems along with the specific features of the property frame the selection of sites for comparative assessment on the assumption that the natural beauty or aesthetic importance of similar types of properties will be comparable. On this basis the Pitons Management Area, St Lucia, is compared with other coastal regions where there are the remnants of volcanic cones and Teide National Park, Spain, is said to 'compare favourably to other World Heritage properties in relation to the scale and diversity of its geological and geomorphological features and its additional distinctive landscape values' (IUCN 2007). Through a similar process Banco Chincorro Biosphere Reserve, nominated by Mexico, was found not to satisfy Criterion vii on the basis that 'none of the characteristics argued to reflect the aesthetic beauty of the property can be considered unique or best represented. Many other places have similar environments'

In these examples the typology of the property, initially determined by its scientific values is read, compared and evaluated as a visual text. The selection of comparable sites according to physical type or scientific values rather than aesthetic values is likely to be emphasised by use of relevant thematic studies undertaken by IUCN as the basis for selection of comparable properties.

The second approach to assessment of Criterion vii, that of justifying outstanding universal value through evidence of international recognition of the aesthetic values or natural beauty of the property appears from the IUCN evaluations and statements of Outstanding Universal Value to be increasingly favoured. The arguments and evidence take a number of forms. Properties are argued to be 'iconic' such that the Jordanian property of Wadi Rum 'is recognised globally as an iconic desert landscape' or in Purnululu National Park, Australia 'the extraordinary array of banded, beehive-shaped cone towers ... have become emblematic of the park and are internationally renowned among Australia's natural attractions'. Supporting such

claims may be references to historical texts (written and/or visual) describing the beauty of the property for example the Dolomites, Italy, where 'Geologist pioneers were the first to be captured by the beauty of the mountains, and their writing and subsequent painting and photography further underline the aesthetic appeal of the property'; specialist agreement for example 'the superlative nature of [Malpelo Fauna and Flora Sanctuary, Mexico] is well recognized by the major diving magazines of the world, which rank it as a top dive destination' or tourism literature more generally for example for Purnululu National Park 'photographers and travel writers include the Bungle Bungles among the world's natural wonders, some describing them as Australia's equivalent of the Grand Canyon'.

International recognition, measured through the popularity of a tourism destination, is also argued for Cod Hole in the Retrospective Statement of Outstanding Universal Value for the Great Barrier Reef.

2.1.4 Threats and impacts to aesthetic values

Review of the threats and impacts to aesthetic values or natural beauty of properties inscribed on Criterion vii over the past decade included the IUCN evaluation of nominations for these properties and State of Conservation Reports where they have been undertaken for specific properties. In their evaluations of natural property nominations, IUCN evaluates the conservation and management of the property in relation to common threats such as mining, infrastructure development, climate change and tourism as well as specific threats such as shipping, coral bleaching and fishing in marine properties. However in the discussion of the potential impacts of these threats on the outstanding universal value of individual properties, the IUCN evaluations rarely refer directly to impacts on aesthetic values or natural beauty. The threats are discussed in relation to impacts the biological, geological or other scientific values of the property. **Given that the attributes of these values are almost always also those of the aesthetic values, potential impact to aesthetic value is implicit.** For example the impact of uncontrolled fishing to the Lagoons of New Caledonia is articulated as loss of biodiversity rather the impact to aesthetic values for which the abundance and diversity of fish are attributes. In this example the impact to aesthetic values is obvious through the loss of attributes of those values. Similar logic does not always apply. Cruise ships are commonly noted as a particular potential threat under the wider category of tourism but their potential impact to aesthetic values is not clear.

Aesthetic values differ from scientific values for example biodiversity or geological formations in being dependent upon the ability to experience the place or at least the attributes that are considered to reflect or embody the aesthetic values. Although not specifically described as threats to the values, occasionally in IUCN evaluation and State of Conservation reports, transient impacts to the experience of a place are discussed in relation to large numbers of tourists, passing ships or turbidity due to weather or more significant and long-lasting impacts directly affecting tangible attributes of aesthetic values - their presence, form, colour.

In a small number of instances the specific threats to aesthetic value have been noted in IUCN evaluations and State of Conservation reports. In the Putorana Plateau in Russia, the use of helicopters to access the park is considered by IUCN to have some visual and acoustic impacts. Similarly in Mt Sonqingshan, China, threats from increasing numbers of tourists include impact to the solitude of the place especially through use of loudspeakers with tour groups. Potential future introduction of a further cable car in the property was also seen by IUCN to impact on aesthetic values who also recommended construction of new dwellings in the park with traditional design and materials was to ensure harmony with the park's features (IUCN 2008:18). A quarry in the West Norwegian Fjords was noted in the IUCN evaluation to have a visual impact but that this is 'quite localised ... and will be addressed by rehabilitation measures'.

2.1.5 Key findings of the review

Review of the outstanding universal value of properties inscribed under Criterion vii, the attributes of these values and associated documentation indicates:

- The values under Criterion viii, ix or x always lead the arguments for outstanding universal value of a property rather than those of Criterion vii.
- The aesthetic values 'describe' the visual aesthetics of the attributes of the scientific values of the property and therefore the attributes of the aesthetic values are those of the values identified under the other natural criteria.
- The aesthetic values are almost always visual and for terrestrial properties, associated with scenic beauty.
- There is a lack of systematic methodologies for, or approaches to, the assessment of aesthetic importance or natural beauty.
- Justification of aesthetic values and natural beauty in Statements of Outstanding Universal Value relies on the rhetorical power of description of the attributes.
- Threats and impacts to OUV are described in relation to scientific values for which the attributes are shared with aesthetic values. Threats to scientific values are therefore by extension threats to aesthetic values although this is rarely explicit in SoOUV or IUCN evaluations.

Discussion of the key findings of the review in relation to the outstanding universal value of the GBR

In all properties inscribed under Criterion vii during the past decade (and presumably earlier), the focus of the inscription is those values argued under Criteria viii, ix and x in the nomination of the property, that is the scientific values for which there are thematic studies and bodies of data that enable comparative quantitative assessment of the arguments for outstanding universal value. The scientific values drive the nomination and inscription of properties, with the values under criterion vii playing a secondary or contributory role.

The attributes of the values against Criterion vii – superlative natural phenomena and/or natural beauty/aesthetic importance - are for the most part the attributes that reflect the values of the property under other natural criteria. The aesthetic values listed in the Retrospective Statement of OUV for the GBR follow this pattern.

The RSoOUV for the GBR lists a number of attributes of aesthetic importance and natural beauty almost all of which are also attributes of values listed under Criterion viii, ix or x. For example a 'diversity of reef and island morphologies' in Criterion ix becomes 'vast mosaic patterns of reefs, islands and coral cays' in Criterion vii. The values under Criterion x include 'six of the world's seven species of marine turtle occur in the GBR. As well as the world's largest green turtle breeding site at Raine Island, the GBR also includes many regionally important marine turtle rookeries' and Criterion vii describes 'spectacular and globally important breeding colonies of seabirds and marine turtles, and Raine Island is the world's largest green turtle breeding area'.

A minor exception to this pattern are the values described under Criterion vii in several of the marine properties including Rock Islands of Palau and the Reefs of New Caledonia which include the scenic value of the 'above water' experience, namely the contrast of colour and form of the marine and coastal or island environments which is not directly related to the scientific values for which the properties were inscribed. Likewise the GBR Retrospective Statement of OUV also describes the 'magnificent vista of green vegetated islands and spectacular sandy beaches spread over azure waters' specifically in relation to the Whitsundays.

There has not been a nomination in which the aesthetic values or natural beauty are, for example reflected in a mountain landscape while the scientific values of the property are linked only to biodiversity.

This appears to reflect the emphasis of natural heritage conservation on biodiversity, ecosystems etcetera; the current practice that properties nominated on Criterion vii must also be nominated on at least one other natural criterion; and a perception that assessment of

natural beauty or aesthetic values is subjective. The absence of an IUCN thematic study of properties of outstanding natural beauty or aesthetic value supports this conclusion.

Implications for the current project

1. Lack of a precedent

There is no precedent (at least in the past decade) for recognition of OUV under Criterion vii for the aesthetic values of attributes that are distinctly different from those of other natural criteria. **Given this, aesthetic values of the GBR that are not underpinned by the attributes of other natural values are unlikely to be considered of OUV**. This is a significant and challenging conclusion. The association of aesthetic values with attributes considered under other natural criteria therefore provide an initial threshold or framework for identifying places of potential OUV.

2. Aesthetic values and attributes may extend beyond those recognised in the RSoOUV

There is a need to consider an approach to assessing aesthetic values that can accommodate features of the property that are not attributes of values identified in the RSoOUV and a methodology for establishing threshold for OUV in those locations where the attributes listed in the RSoOUV are located.

3. Scale is a critical factor

Clear differences in the scales at which the aesthetic values or natural beauty of the property are described are apparent in terrestrial and marine properties. In terrestrial properties aesthetic value is almost always associated with appreciation of the large scale, grandeur or diversity of a landscape - its scenic qualities - whereas in the marine properties, the underwater aesthetic values are associated with attributes visible within a confined or relatively small space, reflecting an intimate relationship between aesthetic values and the scale at which, or lens through which people experience a place.

The aesthetic values of the Great Barrier Reef are described in the RSoOUV at a variety of scales or through distinct lenses – the underwater, the 'sea level' and the panoramic. Although the aesthetic values of other properties are described as having attributes of differing size or scale – and in many cases the contrasting scale of attributes is described as contributing to the aesthetic values of the place - they do not emphasise the appreciation of those attributes at different scales or through different lenses as is explicit in the RSoOUV for the GBR. Under Criterion vii the GBR is described as one of a few living structures visible from space and as an aerial panorama. A 'scenic vista' is described at sea level, underwater is described as a place for experiencing 'a myriad of brilliant colours, shapes and sizes' of species. **The description of the aesthetic values in the RSoOUV for GBR through a variety of lenses recognises the range of size of the attributes of OUV themselves and the scales at which they may be appreciated – from the microcosm to the immense – and as such provides a potential framework for further interrogation and elaboration of the attributes of aesthetic values and the different scales and contexts at which these values are apparent and for investigating sensitivity of those values. The concept of 'lens' is regarded as an important framing idea.**

The great scale of the GBR and the diversity and complexity of the reef system underpins the OUV of the property. The only marine World Heritage properties of comparable size are the Phoenix Island Protected Area (PIPA), Kiribati and Papahanamokuakea National Marine Monument, Hawai'i. Only PIPA is inscribed on Criterion vii:

> *Phoenix Islands Protected Area, an oceanic wilderness, is sufficiently remote and inhospitable to human colonisation as to be exceptional in terms of the minimal evidence of the impacts of human activities both on the atolls and in the adjacent seas. The Phoenix Islands Protected Area is a very large protected area, a vast wilderness domain where nature prevails and man is but an occasional visitor. The property is distinguished by containing a large suite of seamounts complete with a broad expanse of contextual abyssal plain with a natural phenomenon of global significance. The essentially pristine environment, outstanding underwater clarity, the spectacle of*

> *large groups of charismatic aquatic animals (e.g. bumphead parrotfish, Napolean wrasse, surgeonfishes, parrotfishes, groupers, maori wrasse, sharks, turtles, dolphins, manta rays, giant clams) in quantities rarely found elsewhere in the world, aesthetically outstanding coral reef features (e.g. giant clams, large coral heads) together with the spectacle of huge concentrations of seabirds on remote atolls, makes of this property a truly kaleidoscopic natural "oceanscape" exhibiting exceptional natural beauty of global significance*

In the PIPA Statement of OUV for Criterion vii, the entirety of the attributes of the property - the 'oceanscape' - is emphasised as holding the aesthetic values of the property. Although specific attributes are noted these are not discussed in relation to locations within the property or the different scales at which they may be appreciated.

4. No evidence of systematic assessment methods for aesthetic values under Criterion vii

The review found little indication of systematic assessment methodologies underpinning the definition of aesthetic importance or natural beauty under Criterion vii. A lack of assessment methodologies for aesthetic values was also noted by Lucas et al (1997:49):

> *Natural heritage attributes contributing to criterion (iii), natural beauty and aesthetics, were the poorest documented and least known set of attributes [of the Great Barrier Reef]. There is a lack of consistent methodologies to document and understand the aesthetic qualities. Some work has been done in the Great Barrier Reef World Heritage Area, in particular the visual amenity of the Queensland coastline, and at a local scale, in the Whitsunday Islands. It is important, however, that the aesthetic qualities do not become reduced solely to visual amenity. Aesthetic values are more expansive and contain an array of meanings and attachments that people associate with particular places.*

The consistent association of aesthetic values with the values and attributes of other natural criteria has however created a *de facto* criterion for consideration of aesthetic values under Criterion vii. In regard to comparative analysis for aesthetic values in World Heritage properties, a systematic methodology was not apparent from the discussions provided in the IUCN evaluations of nominations over the past decade. Comparable sites are identified on the basis of site type, that is, landscapes of similar geology, hydrology or geomorphology and/or similar environments or places under the (implicit) assumption that similar types of landscapes (or seascapes) will have similar aesthetic values. Comparative analysis then focuses on the presence, absence or scale of particular attributes or features in assessing the relative significance of the aesthetic values.

The nomination dossier of the GBR and the IUCN evaluation report do not discuss any comparative assessment of values under Criterion vii (then Criterion iii) and the RSoOUV does not provide an indication of properties that may have comparable values.

The current project is concerned with the assessment of aesthetic values and elaboration of their attributes within a single property that has already been found to reach a threshold of OUV. However given the aesthetic values that can be considered of OUV will not be found throughout the property, a **framework for comparative assessment of aesthetic values** within the property will be required. **Underpinning the variability of these values across the property will be the distribution of the attributes of aesthetic values, their scale and the lenses through which they become apparent.**

5. Distinguishing superlative natural phenomena and natural beauty

The descriptions of attributes in the statements of values under Criterion vii rarely make a clear or specific distinction between superlative natural phenomena and natural beauty or aesthetic importance and only in a few instances are features specifically identified as superlative natural phenomena. In most cases where a nomination describes superlative natural phenomena under Criterion vii, comparative assessment against other properties with similar types of natural phenomena is quantitative, the phenomenon being evaluated as to whether it is for example the highest, the longest, the largest concentration, according to the character of the phenomenon. This quantitative assessment is commonly included in the description of values under Criterion

vii. The RSoOUV for the GBR lists several superlative natural phenomena, some in general terms and others specifically in relation to scale as evidence of their outstanding value, for example Raine Island is noted as 'the world's largest green turtle breeding area'.

6. Evidence of aesthetic values

In general aesthetic qualities are seen to be inherent in the landscape features, a descriptive inventory in which the values are primarily qualitative and rhetorical, argued through the language of description of the attributes, often equating aesthetic values with visual amenity. A number of characteristics or descriptors, in particular, diversity, abundance or contrast of forms, animals, shapes, colours, features, scales are consistently used to articulate the aesthetic values of properties and are similarly used in the RSoOUV for the GBR. The presence, extent or scale of these characteristics in relation to particular attributes in a given place may provide a further indicator of OUV.

In many properties inscribed under Criterion vii historical and/or contemporary evidence of a wider appreciation of the aesthetic values of the place is also regularly used as evidence in support of OUV. **The RSoOUV for the GBR includes a claim for the international recognition of the Cod Hole near Lizard Island as a significant tourist attraction. Given this, other historical and/or contemporary evidence, including tourist literature, may provide a further indicator of places within the GBR that are widely recognised or appreciated for their aesthetic values and provide a threshold for assessing OUV.** This observation has influenced the types of evidence examined in the present project.

Overall, this review of the application of Criterion vii revealed the lack of a systematic and rigorous methodology for assessing and managing aesthetic values in the World Heritage system. While this finding did not contribute directly in the development of a methodology for the current project, it did point to several factors to be considered in the development of an appropriate methodology for the GBR, namely:

- the need for identification of aesthetic values and their attributes that is independent of the assessment of values under Criteria viii, ix, and x
- the need to more clearly differentiate aesthetic values and their assessment in relation to superlative natural phenomena
- the need to evaluate a broad range of evidence in determining OUV in relation to aesthetic values and the distribution of those values across the property
- the need to consider the conditions in which people experience aesthetic values in assessing impacts and in management (this is explored further below).

2.2 Aesthetic values assessment in heritage & landscape practice

2.2.1 Introduction

This section examines the approaches to aesthetic value assessment that have developed through Australian landscape assessment and heritage practice and that could be used to assist in the development of methodologies for use in the World Heritage system. Australian practice has been reflective and rigorous and therefore offers some potential. It also refers to some overseas methodologies which are starting to influence Australian practice, but limitations on the scope of the present project did not allow for a wider comparative study of methodologies globally.

Within the scope of the present project, this section offers a brief overview of a large topic. It starts by looking at methodologies that have been established for landscape assessments, and illustrates through a typology, the development from 'visual' or 'seen landscape' methodologies to methodologies that encompass a great range of ways that people engage with landscape – through all senses, culture, experience and so on. Then it examines some of the literature on experiential preferences; this work is drawn on later in the consideration of experiential

attributes. A short section of aesthetic values within Australian heritage practice then follows. This section includes current definitions of aesthetic values and methods used in their assessment. Impact assessment is briefly covered in relation to aesthetic values for places on the National Heritage List as this offers an approach that parallels the World Heritage system. It concludes with key points for consideration in the development of the aesthetic values assessment methodology.

It is important to point out here that Australian practice now recognises aesthetic response to a place or setting as being sensory, and it also reflects the influences of perception, culture, experience and interaction with that place. The definitions of aesthetic value applied in heritage assessment practice in Australia now use a broad definition, and methods have been developed in recent years to encompass sensory responses to place. This will be revealed through the narrative below, and offers an important point of connection with the World Heritage system.

2.2.2 Aesthetics and landscape assessment

Contemporary heritage practice has its roots in the post-war period, a response to personal and collective loss combined with the development pressures associated with renewal. In Australia the National Trust led, focusing initially on early and grand buildings. Natural environmental protection, including recognition of natural beauty and scenic values started far earlier and is linked to the 'sense of wonder' associated with British colonisation and their discovery of a 'new land'. Early efforts to protect natural areas in Australia often focused on places that were regarded as unusual, sublime or of great natural beauty. This is reflected for example, in early national park and 'scenic reserve' designations.

In the 1970s, interest in the visual landscape emerged strongly in the USA and in Britain, and Australia followed, importing the experts along with their methods. The methods typically used a combination of *descriptive inventory* combined with *public perception* data, the latter based either on a theoretical understanding of human response to landscape (for example, 'refuge and prospect') or on perception studies (often based on photographs). The focus was universally on the visual or seen landscape, and the viewer was seen as the 'source' of aesthetic values. Photographs were used as surrogates for the real place, and 'scenic quality' was commonly derived from studies where sets of landscape images were ranked and consistent physical attributes distilled as the attributes considered to embody aesthetic values.

Table 2.1 below summarises distinctive types of aesthetic assessment methods (Context 2012), highlighting key differences in the underpinning concepts, the data needed, the methods used and the strengths and issues in each.

Some examples of landscape assessment methods then follow to illustrate the framework in Table 2.1.

Table 2.1: Aesthetic assessment methods

Type	Concept	Data	Key domain	Method	Output	Strengths/Issues
DESCRIPTIVE INVENTORY						
focus is on place attributes	Aesthetic quality of landscape/place inherent in its physical attributes	Physical attributes of place (vegetation, landform, water form etc) May be based on classical concepts of aesthetics.	Geography; land systems	Definition and analysis of physical attributes; attributes rated for aesthetic (often visual) quality	Map of aesthetic quality	Quantitative results, meets scientific standards for reliability, reliability Links values to physical attributes Ignores cultural & social dimensions Professional values may not align with public perceptions Doesn't align with NHL criteria (could with HERCON)
PUBLIC PERCEPTION						
focus is on perceptions	Viewer is source of aesthetic values					
Psycho-social model	Based on general community consensus about values that can be quantified at attributed to physical landscape attributes - and therefore enable values to be predicted in other landscapes	(1) Physical attributes of place (vegetation, landform, water form etc) (2) Public perception data	Landscape	Definition and analysis of physical attributes; attributes rated for aesthetic (often visual) quality - based on perception studies	Map of aesthetic quality	Quantitative results, meets scientific standards for reliability, reliability Adequacy of perception data - and use of surrogates (photos) do not reveal richness of landscape Sensitivity to cultural and experiential differences

Type	Concept	Data	Key domain	Method	Output	Strengths/Issues
						Insensitivity to specific landscape features, symbolic meanings and other cultural values.
Psychological model	Seeks to add psychological processes: how cognition, perception, affect and emotion relate to the experience of place Some methods based on innate cognitive responses to landscape (refuge/prospect)	Adds: memory, past experience, interest, cultural background as co-determinants of response	Environmental psychology	Some methods are based on mathematical modelling of the relationship between physical landscape attributes and responses Others use indirect data sources to postulate landscape responses: art & literature for example	Descriptive or mapped, depending on method	Theoretical strong (situates the person within the experience of landscape and more weight to user preferences) - applied orientation may be weak Ability to find commonalities Use of surrogates (photos) do not reveal richness of landscape experience Insensitivity to specific landscape features, symbolic meanings and other cultural values.
Phenomenological models	Human response to landscape is complex and multi-dimensional, and influenced by culture, experience, and interaction with the landscape Focuses on subjective experience, emotions, personal (and shared) meanings	Direct 'community' engagement needed to understand values	Anthropology; geography; landscape; history; fine arts	Typically uses research and engagement to collect a variety of data in a systematic way, with content analysis. NHL method uses the concept of particular aesthetic characteristics as the basis for content analysis - usually characteristics derived from specific place investigation rather	Description of meanings and values: narrative mode Hard to map discrete areas with different levels of value	Most holistic - focuses on understanding and meanings (and generally lacking strong theoretical base) Qualitative results

Type	Concept	Data	Key domain	Method	Output	Strengths/Issues
				than from broader studies		
						Ability to find commonalities (at relevant scale)
						Aligns best with NHL criteria

Sources: Itami (1993), Lamb (1993), Context (2006)

Psycho-social models

The visual resource management system developed in the USA has been adopted and used throughout Australia. It combines analysis of the inherent physical characteristics of the landscape - land form, land cover (vegetation, land use) and water – to define landscapes with strong similarities. Their scenic quality was assessed, based on a series of assumptions derived from perception studies, generally based on photographs and often using overseas research on perceptions rather than Australian studies, potentially ignoring perceptions shaped by cultural relationships with and meanings imbued in place and landscape.

Using these methods, scenic quality was considered to increase with:

- greater degrees of uniqueness in rock outcropping, water, sub-alpine heathlands and other natural features
- greater degrees of naturalness and lesser degrees of man-made alteration
- greater degrees of relative topographic relief and ruggedness
- greater degrees of vegetative diversity and general landscape variety
- greater degrees of vegetative diversity and green crop patchwork effects in agricultural landscapes
- greater degrees of vegetative mixture and edge diversity in coniferous plantations (Leonard & Hammond 1984, 60).

This type of method is still being used in Australia, particularly in visual impact assessments associated with a potential landscape change. An example is the *Visual Landscape Study* undertaken to assess the visual landscape values of potential industrial development nodes on the Kimberley coast (WA). In this study a visual landscape inventory provided a description and analysis of the visual characteristics of the project landscapes. A future step was intended to be impact assessment, a process which would determine whether a proposed change or development would comply with defined visual management objectives.

The visual landscape inventory method involved systematic description of the visual landscape character, classification of landscape units with common character, definition of the visual significance of each landscape based on 'human values' (using perception research from WA and elsewhere). As well, factors such as observer position, travel routes and viewing points were considered. This methodology assesses the 'seen landscape'.

A similar method has been applied to the Queensland coast (including the continental islands) in *A view of the coast: an overview of the scenic resources of the Queensland coast* (EDAW 1996). It allocates areas to a landscape character type, analyses landform, water form and land use, and assigns a scenic quality rating to each, along with a uniqueness and rarity rating. While offering an analysis of scenic quality only, its scale makes it a valuable comparative data source for the present project.

Psychological models

Psychological models have been infrequently applied in Australia to broad-scale landscapes, largely because of the complexity of understanding directly people's response to place. Smaller scale applications sometimes form part of urban and open space planning for particular sites.

Phenomenological models

Other approaches extend beyond the 'seen landscape' and have been used to consider aesthetic and cultural values and then impacts. For example that *Wind Farms and Landscape Values:* N*ational Assessment Framework*. This study defines landscape values as:

> *Landscape values include the existence value of a landscape or its value to the present or future generations. Landscape values may include biodiversity, geo-diversity, historic or aesthetic values* (Planisphere et al 2007:5).

The method developed in this project was designed to recognise landscape values that derive from an individual's response to the landscape's natural or cultural character including visual and aesthetic responses. It recognises that 'values held by communities about landscapes will vary and not be universal' and therefore that identification of landscape values involves consideration of aggregate community perceptions of the value to a landscape and the identification of values that are shared between communities or amongst community members (Planisphere et al 2007:5). This method envisages that understanding landscape values involves:

- landscape character analysis
- natural and cultural values analysis
- direct involvement of communities and stakeholders in identifying landscape values.

Landscape values are seen as both visual and non-visual, with the latter including associations, memories, knowledge, experiences and other cultural and natural values (Planisphere et al 2007:5).

This project represents a significant departure from the scenic values methods that have dominated the field since the 1970s, and generally follows a 'heritage assessment model' with consideration of documented landscape values (e.g. heritage listings) and community-based research.

In Australia, National Heritage aesthetic values assessments have in recent years adopted a set of methodologies that can be described as phenomenological.

2.2.3 Exploring experiential preferences

While some landscape aesthetics methods focused on understanding the physical attributes of the place that contributed to aesthetic values, others focused on the experience of the place. In this section, three such approaches are examined. These are later taken up in the methodology in relation to the concept of experiential attributes (see Section 3.2).

The three approaches are contained in the following:

- Recreation Opportunity Spectrum (Clark & Stankey 1979)
- Landscape Character Assessment (Swanwick et al 2002)
- *Experiencing Landscapes*: a study into the experiential qualities of landscapes (The Research Box et al 2009).

Recreation Opportunities Spectrum methodology

The Recreation Opportunities Spectrum (ROS) proposes six factors that influence the preferences of recreationists, recognising that different people seek different types of recreation settings, depending on the levels of independence, risk taking, and social contact sought. These settings are placed on a spectrum from urban to primitive. These ROS settings have been used to help determine the permitted activities and uses for areas in the GBR covered by plans of management.

These factors are summarised below:

- Access: Access includes type and mode of travel. Highly developed access generally reduces the opportunities for solitude, risk, and challenge. However, it can enhance opportunities for socializing, and feelings of safety and comfort.
- Remoteness: Remoteness refers to the extent to which individuals perceive themselves removed from the sights and sounds of human activity. A lack of remoteness is important for some setting experiences.

- **Naturalness:** refers to the degree of naturalness of the setting; it affects psychological outcomes associated with enjoying nature. In the USDA Forest Service applications, this indicator is portrayed by using a compatible visual quality objective (VQO) for each setting.
- **Site development:** refers to the level of facilities and management provided at a site. A lack of facilities and site modifications can enhance feelings of self-reliance and independence, and can provide experiences with a high degree of naturalness. Highly developed facilities can add feelings of comfort and convenience, and increase opportunities for socializing.
- **Social Encounters:** This factor refers to the number and type of other recreationists met along travelways, or camped within sight or sound of others. This setting indicator measures the extent to which an area provides experiences such as solitude, or the opportunity for social interaction. Increasing the number of visitors to an area changes the kind of recreation experience offered, attracting new users and causing others to leave.
- **Visitor Impacts:** This factor refers to the impacts of visitor use on the environment. Impacts on wildlife, on habitat, and on air, water, and sound quality will affect the visitor's experience.

A more recent development of the ROS approach combines water and land settings (WALROS) structures the settings into three broad categories - physical, social and managerial. For each an explicit measure is provided against each indicator, for example:

Physical setting:

- Extent that human built structures dominate the viewshed
- Distance from major development
- Degree of natural environment modification, based on extent of visitor awareness of those alterations
- Degree that natural ambience dominates, in terms of opportunities to see, hear and smell nature
- Water quality
- Air quality
- Visual quality.

Social setting:

- Evidence of the presence of visitors, their sights, sounds, smells, litter etc
- Degree to which visitors congregate in an area
- Degree to which many different recreation activities occur in the area, with potential for conflict between activities
- Degree of solitude and remoteness – the sense that visitors view themselves as being alone or far way from others and civilisation.

Managerial setting:

- Extent of management infrastructure, including interpretive signage
- Distance to and extent of visitor infrastructure
- Distance to and extent of public access infrastructure.

These offer a framework for understanding some of the aesthetic qualities that arise from the experience of the place, as well as potentially providing a framework for considering impacts.

Landscape character assessment methodology

Turning to the Landscape Character Assessment methodology, a product of the UK, its development reflects a desire to better understand what makes a landscape distinctive and to build this into landscape planning, impact assessment and management. It demonstrates a distinct move away from 'scenic' methodologies, and recognises that the 'experiential aspects of landscape' relate to both aesthetic and perceptual dimensions of landscape character (Swanwick et al 2002:34). The method uses a set of aesthetic aspects, essentially descriptors, of the visual qualities of a landscape as shown in the illustration below.

Table 2.2: Aesthetic aspects of landscape character

Box 5.1: Aesthetic aspects of landscape character

SCALE	Intimate	Small	Large	Vast
ENCLOSURE	Tight	Enclosed	Open	Exposed
DIVERSITY	Uniform	Simple	Diverse	Complex
TEXTURE	Smooth	Textured	Rough	Very rough
FORM	Vertical	Sloping	Rolling	Horizontal
LINE	Straight	Angular	Curved	Sinuous
COLOUR	Monochrome	Muted	Colourful	Garish
BALANCE	Harmonious	Balanced	Discordant	Chaotic
MOVEMENT	Dead	Still	Calm	Busy
PATTERN	Random	Organised	Regular	Formal

An equivalent checklist is not provided for perceptual qualities which are defined to include qualities that are perceived or experienced by senses other than sight, such as noise, tranquillity and exposure. An extract from a field survey sheet (Table 2.3) offers a set of 'perception' aspects (Swanwick et al 2002:31).

Table 2.3: Perception aspects

Aspect	Spectrum				
Security	intimate	comfortable	safe	unsettling	threatening
Stimulus	monotonous	bland	interesting	challenging	inspiring
Tranquillity	inaccessible	remote	vacant	peaceful	busy
Pleasure	unpleasant	pleasant	attractive	beautiful	(blank)

Experiencing Landscapes study

The Natural England study *Experiencing landscapes* offers a number of interesting ideas. First it suggests that there are eight distinct cultural services offered by landscapes, and through research and surveys sought information about the types of landscapes, landscape features and emotions that are linked to each cultural service.

The Millennium Ecosystem Assessment (MA) defines a range of ecosystem or environmental services that are provided by a healthy environment or landscape. *Cultural services* are those that are vital for human quality of life and well-being. The eight cultural services are shown below.

Table 2.4: Cultural services

Cultural services	Qualities needed in the landscape
Sense of history	The landscape conveys a sense of history and continuity, and the permanence of nature through evidence such as geology, pre-

Cultural services	Qualities needed in the landscape
	history and historic structures
Spiritual	The experience is often associated with more solitary moments and may result from interaction with iconic wildlife, a grand tree, an ancient or revered cultural feature. Often associated with water and with dramatic and ephemeral weather and light effects.
Learning	The desire and experience of learning about nature and about one's own capabilities.
Recreation	The landscape needs to offer activities and ways of accessing them; very diverse types of landscape offer this depending on the preferences and interests of the person
Calm	Landscapes that offered intimate spaces or moments of stillness, often with a sense of remoteness and naturalness.
A sense of place	Distinctive features or qualities that help define that locality and its character or mood. Homogenous landscapes had more sense of place.
Inspiration	The landscape needed to be particularly beautiful, dramatic, visceral, full of wildlife, romantic or powerful
Escapism	Escaping from the everyday often involved needed a sense of remoteness, absence of people, natural soundscape and a sense of peacefulness.

To these, the research added several additional 'services' delivered by landscapes including stress relief, health and exercise, quality time and relationships (The Research Box et al 2009:9).

In reflecting on the results, the importance of all senses 'coming into play' in the experience of the landscape – and not just the visual - is emphasised:

- sound – the rustle of leaves a babbling brook, birdsong
- smell – wild flowers, cut hay, the freshness of the air
- feel – the nature of the surface: smooth, rutted or the feel of wind, rain or sunshine on the skin
- taste – the taste of salt in the air (The Research Box et al 2009:86).

The study also looked at preferences for four landscape qualities with the aim of discerning preferences (The Research Box 2009:8-9):

Variety vs simplicity: the preference was for visual richness and diversity – colours, patterns, layers of views – although a a smaller scale within a landscape, aspects of simplicity were appreciated such as a long stretch of sand, and expanse of wide open marsh, swathes of wildflowers.

Natural vs human-made: the best landscape experiences were those defined as natural, meaning 'green and rural'. Some human-made features were appreciated within natural settings as they provided a sense of history, community and provided access, and features that 'blend in' such as old historic buildings were more acceptable than modern development.

Openness vs enclosure: openness was valued more than enclosure and contributes towards a positive sense of escapism. Enclosure can the threatening for some, but can also have positive

qualities, adding diversity to a landscape and providing a space where peace and isolation can be found in a highly peopled or noisy landscape.

Quality and condition: while the study observed that people found it hard to analyse landscape quality and condition, they could identify negative aspects such as poorly managed land, intrusive development, loss of habitat, over-developed recreation areas.

Finally, the study looked at how three concepts connect to each other:

- *aesthetic qualities* (of the landscape): that is how we 'interpret' the form and arrangement of the landscape and its component parts, for example in terms of scale (small – vast), enclosure (enclosed – exposed), diversity (simple – complex), colour (muted – colourful), the manifestation of the overall 'view' or 'scene'
- *perceptual qualities* (of the landscape): that is how we respond to the landscape, recognising that this is coloured by the experience of the individual eg senses of tranquillity, exposure, wildness, remoteness, security, quality of light and perceptions of beauty or scenic attractiveness.
- *experiential qualities*: this term is used to capture all aspects of how people experience landscapes, aesthetic and perceptual qualities and the cultural services provided by landscapes.

It concluded that aesthetic qualities, perceptual qualities, and cultural services are overlapping ideas: 'for instance, *perceptual qualities* can be seen both as an aspect of the landscape (such as tranquility) and a *service* (quietness / calm) and can be described as an *experiential quality*.

2.2.4 Aesthetic values and heritage assessment

This section provides an overview of Australian heritage practice, and includes discussion of these approaches.

What are aesthetic values?

Aesthetics encompasses a number of distinct meanings – derived from formal definitions as well as from its use in heritage values assessments. The focus of this project is on the practical, heritage-based definition of aesthetics.

For example the 1988 *Guidelines to the Burra Charter: Cultural significance* define aesthetic value as:

> *Aesthetic value includes aspects of sensory perception for which criteria can and should be stated. Such criteria may include consideration of the form, scale, colour, texture and material of the fabric; the smells and sounds associated with the place and its use.*

The *Australian Natural Heritage Charter* defines natural significance as 'the importance of *ecosystems, biodiversity* and *geodiversity* for their existence value or for present or future generations, in terms of their scientific, social, aesthetic and life-support value' (Article 1.3). The concept of 'existence' value is regarded as an intrinsic value beyond the 'social, economic or cultural values held by humans' and yet this value – the right of the environment and other species to exist and flourish into the future - is also a value held by many people today (AHC ACIUCN 2002: 5, 9).

Commonwealth government practice, as reflected in the Comprehensive Regional Assessment of National Estate values in the 1990s for example, uses the following definition (emphasis added).

> *Aesthetic value is the response derived from the experience of the environment or particular natural and cultural attributes within it. This response can be to either visual or non-visual elements and can embrace emotional response, sense of place, sound, smell and any other factors that have a strong impact on human thought, feelings and attitudes.*

These definitions no longer privilege visual as the primary sensory response to place. The sections below first examine the criteria used today and then provide a brief account of the development of aesthetic values assessments methods within the heritage domain.

Criteria

There are two distinct variations on the criterion used in Australia for aesthetic significance:

> *Importance in exhibiting particular aesthetic characteristics* (criterion (e) in the 'common criteria' used at State and local level)
>
> *Importance in exhibiting particular aesthetic characteristics valued by a community or cultural group* (National Heritage List criterion (e))

At the national level the phrase '*valued by a community or cultural group'* has been retained, but has been removed from the common criteria' used at State and local level.

While the essential difference appears to be the need to demonstrate that the values are held by ('experienced by') a particular community or cultural group, aesthetics is an 'experienced value', meaning that there is always a need to demonstrate that it is present and could therefore be experienced.

The National Heritage list criterion (e) - *the place has outstanding heritage value to the nation because of the place's importance in exhibiting particular aesthetic characteristics valued by a community or cultural group* – is accompanied by a significance indicator designed to elaborate the criterion:

> *Features of beauty or features that inspire, emotionally move or have other characteristics that evoke a strong human response*

Interpretation of this criterion requires careful consideration of specific phrases: *particular aesthetic characteristics*, for example is linked to *valued by a community or cultural group*, requiring that an assessor determines first the particular aesthetic characteristics that are valued by a defined community or cultural group. A further interpretation is that a *characteristic* is a quality inherent in the place, and is not an attribute. For example, the characteristic could be 'sense of peace and tranquillity' and the attribute of the place that creates this quality may be its 'extensive rainforest'. The challenge is often the lack of explicit studies.

The term *exhibiting* is interpreted to mean that the place shows or demonstrates particular characteristics. However, this does not mean that every part of a place must be currently visited or accessed. Rather, the characteristics that can be demonstrated to be valued are valued no matter where within the place they are. **Methodologically, this means that if a connection can be made between a valued characteristic and an attribute, then attribute data can be used to map or define valued aesthetic characteristics.**

The phrase '*evoke a strong human response*' used in the significance indicator suggests that the scope of the assessment is the experiential (experienced) qualities of a place that impact on human senses. Further, it is essential to recognise that many things influence the impact of a place on our senses including knowledge, culture, past experiences, and more.

Inspirational landscapes as indicators of significance:

To further illuminate aspects of aesthetic value, the AHC has developed the concept of *inspirational landscapes,* one of the themes in its national thematic framework. *Inspirational landscapes* are defined as:

> *places that inspire emotional, spiritual and/or intellectual responses or actions because of their physical and experiential qualities as well as their meanings, associations, stories and history.*

Eight *indicators* have been developed to identify physical attributes, associations or meanings of landscapes that could suggest significant inspirational value. These are linked to the nine national heritage criteria, with four indicators linked to criterion (e) aesthetic significance (Context 2003).

Powerful landscapes: landscapes that create a powerful emotional response usually due to their exceptional features.

Uncommon landscapes: landscapes with uncommon and unusual qualities within an Australian context that have inspired strong emotional responses

Defining images and creative expressions: landscapes that have inspired defining images and creative expressions that have shaped national perceptions.

Contemplative landscapes: natural landscapes that provide important opportunities for contemplation, spiritual reflection or refreshment of the human spirit.

State and local level assessments

For State and local level heritage assessments, there are now 'common criteria' across Australia:

Criterion E: Importance in exhibiting particular aesthetic characteristics

Some states have developed guides on the application of the criteria; in Queensland for example a series of significance indicators are used:

Natural beauty or other natural aesthetic quality

Picturesque attributes

Evocative qualities

Expressive attributes

Landmark quality

Symbolic meaning (Queensland Heritage Council 2006).

Protecting Local Heritage Places: a national guide for local government and communities (2009:39) describes the concept of aesthetic values as follows:

Aesthetic value to the community includes aspects of sensory perception (sight, touch, sound, taste, smell) for which criteria can be stated. These criteria may include consideration of form, scale, colour, texture and material of the fabric or landscape, and the smell and sounds associated with the place and its use.

- *Does the place have natural or cultural features which are inspirational or evoke strong feelings or special meanings? What are those features, and to what extent are they evocative?*
- *Is the place a distinctive feature that is a prominent visual landmark?*
- *Does the place evoke awe from its grandeur of scale? To what extent is this important?*
- *Does the place evoke a strong sense of age, history or time depth? How does it do this, and to what extent?*
- *Is the place symbolic for its aesthetic qualities? Has it been represented in art, poetry, photography, literature, folk-art, folklore mythology or other imagery?*
- *Does the place have outstanding composition qualities involving any combinations of colour, form, texture, detail, movement, unity, sounds, scents, spatial definition and so on? To what extent is this important?*

The phrasing again demonstrates the complexity of aesthetic appreciations of place and the potential influences of culture, experience of place and knowledge.

Data sources

Since the mid 1990s, the evolving approaches to understanding aesthetic values described above, and particularly the commissioning of aesthetic values assessments for places nominated to the National Heritage List, has revealed the potential of specific processes and data sources.

In summary, the following are now relatively commonly used:

- community and 'public' values may be investigated through surveys, focus groups or interviews
- existing direct evidence of public response to a place may be sought out: this may include a wide variety of evidence including locally 'signatures' and icons, public art, language and naming
- public postings of images on photo websites may be examined and the content analysed in relation to the underlying aesthetic characteristics or qualities
- artistic and creative responses to place may be examined, often with an emphasis placed on images that are in public collections and well-known, recognising that these images may also strongly influence public aesthetic response to a place
- researchers and experts with a deep, long-term knowledge about a place or types of phenomena may be sought, for example foresters who have worked in a particular forest over many years, or a scientist who has researched a particular forest type.

As well, the focus is on multiple processes and data sets, rather than a single data source. Triangulation – that is, multiple methods and data sets – is seen as a valuable way to increase the reliability of the analysis. In some projects, iteration is also used, that is the findings generated by one process are evaluated, enabling the refinement of subsequent processes and potentially the generation of new research questions. These approaches have been drawn from anthropological research methods which essentially underlie all of this work.

By using multiple data sources, information can be compared and contrasted, enabling a richer understanding to emerge. Preliminary testing of the validity of the initial conclusions is also highly desirable, using a variety of possible techniques (for example return of material for checking, or community review of the draft analysis of significance).

Finally, it is now recognised that it is important to select from amongst the range of available methods to suit the scope of an assessment, the nature of the place and the potential ways in which people experience the place.

2.2.5 Aesthetic values, impact analysis and the National Heritage List

While the fields of environmental, social and visual impact assessment are well developed, consideration of impacts on aesthetic values – defined broadly as sensory response – is in its infancy. A recent project in which this has been attempted is for the West Kimberley, a National Heritage List place.

In the draft referral guidelines on the potential National Heritage listing for the West Kimberley, the Commonwealth Government defines an 'action that is likely to have significant impact on National Heritage values' as one where 'there is a real chance or possibility that it will cause:

1. One or more of the National Heritage values to be lost
2. One or more of the National Heritage values to be degraded or damaged; OR
3. One or more of the National Heritage values to be notably altered, modified, obscured, or diminished' (2001:7).

The approach used involved assessing the sensitivity – or the relative robustness or fragility of different attributes – against a range of potential actions. For example the relative robustness of 'geological values which are unlikely to be impacted by most activities' compared to biodiversity and Indigenous culture values' which may be 'more sensitive'. The sensitivity of the attributes is mapped, and a protection level is assigned to broad areas of the landscape based on this analysis.

This approach was applied to the attributes that provide evidence of aesthetic values, and they were rated a protection level of 4 on a scale of 6 where 6 was the highest protection level. The 'attributes' were large-scale landscapes – the coast and extensive national park areas. From the material reviewed, the concept of impact on aesthetic experiences that are more diffused across the whole landscape does not appear to have been examined.

Given the legislative and conceptual links between National Heritage and World Heritage, the approach described above is of some interest in the present project, as is the vulnerability approach used by GBRMPA. These approaches are detailed in Section 3.3 below.

2.2.6 Key points for consideration

The emergence of aesthetic values methods in the Australian heritage practice (Section 2.2.4) provides a strong foundation for the present project, particularly in the light of the discussion in Section 2.1 where it is revealed that there is no established World Heritage methodology for assessing natural beauty and aesthetic values under Criterion vii. These approaches, while relatively new, have been tested on large-scale and small-scale places being considered for the Australian National Heritage List over the last 10 or so years, with most effort occurring in the last 5-6 years.

Further, the exploration of experiential preferences described in Section 2.2.3 suggests that a framework could be derived with some confidence.

It is therefore considered that in the present project:

- the broader definition of aesthetic value should be used, and a reversion to narrower 'visual' and seen landscapes approaches should be avoided
- the methodology developed should link the assessment of values to the consideration of impacts on those values
- the methodology should be able to be used at a variety of scales, recognising that the present project is focusing on the GBRWHA as a whole, but that subsequent projects may seek to look at the values and impacts on those values for a specific part of the GBR
- multiple data sets should be used, within the constraints of available data and project resources
- the analysis of the data should use a variety of analytical techniques, such as narrative in examining historical appreciations, content analysis for images and so on.

3 SHAPING A METHOD

3.1 Introduction

Development of a methodology suited to assessing the aesthetic values of the GBR, a large and complex World Heritage Area required an approach that:

- responded to contemporary understandings of aesthetics, and to Outstanding Universal Value (Criterion vii) and its interpretation (see *Section 2 Framing the Assessment of aesthetic values*)
- considered the nature of the GBR – its size and scale, its physical and biological dimensions above and below water, and its complexity
- considered its history of human use of the GBR and how it has been perceived over time, recognising that there will be distinctive, culturally-based perspectives on the GBR especially considering Indigenous and settler Australians, and visitors
- considered its iconic status in Australia and internationally
- enabled consideration of the sensitivity of these aesthetic values to detrimental impacts
- was feasible, given project resources and available data, especially as no new research was possible within the scope of the present project
- was aligned with existing concepts and processes that are used in recognising and managing the values of the GBR.

A workshop at GBRMPA on 13-15 August 2012 enabled the project team to present their initial ideas on the assessment of aesthetic values, and to develop them in collaboration with GBRMPA and DSEWPaC staff. The methodology developed offered a detailed approach to aesthetic values assessment, and proposed that the sensitivity analysis would adopt the GBRMPA 'vulnerable assessment' model. Report 1 documented this methodology.

It was then refined through a peer review workshop (held at DSEWPaC) plus written and verbal comments from GBRMPA and Queensland's Heritage Office.

A second workshop was held was GBRMPA in October 2012 to review the values assessment approach, to enable further development of the sensitivity analysis, to consider the approach to the mapping of values and attributes and to select 2 case study areas.

The refined method is detailed below. It is presented as a step-by-step approach.

3.2 Developing a methodology to assess aesthetic values

3.2.1 Step 1 - Defining the scope and framework

Step 1 involved defining the scope of the work and providing a frame of reference.

Key components

The key components of this step in the process were:

4. Scoping the project and the aesthetic values assessment
5. Defining key concepts
6. Establishing some clear frames of Reference relevant to the GBR
7. Scoping data sources available
8. Mapping
9. Defining the steps.

Each component is described below.

Step 1 - 1. Scoping the project and the aesthetic values assessment

The scope of the present project was shaped by the brief. It encompassed the whole of the GBR and our approach was designed to define the aesthetic values of the whole property at a scale and level of detail achievable with the available resources and timeline. Preliminary reading (including Lucas et al 1997) and initial consultation with GBRMPA (described above) revealed that the scale and interconnectedness of the property are profoundly important foundations for its OUV. This has influenced our approach.

Step 1 - 2. Defining key concepts

The key concepts employed in the present project are described below.

Aesthetic value:

Criterion vii encompasses two distinct elements:

> *containing superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance*

As stated above, the present project focused on the second element 'exceptional natural beauty and aesthetic importance'. In the absence of an established methodology for World Heritage assessment of this value, defining aesthetic value was therefore critical.

Aesthetic values relate to human perceptions of and experience of an environment, with the term environment used broadly to encompass specific places, localities, landscapes and areas, habitats and ecosystems (including living organisms). The concepts and practices in assessing aesthetic values are described in Section 2.1 in relation to OUV and the World Heritage system, and in relation to aspects of practice in Section 2.2.

Based on the review in Section 2, we will define aesthetic value or significance as the response (the aesthetic response) derived from the experience of an environment or parts of an environment. Human senses - sight, touch, smell, sound, movement – are important in how humans experience an environment. And culture, knowledge, expectations and past experience mediate sensory perceptions.

Aesthetic response can therefore be said to be linked to:

- the characteristics of an environment
- culturally or personally derived preferences.

Aesthetic value or aesthetic significance is therefore defined in this project as including sensory, experiential and emotional response to place. Aesthetic value is more than visual and, reflecting the review and findings in Section 2, the present project has used this broader conceptualisation. This decision is supported by our analysis of directions in the practice of assessing aesthetic values, including our review of World Heritage assessments of OUV.

Aesthetic qualities can be judged against various aesthetic ideals, for example: the ideals of beauty, picturesque, expressive etc. each of which has its own distinctive qualities. The project team is not currently aware of any established frameworks for assessing 'natural beauty' against such ideals.

The definition used in national heritage values assessments in Australia will be adopted to guide our work:

> *Aesthetic value is the response derived from the experience of the environment or particular natural and cultural attributes within it. This response can be to either visual or non-visual elements and can embrace emotional response, sense of place, sound, smell and any other factors that have a strong impact on human thought, feelings and attitudes* (O'Brien & Ramsay 1991).

Recognising that aesthetic values are influenced by culture, experience, expectations and past experiences, our approach has been to seek out data on aesthetic values that are broadly shared.

This has presented the project team with a dilemma. In Australia it is widely appreciated that Australian Indigenous peoples view the world in ways that are distinctly different from 'western' perspectives, with the latter representing the 'mainstream' view. Further, there is limited research into Indigenous perspectives on aesthetic value, and limited research into Indigenous traditional owner values in relation to the GBR. Based on the scope of the project and the limitations of time and budget, it was decided that Indigenous perspectives could not be adequately addressed, and that instead recommendations should be made as to how such perspectives could be considered in future studies. This is covered in *Section 7 Conclusions & recommendations*.

Attributes:

Examination of the World Heritage procedures (see Section 2) indicates that statements of OUV for natural places appear to attribute aesthetic values to **features** and **phenomena** that are considered to reach OUV threshold against other criteria. The aesthetic values are defined through the rhetoric of description and through comparative assessment of **attributes**. This is a qualitative approach and no documents have been located that demonstrate a systematic or rigorous approach. This is one of the challenges for the present project.

In the present project, **attributes** are defined as the entity that holds or embodies values.

Attributes are regarded as the expression of the value, or that which embodies or contains the value. Attributes are generally considered to be tangible. For example, the 'characteristics of an environment' are tangible attributes, that is, they offer a physical or material expression or embodiment of the value.

Attributes with a cultural expression, such as ritual, traditions, knowledge systems, language, performance etc, are referred to as 'intangible heritage' to distinguish them from place-based or object-based heritage (UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage, 2003).

Considering the nature of the present project, we consider that attributes may have a material (physical) expression or a cultural expression. However, our focus is on perceptual and experiential attributes, rather than the broader set of cultural expressions referred to in the 2003 Convention.

In analysing the research and other data, we have therefore defined two types of attributes:

- Environmental attributes
- Experiential attributes.

These are discussed further below.

Elements:

Elements are all of the components of the physical, biological and human world that together make up the landscape or place including:

- physical (land forms, water forms, geology/geomorphology)
- biological (plants and animals)
- human (settlements, activities, land uses).

Elements should not be confused with attributes of value, although an element may be an environmental attribute.

Character:

Character or landscape character, is what makes a landscape distinctive and recognisable. Landscape character represents a consistent pattern of elements - physical, biological and human - that make one landscape different from another. Character and the process of characterisation do not imply that one landscape is better or worse than another, just different.

Visual aspects:

The visual aspects of landscapes or places can be described systematically to define similarity and differences between them. Terms used as descriptors for visual aspects of a place can include: scale, enclosure, diversity, texture, form, line, colour, balance, movement and pattern.

Risk assessment:

Risk assessment is used to assess the risk associated with a particular action, pressure or threat, and is usually based on a combination of the severity of the consequences and the likelihood that it will happen, using a matrix approach. This approach has been used by GBRMPA in the *Outlook Report* (2009). It provides a valuable framework and is the foundation of vulnerability assessment approach developed by GBRMPA in their *Biodiversity Conservation Strategy* (2012) and applied to species and habitats.

Vulnerability assessment:

GBRMPA has developed an approach to assessing the vulnerability of species, groups of species and habitats. Their approach involves considering:

- the degree of exposure of the species, group of species or habitat to a key pressure (this is equivalent to the risk assessment component described above)
- the sensitivity of the species, group of species or habitat by considering the relative effect of the pressure
- the ability of the attribute to adapt and of management to increase its adaptive capacity (or mitigate impacts).

Sensitivity:

Sensitivity can be defined in several ways. For example it could be a measure or an indicator of the fragility or robustness of an attribute to impact from an action. In the vulnerability assessment, sensitivity is framed in relation to the **relative effect** of a pressure: for example a low sensitivity means that exposure to the pressure will have minimal impact on significant factors like the ability of a species to reproduce, migrate, feed etc.

Visual sensitivity is usually based on the visibility of an area and the number of people seeing it – for example from travel routes or viewing points. The distance of the area from the viewer is a factor. This is a useful concept but assumes that the visibility of an area will not change. This concept has not be applied in the present project.

In this project sensitivity has been defined as the **relative effect** of an activity on an attribute, that is the amount the attribute is affected. The sensitivity statements used in the vulnerability assessments have been adopted for the environmental attributes, and parallel approach has been developed for experiential attributes.

Step 1 - 3. Establishing clear frames of reference relevant to the GBR

A frame of reference has been defined to ensure that the particular nature of the GBR is considered throughout the subsequent steps. There are a number of aspects to this frame of reference, not all of which have been able to be explicitly considered in the present project, due to limited time and budget.

Scale:

The size of the GBR is recognised as a 'fundamental and necessary antecedent' to many of its natural values (Lucas 1997: 47).

The GBR can be appreciated at several distinct scales, each related to different modes of experiencing the place:

- A whole place: that is at a vast scale, experienced for example, from the air or remotely via satellite images or from a conceptual understanding of its being an interconnected whole. This idea is also expressed in the singular naming of the place - 'The Great Barrier Reef'.

- Locally: that is as a local landscape or environment – experienced for example as part of daily life for nearby communities, and as a place to go out and explore
- Intimately: that is through immersive and close-up experiences.

The size of the reef, and its latitudinal and longitudinal spread, creates a series of distinctive environments and ecosystems, each offering opportunities for different aesthetic experiences. In line with the values under Criterion vii in the RSoOUV, much of the data used to assess aesthetic values is derived from research on the whole of the GBR, with a limited range of data specific to parts of the GBR, and typically associated with the places most visited by tourists.

Perspectives:

The GBRWHA can be seen as two interactive landscapes – above water and below water – each seen through several distinctly different perspectives/lenses

- **Panoramic:** the GBR experienced from above – aerial perspectives and those from high look-out points. The GBR as a pattern of waters, reefs, cays, and islands, and as a vast landscape.
- **At water or land level:** the GBR experienced from water level or from the land. The GBR as sky, water, as land emerging from water, and with a sense of a world beneath the water. This perspective is at eye–level.
- **Below water:** the GBR as an underwater landscape offers humans an immersive experience unlike that offered on land. The three dimensional qualities of the underwater landscape, its relatively intimacy with long-distance views being rarely experienced, and the position of the human viewer 'floating' above and within the underwater landscape are all distinctive. Added to this is that the underwater world not part of everyday human experience; it is an 'other' world, and therefore edged with a frisson of discovery, excitement and fear.
- **Looking out and looking in:** the GBR is part of every vista from a large section of the Queensland coast, from the ocean looking landwards, and in all directions from places within the GBR.
- **Settings:** The GBR has two settings – that is, the 'area around the place', including its visual and physical catchments:
  - **Land:** the edge of the land and water is symbolic and real boundary between these two environments and the land creates the physical, environmental and visual setting to the west of the GBRWHA
  - **Waters**: of the Pacific Ocean beyond the continental shelf creates a boundless edge.

  Elements within the place also have settings: for example, an area of coral reef may be on the edge of the continental shelf and have a deep water setting on one side.

Dynamism:

The GBR is a dynamic, living place. It is ever-changing, growing and declining, with natural cycles and events reshaping it constantly. Species within the GBR have their own dynamics: migration, seasonal spawning, times of abundance and decimation.

Creation of the GBR:

There are two perspectives on the creation of the GBR – Indigenous perspectives and western perspectives. Each perspective makes an important contribution and is part of how this place is understood and appreciated.

Going to the Great Barrier Reef:

For most people the Great Barrier Reef isn't where they live and work. The GBR may be able to be seen from 'home' – from the shore – but experiencing the GBR involves travelling to it.

Lenses

The key elements of these different frames of reference that have been able to be considered in the present project have been termed 'lenses'. Three lenses have been used in our analysis of aesthetic values and sensitivity. These are three of the perspectives described above:

Panoramic

The GBR is appreciated at the panoramic scale – remotely from 'space', from the air on scenic or regular flights, and from lookout points that provide expansive views.

At water or land level

The GBR is appreciated at water or land level – that is, human eye level. This lens may include looking into the water.

Below water

The GBR, and particularly the reef itself is appreciated from below the water. In this medium, the topography and biodiversity of the reef is experienced.

Principles

GBRMPA has established biophysical operating principles to guide the establishment of new 'no-take areas'. At the 1st GBRMPA workshop it was suggested that a parallel set of principles could be used to guide recognition of aesthetically significant, unique and special areas, and a preliminary set of principles for consideration of aesthetic values has been drafted.

These principles – below – have guided the shaping and application of the methodology to the extent possible within the scope of the present project. Their application in the assessment of aesthetic values and impacts is addressed further in *Section 7 Conclusions and recommendations*.

1. Recognise Indigenous and traditional owner perspectives on aesthetic values
2. Recognise that the GBR is a dynamic living place, changing seasonally and in response to natural events and cycles and climatic variation
3. Recognise that human aesthetic values and aesthetic perceptions have changed and will continue to change, and that different generations may hold distinctly different values
4. Recognise that the aesthetic values of the GBR are linked to its natural elements, its size and scale, the interconnectedness of its elements and processes, specific places with aesthetically distinctive qualities, and the opportunities and experiences it offers.
5. Enable visitors and local people to experience the aesthetic values and experiences offered by the GBR, while respecting and protecting all the values of the GBR, including its Outstanding Universal Value (OUV).
6. Recognise that human health and wellbeing across the region is integrally linked to the health and sustainability of the GBR.
7. Recognise that the setting of the GBR encompasses both land and ocean, and includes its catchment and view shed.

8. Understand the potential for adverse impacts on the aesthetic values and attributes of the GBR and the potential consequences of such impacts.

Step 1 - 4. Scoping the data sources available

Working with GBRMPA and DSEWPaC staff, the project team has been able to identify a range of potential data sources for use in assessing aesthetic values and sensitivity. This process has been ongoing throughout the project.

Step 1 - 5. Mapping

Initial the project team anticipated that they would be mapping environmental attributes associated with aesthetic values. However, as development of the methodology progressed, the potential risks associated with this approach became apparent. The scale of the present project, with its focus on the whole GBR, meant that the data would be generalised to enable mapping at that scale. As well, many of the available data sets would have needed to be further developed, defined or distilled to enable their use. While this may occur in the longer-term, it was difficult within the time available for the present project.

An alternative approach, that of **conceptual mapping**, was considered at the second GBRMPA workshop and a decision made to use this approach. For the present project, conceptual mapping involved illustrating the range of environments found across the GBR and linking these to the environmental attributes.

For example, 'pristine sandy beaches' is an attribute associated with aesthetic value. Mapping of this attribute geographically across the GBR would involve identifying all such beaches and delineating boundaries. This data set was not immediately available, although such mapping was considered to be possible. On the other hand, the use of conceptual mapping presented typical or idealised environments of the GBR, illustrating the attributes and typical locations for these attributes.

STEP 1 – 6. Defining the steps

The key steps to be followed in assessing aesthetic value and sensitivity were developed following the first workshop held at GBRMPA and documented in Report 1. This methodology was then refined through a peer review workshop held at DSEWPaC, further review and a second workshop at GBRMPA. Report 2 presented the methodology and the analysis of aesthetic values in relation to RSoOUV, and comments were received. The methodology described here reflects all of these processes of development and review, and presents the methodology as applied.

3.2.2 Step 2 - Defining aesthetic values

Key components

Step 2 in defining the methodology to assess aesthetic values involved gathering and analysing data on aesthetic values from a range of sources, and relating this to the RSoOUV to define, at a level of greater specificity and based on evidence, the aesthetic values of the OUV for the GBR.

The key components of this step in the process were:

Step 2 – 1: Defining a typology of environmental attributes

Step 2 – 2: Defining a typology of experiential attributes

Step 2 – 3: Analysing a range of data sources seeking evidence of aesthetic values and their attributes

Step 2 – 4: Compiling a list of places that appear to be strongly recognised for their aesthetic values in a variety of sources

Step 2 – 5: Presenting the evidence of aesthetic values in relation to the RSoOUV

Step 2 – 6: Analysing the evidence of values against RSoOUV. This involved:

- analysing the data in relation to RSoOUV
- defining the qualities of each environmental and experiential attribute that, from our analysis, were considered to enhance aesthetic value
- providing an extended description of each aspect of OUV based on RSoOUV
- providing conceptual mapping that presents and illustrates the aesthetic values and attributes, and where these are located across the World Heritage property.

Each of these elements is described below.

Step 2 - 1. Defining a typology of environmental attributes

The GBR is a complex place comprising interconnected landscape, seascape and below water environments. Two approaches to the task of defining environmental attributes were considered – a landscape characterisation or a typology.

1. A characterisation approach aims to define environments or landscapes that have common characteristics and that can be distinguished from adjoining environments or landscapes. If applied, this approach would define a series of character units based on combinations of physical, biological and land use elements. Using this approach, the values and attributes of each unit would then be assessed. The disadvantage of this approach for the present project is it would create a new set of 'units' solely for this purpose and may result in too great a focus on the detail rather than on the property as a whole. Further, the resources required would be substantial, potentially detracting from other aspects of the project.

2. A typology approach would define distinctive types of environments broadly using existing frameworks such as broad geomorphological types as a means of understanding variability in the landscape and the potential for variability in aesthetic experiences and values across the GBR.

Characterisation would create a comparative framework but a typological approach would use existing measures of variability in physical and biological realms as a baseline. Further, the analysis required to establish a robust characterisation was beyond the scope of the available project resources, and would have required extensive use of geographical mapping combined with ground truthing in the field.

A framework of **environmental attributes** could be based on a number of different ways of categorising the environment, including:

- a type of habitat or ecosystem (for example a coral reef)
- an element in a habitat or ecosystem (for example, a 'blue hole' in a reef or a specific species)
- a characteristic of a habitat or ecosystem, for example the clarity or colour of the water
- animal species, singly or collectively, and
- an environmental process, such as coral spawning, whale migration, tidal range.

Given that the typology approach offers a simpler approach and one more broadly compatible with zoning in the GBRMPA and with the aesthetic values described in the RSoOUV, the approach was selected. The base typology used was a set of marine and coastal ecosystems and species derived through consultation with GBRMPA and using the environmental typologies from two key sources: *Great Barrier Reef Biodiversity Conservation Strategy 2012: Draft for public consultation* (GBRMPA 2012d) and *Informing the Outlook Report* (GBRMPA 2012c). In the latter, coastal ecosystems have been divided into 14 off-shore, inshore and associated coastal and catchment ecosystem types (GBRMPA 2012c: 72-85). These are presented in Table 3.1 which includes only the ecosystems represented in the World Heritage property.

In Table 3.1, marine species and biodiversity refers to the richness and abundance of species (including schools of fish, spawnings), and iconic species comprises large marine animals (e.g. whales, turtles, dugong, sharks, dolphins, crocodiles etc) and large fish.

Table 3.1: Typology of marine and coastal ecosystems and species

Broad grouping	Types	Elements
Coral reefs	Coral reefscape	Morphology Complexity
	Reef biodiversity	Species richness
		Iconic species
	Fringing and near shore reefs	Mainland coastal fringing reefs (eg Cape Tribulation)
		Continental island fringing reefs (eg Whitsunday)
		Reef flats
	Mid shelf reefs	Submerged reefs
		Reef patches
		Crescentic reefs
		Lagoonal reefs
		Planar reefs
		Blue holes
	Outer shelf reefs	Submerged reefs
		Reef patches
		Crescentic reefs
		Lagoonal reefs
		Planar reefs
		Detached reefs
		Deltaic reefs
		Ribbon reefs
		Blue holes
Islands	Continental inshore islands	Sandy beaches and bays
		Promontories and headlands
		Island high points and outcrops
		Island vegetation cover
	Coral cays	Un-vegetated coral cay
		Vegetated coral cay
		Low wooded islets
	Mangrove islands	
	Island species	Sea birds, shore birds Terrestrial fauna: reptiles, insects, mammals
Open water	Marine species	Species richness
		Iconic species
		Water clarity and colour
Inshore lagoon	Lagoon Floor	Sandy / muddy bottoms
		Rocky bedrock
		Sponge gardens
		Algal beds (Halimeda)
	Seagrass meadows	Seagrass beds in rivers and inlets
		In protected coastal waters
		In reefal areas
Coastal & estuarine ecosystems	Coastline	Sandy beaches
		Muddy shoreline
		Rocky coast
		Cliffs

Broad grouping	Types	Elements
		Forested/rainforest coastal edge
	Estuaries	Mangroves
		Salt marshes
		Heath and shrublands

A set of **environmental attributes** was developed, using this above typology, following examination of the evidence of aesthetic values. The environmental attributes and the qualities that individually or collectively enhance aesthetic value can be found in Table 4.19.

Step 2 - 2. Defining a typology of experiential attributes

The concept behind the definition of experiential attributes is discussed in Section 2 above. The experiential attributes selected for consideration (Table 3.2) have been derived from three main sources:

- Recreation Opportunity Spectrum which examines recreation settings and user preferences (Clark & Stankey 1979)
- Landscape Character Assessment: method which considers the perceptual aspects of landscapes (Swanwick et al 2002)
- *Experiencing Landscapes,* a UK study into the experiential qualities of landscapes (The Research Box et al 2009).

Added to this, at the second workshop held at GBRMPA (24-25 October), the concept of experiential attributes arose, and aspects such as immersion in nature; spiritual or transcendental experiences were discussed.

Given that the aesthetic values recognised in the RSoOUV are closely linked to its natural values, we have adopted a scale where attributes associated with settings or places that are undeveloped are judged as positive and those at the developed end as negative. This judgement reflects the research into visitor preferences reported in Section 4.3.4.

Finally, we have focused on the experiential attributes that can be safeguarded through management from impacts by pressures and activities. For example the presence or absence of the following attributes will influence the sense of comfort and security for the person experiencing the GBR but they were not included as they are outside the influence of management:

- weather: wind, sunshine, rain
- water roughness
- presence of nuisance stinging and biting animals.

Table 3.2 summarises the experiential attributes, the positive and negative expressions of each attribute, and the factors considered to influence whether an attribute has a positive or negative expression. These ideas are further developed in Section 5.2.2 and Table 5.4.

Table 3.2: Experiential attributes

Attribute	Positive		Negative	Factors
Sense of Beauty	Beautiful, dramatic, spectacular, visceral, full of wildlife, romantic or powerful, inspirational	↔	Bland, monotonous, empty, meaningless	Visually and sensually pleasing in terms of colour, form, pattern, movement (etc).
Sense of Naturalness	Natural places, in good condition and without damage	↔	Constructed environments and damaged natural places	Absence of apparent modified landforms and habitats Absence of apparent

Attribute	Positive		Negative	Factors
				environmental and species disturbance or damage (including visitor damage) Absence of conflicting land uses
Sense of Tranquillity	Appreciating nature: sights, sounds, smells, ambience	↔	Discordance, human presence and disturbance	Absence of discordant and intrusive sounds, smells and sights - opportunities for moments of stillness, peace, intimacy offered by the landscape
Sense of Solitude	Uncrowded	↔	Congested with people	- absence of people other than one's companions
Sense of Remoteness	Sense of remoteness, freedom, getting away from it all	↔	Highly managed environments and experiences	- absence of settlement (or distance from population centres) - absence of human presence or intervention in the landscape(structures & changes) - absence of obvious accessibility
Sense of Discovery	Immersion in nature, encountering other species, learning and exploring	↔	Immersion in human environment	- opportunities to explore, discover and learn in a natural setting - opportunities to encounter iconic, rare and interesting species
Sense of the Spiritual	Profound feelings as a result of connecting to nature, another species, or responding to an ephemeral effect	↔	Mundane, everyday, of the world.	May result from a combination of the other experiential attributes. Often associated with solitude, water, encounters with other species or a sense of the ancient, and ephemeral effects of weather and light.

Step 2 - 3. Analysing a range of data sources seeking evidence of aesthetic values and their attributes

To understand the evidence of aesthetic values, we have examined a range of available data sources, focusing on the perceptions of several distinct groups. At the start of the project we had hoped to be able to consider data related to all of the following groups:

- **Visitors:** both Australians and overseas visitors (note: the tourism data indicates that typically around 40-50% of visitors are from Australia and 50-60% are from overseas)
- Scientists and researchers
- Indigenous traditional owners
- Australians generally

Based on our initial scoping of data and project resources, it proved necessary to refine this list and to largely exclude consideration of Indigenous Traditional Owners; Section 7.4 discusses the increasing importance of understanding the values held by Traditional Owners and Indigenous communities in the World Heritage system.

As a result of GBRMPA proposing to hold community workshops in August-October, we were able to add 'Reef' coast communities.

Our final data sources included material relevant to the following groups:

- Visitors
- The 'Reef' coast communities: that is those who live along the GBR coast
- Australians generally
- Experts and scientists.

Table 3.3 below indicates the types of data sets examined, and their relationship to the groups noted above. Other potential data sources not examined are noted in *italics.*

Several data sources demonstrate how the GBR is presented by Australia to domestic and international visitors. As is discussed further in Section 4.3, this evidence offers a perspective on how Australia and Australians see the GBR and its important values, at the same time recognising that some of the imagery is idealised.

Table 3.3: Scope of data and relationship with particular groups

Data sets	Scope	Group/s
Artistic and creative sources	Research, listing of examples and content analysis, focused on professional photography. *Visual arts, including GBR-based exhibitions.*	Australians
History of visitation, recognition and protection	Research and analysis: histories; 'recollections' project; images. Key moments of change in national attitudes to and perceptions of the Reef.	Australians
Visitor perceptions	Existing visitor surveys and valuation research. Content analysis of 1-3 snapshot websites. *Visitation data – locations and specific sites as attractors and/or exemplar places.*	Visitors domestic and international
Tourism websites	Content analysis of government tourism websites and National Landscapes site	Australians
Local perspectives	GBRMPA stakeholder, Traditional Owner and Local Marine Advisory	Reef coast community

Data sets	Scope	Group/s
	Committee (LMAC) workshops (Aug-Oct 2012). Other data sources.	
Iconic status of the GBR in Australia and globally	International nature publications e.g. National Geographic. International tourism marketing; international travel writers; films and national promotions.	International visitors
Expert perceptions	Examine a range of existing studies and reports including Lucas et al (1997), landscape studies, Australian Heritage Database (AHD) listings and input through the GBRMPA workshop held as part of the present project.	Experts and scientists

Step 2 - 4. Compiling a list of places that appear to be strongly recognised for their aesthetic values in a variety of sources

The RSoOUV (Criterion vii) currently includes reference to some specific places – for example the Whitsundays, Hinchinbrook Channel, Raine Island, and the Cod Hole. To gain a better understanding of the range of places that exemplify the aesthetic values of the GBR, the project team has undertake a limited amount of research and data gathering. The sources used combined expert and community knowledge:

Expert data:

- first GBRMPA workshop: we sought information from GBRMPA staff about the places that they considered to have high aesthetic values, based on their own knowledge and experience
- GBR National Landscapes submission: this document listed locations where iconic images of the reef could be taken
- Australian Heritage Database: from this database of heritage assessments of natural and cultural places, we searched for 'Great Barrier Reef' and for all other places identified from the other sources and listed those where an aspect of aesthetic value was noted in the on-line citation
- Lucas et al (1997) provides an expert perspective on the GBR and its OUV, and specific places mentioned in this report as evidence of outstanding aesthetic values have been added to the list of special places
- Landscape studies: several studies have investigated the scenic or landscape quality of the coast; although this work emphasises only one aspect of aesthetic value, nevertheless it offers specific examples of such places.

Community

- Places identified at any of the stakeholder, traditional owner or LMAC workshops held in August-October 2012 were included. It was not possible to identify from the workshop reports the places that were specifically recognised for aesthetic value.

This list of Special Places is contained in Appendix 4.

Step 2 - 5. Presenting the evidence of values in relation to the RSoOUV

The next step was to distil and present the evidence from each of the data sets in relation to the RSoOUV. This is presented in *Section 4.4 Results*.

The aesthetic values identified from the evidence have been documented in relation to the RSoOUV. Some aesthetic values identified extend the understandings contained in the RSoOUV. The analysis of values is presented in Section 4.4.1, the attributes are distilled in Section 4.4.2 and an integrated presentation of aesthetic values is offered in Section 4.4.3 against RSoOUV. The implications are discussed in *Section 8 Findings, Conclusions and Recommendations*.

Exemplar places, recognised in the RSoOUV or derived as described above, are included in the analysis as examples to help illustrate the values. As well, this step has assisted in developing the conceptual mapping by providing examples of the range of environments. It has also been used in the case study (see *Section 6 Case Studies*).

It is important to note that the exemplar places are examples that illustrate the aesthetic values and attributes; they should not be interpreted as the only or the most outstanding of places holding those values.

Step 2 - 6. Analysing the evidence of values

The next step was to distil the evidence of aesthetic values from our research in relation to the RSoOUV, and providing:

- images to illustrate or text to explain the evidence of the values
- the lens through which this value is most apparent (panoramic, at water or land level, below water)
- exemplar places, drawn from the RSoOUV and the 'special places' list (Appendix 4)
- environmental attributes, and
- experiential attributes.

Each table represents analysis of a particular body of evidence, with historical and contemporary images combined. The four tables are provided in Appendix 5:

Table 4.15 - Images: historical and contemporary

Table 4.16 - Visitor perceptions

Table 4.17 - Community perceptions

Table 4.18 - Expert perceptions.

Next we defined the qualities of each environmental and experiential attribute that, from our analysis, were considered to enhance aesthetic value

The final step was to provide an extended description and conceptual mapping of each aspect of OUV based on RSoOUV (Section 4.4.3) that referenced:

- the spatial scale of the aesthetic values, considering which values can be attributed to the whole GBR and which to parts of the GBR
- the lenses through which the values can be appreciated
- associated environmental and experiential attributes
- exemplar places.

Using the attributes as a basis for geographic mapping, it would be possible to demonstrate the clustering of aesthetic values, recognising that some parts of the GBR may demonstrate an intensity of aesthetic values compared to other parts of the GBR.

In our initial analysis, we attempted to indicate the strength of the values, as indicated by the breadth of values across the evidence and recognising there are variations in relative values. However, we felt that this aspect was not sufficiently robust to present in our final report and required further research and analysis.

The conceptual mapping presents and illustrates the aesthetic values and attributes, and where these are located across the World Heritage property (see Section 4.4.3).

3.3 Developing a methodology to assess sensitivity & impacts

As outlined in Section 3.1, the second part of the methodology to be developed involved consideration of the sensitivity of aesthetic values to detrimental impacts.

Given that there were existing approaches for impact assessment already in use by GBRMPA and a proposed model being developed for the comprehensive strategic assessment, the present project sought to align with these approaches.

Section 3.3 first describes these existing approaches, and then defines the key elements used in the present project. Section 5 contains the sensitivity and impact assessment.

An **impact assessment** approach is designed to determine if the **values** will be **impacted** by particular **action**, activities or pressures, and the relative effect on the attributes.

If an environmental attribute that holds the value is impacted adversely, then the value is also impacted. Similarly, if desired experiential attributes are impacted, then the aesthetic value will be reduced.

For example, thinking about the 'coral reef ecosystem', the aesthetic response could be to 'marvel at the colour, shapes and aliveness' of that ecosystem and to 'feel at one with nature'.

The tangible environmental attribute might be defined as 'coral reef species richness' and the experiential attributes as 'beauty', 'naturalness' and 'isolation'.

An impact on the reef ecosystem, for example coral bleaching, would impact on the tangible environmental attribute and thereby the associated aesthetic value, and is also likely to impact on the experiential attribute of naturalness. The research demonstrates that visitors to the reef are aware of coral quality. Other types of impacts on the experiential domain – for example the arrival of a large group of people at a reef – could impact on the feeling of 'isolation' but have no impact on the environmental attribute.

This distinction between environmental attributes and experiential attributes has been built into the methodology for assessing aesthetic value and was therefore be carried forward into the methodology for assessing their sensitivity to activities that may impact on aesthetic value.

3.3.1 Existing approaches

The GBR Outlook Report approach

The Great Barrier Reef Outlook Report (2009) adopts a risk assessment method to the consideration of impacts using the Australian Standard for Risk Assessment (AS/NZ 4360:2004). The steps undertaken are summarised below.

First, information was gathered on potential threats to the Reef from reef scientists, stakeholders (including Local Marine Advisory Committees and Reef Advisory Committees), industry partners and the local community. From this, a list of 41 threats to the Reef ecosystem were identified and ranked in terms of perceived risk, highlighting strong agreement and some subtle differences between interests. Each threat was linked to a 'driving factor', and some to several factors (GBRMPA 2009: 168).

Two 5 point scales (below) were used to consider the likelihood and consequence of each predicted threat. The best available information was applied (GBRMPA 2009: 164-165,186).

Table 3.4: Likelihood

Category	Expected frequency of a given threat
Almost certain	Expect to occur more or less continuously throughout a year
Likely	Not expected to be continuous but expected to occur one or more times in a year
Possible	Not expected to occur annually but expected to occur within a 10 year period
Unlikely	Not expected to occur in a 10 year period but expected to occur in a 100 year period
Rare	Not expected to occur within the next 100 years

Table 3.5: Consequence

Category	Broad scale	Local scale
Catastrophic	Impact is clearly affecting, or would clearly affect, the nature of the ecosystem over a wide area Recovery periods greater than 20 years likely.	
Major	Impact is, or would be, significant at the wider level. Recovery periods of 10-20 years likely.	Impact is, or would be, extremely serious and possibly irreversible to a sensitive community or population. Condition of an affected part of the ecosystem possibly irretrievably compromised.
Moderate	Impact is, or would be, present at a wider level. Recovery periods of 5-10 years likely.	Impact is, or would be, extremely serious and possibly irreversible over a small area. Recovery periods of 10-20 years likely.
Minor	Impact is, or would be, not discernable at a wider level. Impact would not impair the overall condition of the ecosystem, sensitive population or community over a wider level.	Impact is, or would be, significant to a sensitive population or community at a local level. Recovery periods of 5-10 years likely.
Insignificant	No impact or if impact is, or would be, present then only to the extent that it has no discernable effect of the overall condition of the ecosystem.	No impact or if impact is, or would be, present then only to the extent that it has no discernable effect of the overall condition of the ecosystem.

The likelihood and consequence are combined to indicate the degree of risk, using the categories low, medium, high and very high.

Some of the 41 threats are specific to a particular pressure – for example, sea temperature increase is directly connected to climate change - whereas others such as 'clearing coastal habitats' could arise from a variety of activities such as port development, tourism development

etc. This distinction is relevant to discussion of the comprehensive strategic assessment process below.

A risk matrix was then prepared to show the assessment for the 41 threats identified in the Outlook Report (GBRMPA 2009: 166). The report notes that:

- climate change and catchment run-off are driving most of the very high risk threats to the ecosystem
- most of the very high risk threats are already impacting or are expected to impact within the next 10-20 years, and
- most of the very high risk threats are expected to impact reef-wide.

Vulnerability assessment for species and habitats

As part of the *Great Barrier Reef Biodiversity Conservation Strategy 2012*, vulnerability assessments are being undertaken on habitats, species and groups of species identified as being potentially at risk. These assessments and their status (as at 27.11.2012) are shown in the table below:

Table 3.6: Vulnerability assessments and their status

	Vulnerability assessment	Status
Species or groups of species	Bony fish - Threadfin salmon	Complete
	Bony fish - Grey mackerel	Complete
	Bony fish - Snapper	Available soon
	Dugong	Available soon
	Dwarf minke whale	Complete
	Holothurians (sea cucumbers)	Available soon
	Humpback whale	Available soon
	Inshore dolphins - Australian snub-fin and Indo-Pacific humpback	Complete
	Inshore dolphins – Bottlenose	Complete
	Marine turtles	Available soon
	Sawfish	Complete
	Sea snakes	Complete
	Seabirds – Inshore and coastal foraging	Complete
	Seabirds – Offshore and pelagic foraging	Complete
	Shorebirds	Complete
	Sharks and rays	Complete
Habitats	Coral reefs	Available soon
	Islands	Available soon
	Lagoon floor	Available soon
	Estuaries	Available soon

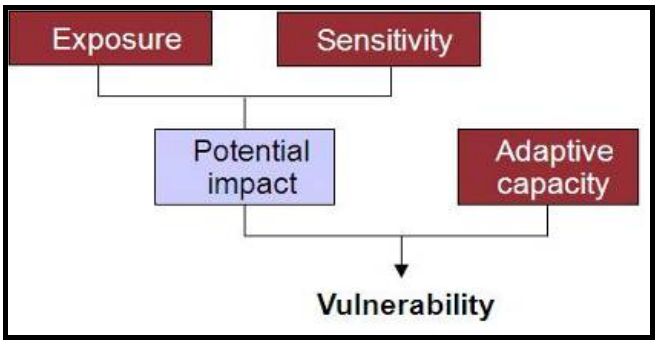
	Vulnerability assessment	Status
	Open water	Available soon
	Seagrass	Complete

The vulnerability assessment approach builds on the risk assessment process developed in the Outlook Report and described above. Vulnerability assessment involves a step-by-step process:

- first, is the habitat, species or group of species exposed to the source of a pressure? Yes, no or don't know
- second, what is the degree of exposure of the habitat, species or group of species to the source of the pressure – this involves using the **risk assessment** method in the Outlook Report (2009: 186) to determine the 'degree of exposure'
- third, criteria were developed to determine the degree of sensitivity of a species, group of species or habitat to the source of the pressure, considering the potential to cause mortality, interrupt ecosystems services, have reproductive impacts, cause displacement or disturbance, impact on critical habitat or prey, or impact on population numbers. These factors, in combination are used to give a sensitivity rating of low, medium, high or very high.

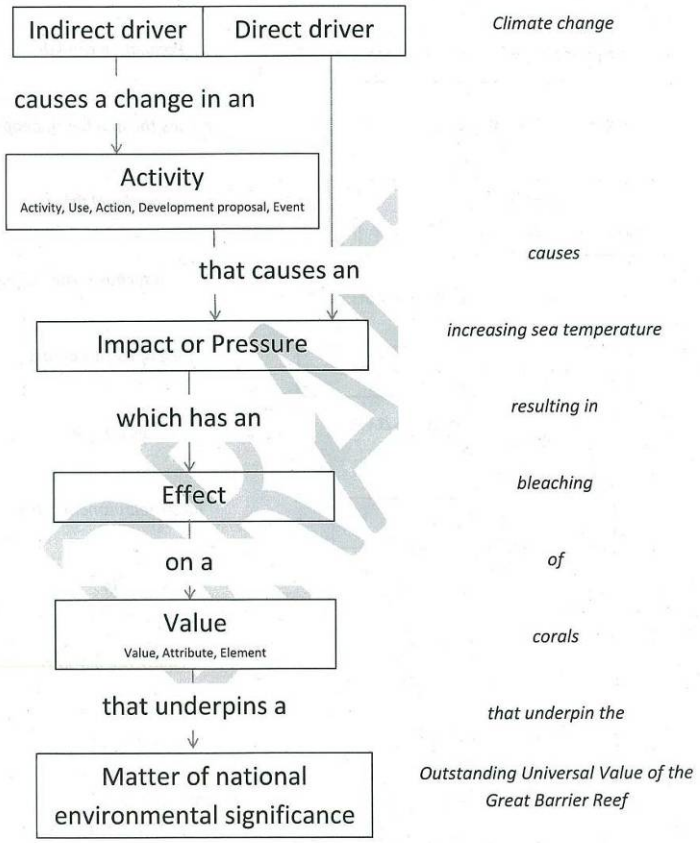
The degree of exposure plus the sensitivity is combined via a matrix to provide an overall potential impact level, assessed as low, medium, high and very high.

A subsequent step then considers the natural adaptive capacity of the species or habitat to adapt to the pressures and the capacity of management to intervene and assist the species or habitat to adapt. Impacts and adaptive capacity are then combined through another matrix to determine the level of vulnerability. The process is illustrated in the diagram below.



The comprehensive strategic assessment approach

The comprehensive strategic assessment being undertaken by the Commonwealth and Queensland governments used a set of standard terms for the assessment of the effects of an impact on a value. This is shown in the diagram below.



There are some differences in terminology between the Outlook Report (2009) and the comprehensive strategic assessment; the present report generally adopted terminology used in the comprehensive strategic assessment.

Table 3.7: Terminology

Comprehensive strategic assessment	Outlook Report	Present project	Example
Indirect or direct driver	Driving factor	(not used or needed)	Population growth
Activity	Driving factor	Activity	Recreation
Impact or Pressure	Threat	Impact	Increases in animal strike by boats
	Risk: level, scale, timeframe	Risk: level and scale	Risk is medium and local
Effect		Sensitivity: level	Mortality of animal/s; impact on experience

A list of broadly defined 'activities' was provided to the project team; these are (in alphabetical order):

Agriculture	Recreation (e.g. sailing, PWCs)
Aquaculture	Recreational fishing
Climate change/Extreme weather	Scientific studies
Commercial fishing	Shark Control Program
Defence	Shipping
Industrial development (including Ports)	Traditional use of marine resources
Marine tourism (resorts, marinas, cruise ships and reef-based)	Urban development.

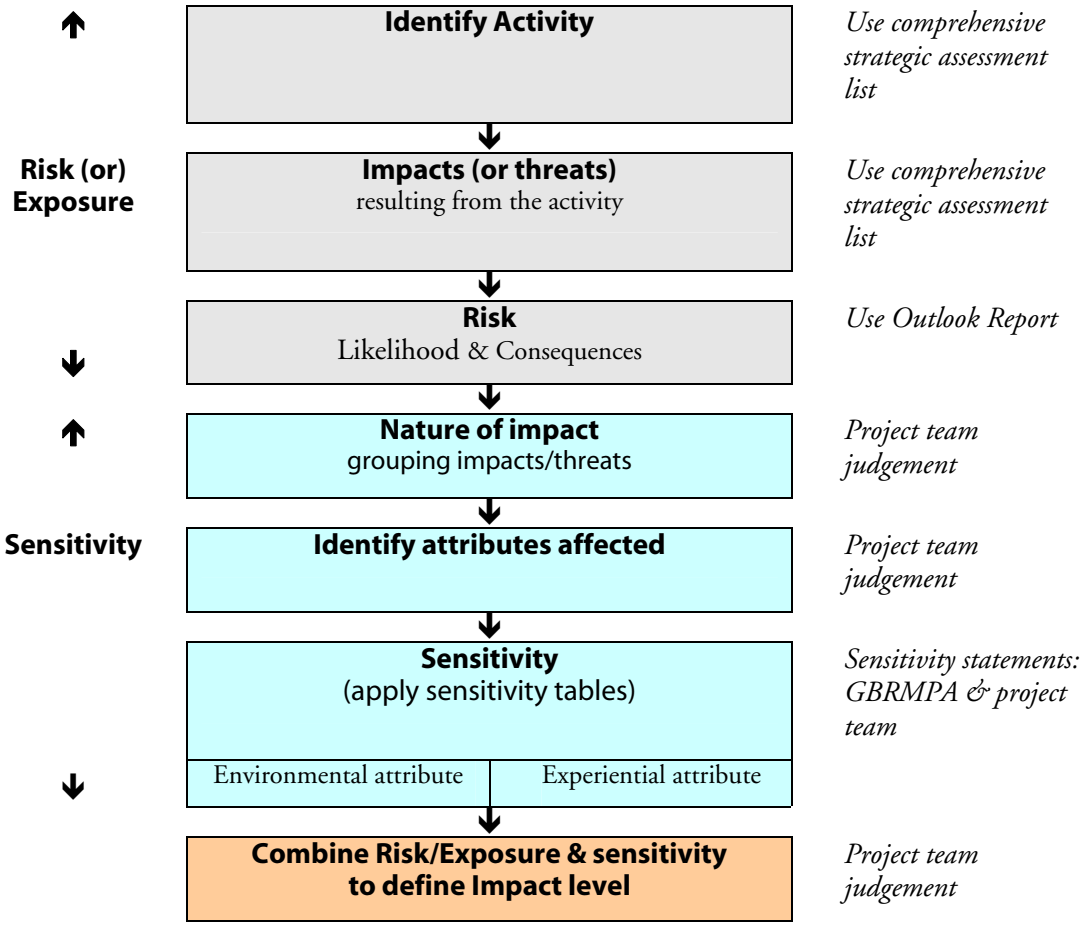
A list of potential and actual impacts for each activity was provided to the project team, these include the 41 threats identified in the Outlook Report, plus a range of additional threats or impacts. Some of these impacts include a description of the activity and the associated impact – for example 'Dredging - habitat disturbance'.

This list of activities was adopted for use in the present project.

3.3.2 Assessing impacts on aesthetic values and attributes

The approaches described above provided the framework for assessing the impact of activities and their associated impacts (or threats) on identified aesthetic values and attributes. This section describes how we applied and built on existing approaches in the present project.

Our approach involved the following steps:



These steps and their application are detailed in Section 5.

4 AESTHETIC VALUES OF THE GREAT BARRIER REEF WORLD HERITAGE AREA

4.1 Introduction

The first section below – Section 4.2 - briefly examines the previous assessments of the aesthetic values of the GBR.

Section 4.3 examines the evidence gathered in the present project. The evidence is examined in relation to:

- historical perspectives and images (4.3.1)
- contemporary images (4.3.2)
- selling the Reef – examining how tourism sells the Reef (4.3.3)
- visitor perceptions (4.3.4)
- reef community perceptions (4.3.5)
- expert perceptions (4.3.6).

Each area of evidence is concluded with a summary table.

Section 4.4 then presents the results, integrated into 4 tables. Each summarises the evidence from our research against the elements of RSoOUV – illustrated with one or more images where applicable. For each RSoOUV element, the table also notes the relevant lens or lenses, lists exemplar places and identifies the environmental and experiential attributes.

4.2 Previous aesthetic value assessments

In 1997, Lucas et al presented a thorough review of the OUV of the GBR, noting the changes in the World Heritage criteria since 1981, and then examining the available data on OUV, primarily through extensive consultation with experts combined with literature review. Across all values, they note the importance of the scale of the GBR as 'fundamental and a necessary antecedent' to many of the values expressed in the OUV. The relevance of this statement to aesthetic value is considered in Section 4.4 below.

Lucas notes that 'natural heritage attributes contributing to ... natural beauty and aesthetics were the poorest documented and least known set of attributes' and that there is a 'lack of consistent methodologies to document and understand the aesthetic qualities'. They examine and reject the potential to reduce aesthetic qualities 'solely to visual amenity' and proposes that aesthetic values be regarded as 'more expansive and contain an array of meanings and attachments that people associate with particular places' (Lucas et al 1997:49). They also note that the Resource Assessment Commission recognises that community groups may value the coast for 'aesthetic and experiential issues' defined as the 'variety of pleasures obtained from a particular landscape or locale' (RAC 1993:17).

In a more detailed consideration of each value, Appendix 4 of the Lucas report contains an examination of aesthetics, concluding that the attributes that 'satisfy natural heritage criterion (iii) are difficult to measure', but that the aesthetic qualities are regarded as significant and contributing to the GBR's OUV (Lucas et al 1997:103). The literature examined at that time in Lucas (1997:104-105) was limited to:

- an assessment of the scenic quality of the Wet Tropics WHA using photographs to develop a predictive model of scenic quality (Prineas & Allen 1992)
- a study of aesthetic quality of Stage 2 of Kakadu National Park based on interviews with people with long exposure to the region (a technique referred to as 'forest critics' and

applied in the Australian Regional Forest Agreements studies of aesthetic values) followed by field review and expert assessment, and last drawing on artistic and literary works. The results were described as 'aesthetic phenomena' (Harding et al 1987)

- a visual landscape evaluation of the Queensland coast, drawing on a public perception study of the Whitsunday region, deriving and applying a set of scenic quality criteria: naturalness; built form and identity; vegetation diversity and contrast; landform diversity and contrast; shoreline diversity and contrast; and the presence, extent and visual character of water. The coastal zone was regarded as a highly scenic landscape due to:
  - expansive water views
  - the contrast and diversity of the land water interface
  - movement and diversity in the water, particularly at its edge
  - the diversity due to coastal form (Catherine Brouwer Landscape Architects 1994).
- a subsequent study provided a state-wide scenic quality assessment of the coast, identifying eight main coastal landscape types and, based on criteria for assessing scenic quality, applied a rating scale for relative scenic quality (Edaw 1996). Areas receiving very high and high ratings have been included on the 'special places' list (Appendix 4).

In response, the report recommends establishment of a new research program focused on 'aesthetics and natural beauty research' to better understand aesthetic values of the natural heritage attributes of the GBR so as to bring these values into planning for management of the GBR (1997:49). The present project is the first attempt to do this, although since 1997 a number of research projects have investigated aspects of perception, meanings and attachments.

A subsequent review of the economic values of ecosystem services of the GBR examined the research available on each aspect of OUV. Lucas et al was noted as the only source on aesthetic values and the evidence that the GBR is considered an Australian icon was the original 1981 nomination of the GBR to the World Heritage List (Stoeckl et al 2011:127).

Aesthetic values of the GBR, or parts of it, have also been made as part of broader heritage assessments. A review of citations on the Australian Heritage Database has identified a number of such assessments and these are referenced on the 'special places' list.

The need for the present study is self-evident.

4.3 Analysis of the evidence gathered in this project

4.3.1 History of perceptions of the Reef

Introduction

As discussed in Section 2.2.4, historical and contemporary images offer an important opportunity to examine the way that a place has been presented – by those seeking to promote or advocate for its qualities for tourism or environmental protection for example – and by those who visit the place.

Using images and selected published sources, this section presents an analysis of the changing expressions of aesthetic value over the twentieth century. Section 4.3.2 then examines contemporary images (including images taken by professional photographers) and Section 4.3.3 looks at images from tourism and promotional sources.

The analysis of images of the Great Barrier Reef aimed to identify the aesthetic values expressed through images, and the types of images and attributes that convey these values. The analysis of photographs primarily available through online search engines and archives included:

- historical images (1900-1995)
- images from professional photographers

- images taken by visitors to the reef (c.2000 – present).

The published sources include several well-illustrated guides to the Reef, and two analyses of the history and changing responses to the aesthetics of the Reef (Pocock 2002; Bowen & Bowen 2002).

Historical images

A survey of 20th century images of the Great Barrier Reef investigated:

- the aesthetic values of the reef conveyed through photographs
- continuity and change through time in these values and/or their attributes.

A total of approximately 2500 images were viewed in the analysis. The majority of these are available through the online catalogues of the National Archives of Australia (NAA) and the National Library of Australia (NLA) (approximately 2000 images). The Great Barrier Marine Park image catalogue, Queensland Government Archives, the State Library of Victoria, online search engines including Google images and several print sources were also searched for relevant images.

Although significant for the large number of images viewed, the survey is 'opportunistic', that is, focused on readily available, mainly online images. The images available through the NAA and NLA are primarily collections of images taken by government agencies with the express aim of promoting the reef for tourism, to national and international markets (see Table 4. *.). These are constructed, purposefully appealing images of the Great Barrier Reef taken by professional photographers that emphasise the beach and water activities and experiences the Great Barrier Reef offers.

The collections of the NAA and NLA also include photographs taken by scientific expeditions in the early 20th century primarily although not always for descriptive purposes. Despite the lack of personal photographs in the surveyed images, these collections provide a rich resource of information about how people experience the GBR, the attributes of the GBR that underlie their aesthetic experiences and importantly, how these attributes have changed – and stayed the same – over the past century.

Survey of the photographs revealed a number of types of images that recur throughout the century. Through their compositions and pictorial elements or attributes the types of images each express different aesthetic experiences of the reef:

1. Panoramic aerial images of reefs, sand cays and small islands
2. Panoramic images of islands, beaches and water from the air or high points of the islands
3. Beachcombing – people exploring the reef
4. Beach vistas in particular views from the beach looking out to sea
5. Sunbathing/beach/water activities
6. Underwater images of the natural life of the reef
7. Images of people observing or exploring the underwater realm.

The key elements or attributes used to convey the aesthetic experience depicted in each type of image is listed in Table 4.1. Then, Table 4.2 provides examples of promotional images of the GBR from Australian Government agencies, and Table 4.3 provides examples of each of these types for the period 1900-1940 and then for each decade from 1940 to the 1990s.

Although these types of images and the attributes of aesthetic values remain consistent over the century, they depict a change through the century in the ways in which people are able to access and engage with the Reef and experience these values. These changes are a reflection of:

- changes in transport by which people can access the reef, initial by boat and subsequently by air and directly from the islands

- increasing access to the underwater realm of the reef through transport (increasing size and range of boats, the introduction of air flights) and technology (scuba diving and underwater photography)
- the evolution in public awareness of environmental conservation evident especially in the ways in which people interact with the natural environment.

Evolving perceptions of the Great Barrier Reef in the images of the 20th Century

Until the 1950s access to the reef and associated activities were framed by sea transport. Many of the images from this early period are taken from or involve activities on boats or were associated with scientific expeditions such as that of Charles Yonge 1928 – 1929. Although as Pocock (2002:372) notes a contemporary reef experience is regarded as incomplete without a venture into the underwater world, in early 20th-century 'underwater experiences were not only impracticable but also undesirable.' People knew the life of the underwater reef through fish catches and collected coral and shell.

Bowen and Bowen (2002) emphasise the historical and ongoing connections between scientific research and tourism on the reef and the associated rise of the conservation movement. The development of resorts on the islands in the early 1950s coincided with the establishment of research stations such as that on Heron Island in 1952 where an existing tourist resort was divided to create a research station. By 1958 there were research stations on Heron, One Tree and Lizard Islands. Tourist activities from this earlier period and especially pre-WWII depict encounters with the wildlife of the reef through catching large and/or numerous fish and in activities such as turtle riding.

In the late 1950s and 1960s airline companies began to build resorts in the Whitsundays and fly tourists directly to those resorts, rapidly increasing visitor numbers. In 1947 there was an average of 5000 visitors per annum to the GBR but with air flights to the islands, by 1963 this increased to 125 000 visitors per annum (Bowen and Bowen 2002:324). At this time there is large increase in the relative number of images of both the resorts themselves, the activities of people on beaches associated with the resorts and panoramic images of islands taken from aircraft. Pocock (2002:374) notes that

> *without the emphasis on underwater ventures [in the mid20th century], activities on the Reef more readily included a range of land-based aesthetic experiences. Forms of trees and silhouetted shapes of people, mountains, islands and boats were important visual images.*

The reef is depicted more as a playground becoming a backdrop to generic 'tropical' holiday activities. The 'playground' of the reef and an association with nature, freedom and isolation is further emphasized in many images from the 1970s, especially the use of young women to convey the sensual pleasures of Reef holidays following the release of the film 'The Age of Consent' in 1969, filmed on Dunk Island. A collection of fashion photographs from 1971 from depicting female models draped on the beach mirror well known images from the film.

Advertising and image from 'The Age of Consent' released in 1969

Tourist poster (1969) and fashion advertising (1972)

At the same time the key iconic images of beachcombing, the 'treasures' of the reef and the island and beach landscapes continue. The advent of the glass bottom boat in 1958 and the

construction of the underwater observatory on Green Island in 1955 provided access to the underwater realm of the reef that had not been possible for most visitors until that time. In contrast to earlier images of collected coral and shell, from the 1960s – 1980s the natural life of the reef is increasingly captured in situ through images of fish and coral taken looking through the glass. Many images also depict other people observing through these mediums, reflecting a fascination with being able to observe the reef below the water. It was through the Green Island underwater observatory that the Crown of Thorns starfish was first observed on the reef in the 1960s heralding the major environmental campaign to stop the destruction of the reef by the starfish.

From the 1980s, underwater photography became far more accessible for visitors, coinciding with the inscription of the GBR on the World Heritage List in 1981 and international recognition of the outstanding biodiversity of the reef. As soon as this technology becomes readily available (and probably accelerated by the arrival of digital photography) people take images of the underwater environment. The new types of technology made new forms of knowledge available and shaped people's aesthetic experiences of the Reef (Pocock 2002:379). The images of coral, fish, shell move from people showing them, looking for them or looking at them above the water to depicting them to under the water in their 'natural' state much like the illustrations of the tourist poster from the early 20th century. Not only do the images move from above to below the water, they move from images of people appreciating the coral/fish to the coral/fish being the subject. The depicted experience of the reef is direct and transferred to the viewer instead of offering a secondary appreciation through the experiences of others as depicted in the image. The aesthetics are dominated by colour and variety of fish, corals and shells.

People or evidence of human activity begins to disappear in images taken from the 1980s onwards, again coinciding with the inscription of the Great Barrier Reef on the World Heritage List. The underwater images are increasingly intimate portraits of specific species of animals – turtles corals, fish, crustaceans, close ups that anthropomorphize the subject and emphasise the experience of encounter.

The aesthetic values or aesthetic experiences depicted in the historical images of the Great Barrier Reef for the most part reflect the aesthetic values of the reef that have been identified under Criterion vii of the Retrospective Statement of Outstanding Universal Value (RSoOUV) for the World Heritage property. In particular the panoramic and underwater images of the later part of the 20th century directly reflect the 'superlative natural beauty above and below the water [that] provides some of the most spectacular scenery on earth'.

As discussed above, access to the reef and in particular the development of underwater photography underpins changes in the composition and elements of images over the 20th century. In the earlier images experience of the reef is dominated by beachcombing and collecting coral, shells and fish. While not directly reflecting the aesthetic values of the reef as seen from the 'below water' perspective directly, these images do reflect the appreciation of the world beneath the water - 'the abundance and diversity of shapes, sizes and colours ... the myriad of brilliant colours, shapes and sizes' described in the RSoOUV. Similarly many of the photographs made possible by the air transport of tourists to the islands from the 1960s visually describe the 'magnificent vista of green vegetated islands and white sandy beaches spread over azure waters' associated with the Whitsunday Islands in the RSoOUV.

The images also depict experiences not mentioned in the RSoOUV, in particular beach activities – sunbaking, swimming, playing. These are considered to be generic (tropical) holiday experiences and while important in the history of the GBR are not of outstanding universal value. This type of experience arises again in the discussion of data on visitor perceptions (Section 4.3.4) but is of limited relevant in the present project.

Table 4.1 below provides a summary of the key attributes identified from the analysis of historical images, Table 4.2 offers some examples of promotional images from Australian Government agencies. Table 4.3 then provides a chronological sample of historical images, demonstrating some of the changes discussed above.

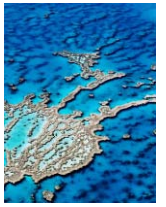
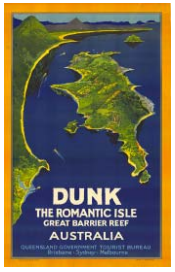
Table 4.1: Summary of key attributes conveyed in each type of historical image

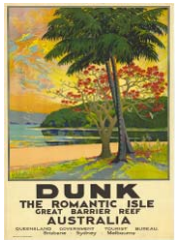
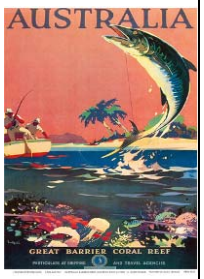
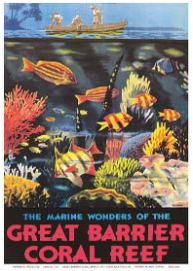
Lens	Types of Images	Description and attributes
Panoramic:	1. Reefs, sand cays and small islands	The reef, cays and small islands are depicted as a pattern of colours and forms, intertwined land, reef and sea. Many images emphasise small jewel-like white-sand islands or cay isolated in turquoise water. Clarity of the water enables visibility of the reef pattern beneath. Rarely do these images include people, occasionally yachts. Over time the clarity of the images increases as they become more abstracted and mosaic-like.
	2. Islands, beaches and water	The interface of island and the sea emphasized by contrasting colours and textures of green vegetation, usually white sand beaches and blue sea. Earlier images include settlements (camps and resorts). More recent images are 'natural' environment, that is, increasingly devoid of human and built elements.
At water or land level:	3. Beachcombing	People 'treasure hunting' for coral and shells on the reef at low tide, displaying their finds, snorkelling. In all these images, people are engaged with the object of their gaze – the reef and the potential treasure it offers in coral, fish, shells of many different colours and shapes. The images convey a sense of focus on, and wonder and delight in finding the 'treasures' of the reef.
	4. Beach vista	Iconic romantic tropical island idyll looking out from the island to the sea, framed by palm or other trees with white sand in the middle distance. Generally people are absent from the images or only one or two are included, relaxed and contemplative. The emphasis is on the natural, sunset, quietness. These are generic images of the tropics that are not specific to the GBR but capture a personal reflective moment with little or no action, and a strong sense of tranquillity.
	5.Sunbathing/beach/water activities	Fishing from boats, sunbathing, swimming, walking - the islands and resorts, white beaches, blue water, palms/trees, socializing, people enjoying people in the place. The focus of these images is not the reef specifically but the potential of the environment in general – the beach, the water, the warmth - for activities, games, sport. Most earlier images of this type are taken from boats and subsequently on beaches.
Below water:	6. Underwater images of the natural life of the reef	These images are 'another realm' or world – beneath the water where people can experience another world in which they are alien. The images of reef, coral, schools of fish, individual fish or other animals and the water consistently emphasis the diversity in the forms of corals, shells and fish, and more recently colour. These images become increasingly 'intimate' and close-up as developments in photographic technology permit. Early images are of the reef visible at low tide, by mid-century images through glass in underwater observatories appear, and in the later 20th century the focus is on capturing underwater images. Water clarity is essential to the capturing of light, the blue of the water and contrasting colours and forms. The range of species represented, especially signature species including dugong and turtle, increase over time.
	7. Observing the reef	The images depict people observing and exploring the underwater realm directly (rather than through beachcombing). These are not images of aesthetic attributes in themselves, although they may include natural elements of the reef, but images of people engaging with or experiencing the reef and its aesthetic values. In these images the focus is people looking into the underwater world through glass-bottom boats, underwater observatories, snorkelling and diving.

Table 4.2: Examples of promotional images of the Great Barrier Reef from Australian Government agencies (Source: National Archives of Australia)

			
Queensland Government Tourist Bureau poster 1939	'Fishing on the Great Barrier Reef' 1946 photographer, J. Band Commonwealth Department of Information, Central Office	'Holiday makers on the beach at Lindeman Island, on the Great Barrier Reef' 1961 photographer, W Brindle. Australian National travel Agency	'Great Barrier Reef, Queensland - South Molle Island' 1963 photographer, John Tanner. Australian News and Information Bureau, Canberra
			
'These glass bottom boats enable tourists to see colourful coral and fish in the waters off Green Island, near Cairns', 1972. Australian Tourist Commission	'Shute Harbour on mainland at Northern end of Whitsunday Passage, Great Barrier Reef, Australia', 1977 Australian Information Service, Canberra	'Tourists snorkel and explore reef pools at low tide, the Great Barrier Reef, Queensland Australia', 1980. Australian Information Service, Canberra	'Beach at Dunk Island, Great Barrier Reef', 1984 Australian Information Service, Canberra

Table 4.3: Examples of images by period

Lens	Types of images	Periods Pre-war	1940s	1950s	1960s	1970s	1980s	1990s -
Panoramic:	1. Reefs, sand cays and small islands							
	2. Islands beaches and water							
At water or land level:	3. Beachcombing			 				

Lens	Types of images	Periods Pre-war	1940s	1950s	1960s	1970s	1980s	1990s -
	4. Beach vista							
	5.Sunbathing/beach/water activities							
Below water:	6. The reef, coral, schools of fish, individual fish or other animals, the water,				 	 		 

Lens	Types of images	Periods Pre-war	1940s	1950s	1960s	1970s	1980s	1990s -
	7. Observing the reef				 	 		

4.3.2 Contemporary images

Introduction

A survey of contemporary photographs and videos was undertaken to see how contemporary images convey the aesthetic values of the Great Barrier Reef. The basis for this approach is discussed in Section 2.2.4.

Analysis of these images, using web based sources, covered two main categories.

1. Images presented by professional photographers who seek to capture the aesthetic characteristics of the Great Barrier Reef.
2. Images taken by visitors to the Great Barrier Reef and uploaded onto public snapshot websites.

A discussion of the findings in each of these categories, including summary tables of images and their attributes. Table 4.4 samples professional photographers' images, and Table 4.5 samples images taken by visitors and posted on public websites.

Table 4.15, described in Section 4.4.1 and to be found in Appendix 5, integrates the analysis of historical and contemporary images from Section 4.3.2 (above) and 4.3.2 (below).

Professional photography: images collected by the 'aesthetic hunters'

A number of websites representing national and international sources of professionally taken photographs were searched and assessed on 12th October 2012. They included images in the portfolios of individual photographers including those who have contributed to international publications such as National Geographic magazine, and images banked in collections such as Getty Images and AUSCAPE.

A sampling of the images taken by professional photographers and described in the section below are presented in Table 4.4.

Professional photographers

The following individuals were suggested by David Wachenfeld of GBRMPA (who has himself taken many aesthetic images of the reef) as established professional photographers with an interest in the Great Barrier Reef.

Steve Parish Publishing www.steveparish.com.au has published a number of 'coffee table books' on areas of Australia including *The Great Barrier Reef A World Heritage National Park* with photography by Gary Bell and text by Tony Ayling. An underwater view of a coral reef adorns the cover and a couple of sample pages feature marine life portraits.

In contrast, Peter Lik www.lik.com an Australian photographer who moved to the United States in 1984 has produced stunning photography of landscapes, architecture and elements of both mostly in America. A link to 'the work' leads to 16 categories of images including 'oceans, beaches, harbours'. Of the 183 photographs presented several of them feature the Great Barrier Reef often with evocative titles capturing the aesthetic values of the scene portrayed.

'Aqua mosaic' captures the clarity and purity of the water reflecting on the white sandy seabed below, and 'Coral Sea dreaming' presents a vertical slice of the coastline of Fitzroy Island disappearing into a blue horizon. His use of wide-angle panoramas to portray Hardy's Reef and Lady Musgrave emphasise the remoteness as well as the beauty of the Great Barrier Reef. His images are finely composed, illustrating a sense of beauty and naturalness and other experiential attributes such as remoteness, solitude and tranquillity. A selection of his images are included in the table below.

Roger Steen www.rogersteen.com features several categories of photo ranging from portraits to landscapes. One category entitled 'powerful water' presents 17 images mainly of breaking waves. However, there were no references to the Great Barrier Reef.

National Geographic

National Geographic photography is of the highest professional standard. A search of their website www.photography.nationalgeographic.com on 15th October 2012 led to a link to 'underwater photo of the day' which led to 92 results. Two of the images were located on the Great Barrier Reef; a close-up image of a Parrot fish and the blue waters and fish schools experienced on the Yongala shipwreck (both shown in the table below)

A further search of 'Great Barrier Reef Australia' led to a long list of articles and also a photo gallery presenting 17 images of "A Fragile Empire" by photographer David Doubilet. Two are captioned with text alluding to their aesthetic attributes. The image of the coral reefscape is captioned, "*...Reefs for me are places for solitude and thought, says Australian marine scientist Charlie Veron, here admiring a garden of stony corals on the northern Great Barrier Reef...*"

The aerial panorama is captioned, "*...Wide ribbons of coral, visible off Australia's east coast, divide the continental shelf from deep, darker waters farther out to sea...*"

Of the 17 images; 6 are portraits of marine species; 4 are close-up studies of small fish or coral; 3 are images of fish schools; 2 of coral reefscape; 1 aerial panorama of ribbon reefs; and 1 satellite image of catchment water flows into the sea.

Getty Images

The Getty Images showcases 70 photographs of the Great Barrier Reef illustrating a wide range of images including;

- aerial panoramas particularly of the reefs and coral cays set in turquoise waters;
- underwater images of 'reefscapes' and high definition close-ups of reef species;
- underwater portraits of fish and turtles; seascapes taken from the water surface featuring the wide open sky/ocean interface; beach photos many at sunset and;
- a few landscape images of islands or the coastline and individual portraits of starfish, turtles, birdlife and a lighthouse.

Of the 70 photographs reviewed, 32% were underwater images both close-ups and wider reef landscapes. Aerial panoramas accounted for 27% with seascapes (13%) and beaches (13%) forming the next popular image type. Island coastline landscapes formed 4% with the remainder (9%) portraying individual portraits of marine life and terrestrial fauna and a lighthouse.

No location information is provided for the majority of the images (50) and of the remaining 20 the following locations were identified as: Heron Island (8) Michaelmas Cay (3) Coral Sea (2) and one each for Cairns, Hayman, Green Island, Paradise Reef, Heart Reef, Knuckle Reef and Lizard Island Reef.

AUSCAPE International Photo Library

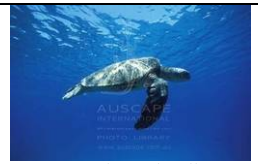
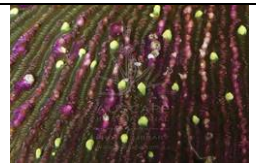
A search of the AUSCAPE Photo Library, www.auscape.com.au , one of the world's premier source of rights-managed photography specialising in the natural world on 12th October 2012 revealed 2,128 images of the Great Barrier Reef. The images are all artistically composed and high quality, as illustrated in the table below and all give details of location. An appraisal was made of the first 500 images. Eight photos showed maps and satellite images of Australia and Queensland and the majority of images of birdlife on closer inspection were either from Western Australia, Cook Islands, or the Galapagos. Ten of the large fish portraits were from Iceland (killer whales). A summary assessment of key images and aesthetic characteristics is tabled below.

A quick review of the next 500 images revealed mostly underwater studies (over 90%) and details or close-ups of marine life in all its many forms.

Table 4.4: Contemporary images taken by professional photographers

Perspective	Main Elements	Evidence of aesthetic values and attributes	AUSCAPE	Getty	Individual
Panoramic					
	Reef formations, sand cays and small islands	Images depict the pleasing patterns formed by the coral reefs visible in the clear blue waters. Images often contrast the turquoise waters of the shallow reef with the deep blue channels in between. Abstract patterns are captured and a great sense of beauty and remoteness is portrayed.	 Wistari Reef Copyright© Darren Jew	 Helicopter flight from Knuckle Reef by Tanya Puntti	 Great Barrier Reef, Hardy's Lagoon, Peter Lik
	Main island groups, beaches and coastline	Images depict forested islands, peninsulas and coastal headlands often with distant mountain range or further island groups. The green of the islands contrast with the white sandy beaches and the deep blue sea beyond. Images portray a sense of beauty and naturalness.	 Whitsunday Islands Copyright© Gary Steer	 Tribulation by ash	 Sapphire Shores, Lindeman Island, Peter Lik
At Water / Ground Level					
	Coastline and island vistas	Views along the coast or over reef and mudflats emphasise the natural beauty of the scenery as well as a sense of solitude and tranquillity.	 Stilt-rooted mangrove, Low Isles Copyright© Reg Morrison	 Heron Island by I Should Coco	 Coral Island Lady Musgrave, Peter Lik

Perspective	Main Elements	Evidence of aesthetic values and attributes	AUSCAPE	Getty	Individual
	Seascapes and beach vistas	Images depict blue waters merging into blue sky illustrating a sense of expanse and remoteness – where does the ocean stop and the sky begin. Views along pristine sandy beaches out to sea present an unpopulated natural idyll.	 A coral cay Copyright© Mark Spencer	 Heron Island by I Should Coco	 Ocean Whisper, Sandy Cay, Peter Lik
	Water activity, snorkelling, boating, reef walks	Images portray people focussed on the treasures of the reef and the clear waters that enable its discovery. Delight of being in another realm and the sense of beauty, naturalness and tranquillity this engenders.	 Snorkelers on Hardy Reef Copyright© Darren Jew		
	Nature studies, birdlife and terrestrial fauna	Sense of discovery and witnessing the natural world.	 Pacific reef-egret, Heron Island Copyright© Mike Osmond	 Baby tropic bird by Scott1e2310	

Perspective	Main Elements	Evidence of aesthetic values and attributes	AUSCAPE	Getty	Individual
Below Water					
	Reefscapes and coral gardens	Underwater landscapes -expansive, diverse, colourful, disappearing into the blue. Clarity of water essential in capturing the sense of beauty and naturalness of the underwater reefscape.	 A variety of coral forms Copyright© Attila Bicskos		 Aqua mosaic, Peter Lik
	Portraits of fish and other marine fauna	Awe inspiring images of the natural world and its myriad shapes and forms. Underwater encounters engender a great sense of discovery.	 Green Turtle, Lady Elliot Island Copyright© Mark Spencer	 Clown fish by hawkgenes	 Yongala Shipwreck, National Geographic
	Close-up photography of fish and reef coral	Images depict gleaming colour combinations and abstract patterns of the natural world. Intimate portraits of great beauty and often wonder.	 Mushroom coral Copyright© Mark Spencer	 Heart of a giant clam by Kumukulanui	 Parrot fish National Geographic
	Observing the reef	Images show divers directly observing the underwater reefscapes and marine life showcasing different textures, colours and forms – a sense of discovery, but also solitude and reflection.	 Diver in coral garden Copyright© Becca Saunders		

Snapshots: images captured by the Great Barrier Reef visitors

Today many people share their images of a visit to a certain place via photo websites and these images can be analysed in terms of the aesthetic values they convey. Two snapshot sites were searched for images of the Great Barrier Reef: Photobucket and Flickr. In addition, with the rise in popularity and use of video snapshots to record personal experiences of a place or activity an appraisal was made of GBR related material on YouTube.

Whilst the people posting photos on the public snapshot sites are for the most part amateurs, many of the images portray highly competent photography. The sheer range and number of images encountered on the sites also reflects enormous interest in the Great Barrier Reef both nationally and internationally.

The Reef itself

A search of 'Great Barrier Reef' on the www.photobucket.com website on 5th October 2012 revealed a total of 5,335 photos and 35 videos of the Great Barrier Reef organised in two categories – 'popular' and 'most viewed'. The first 28 images under the most viewed heading displayed:

- 9 images of divers underwater
- 4 images of underwater coral reef
- 4 images of underwater fish
- 2 aerial panoramas of the reef
- 2 visitors on land
- 1 yacht
- 1 Nemo poster
- 1 map
- 1 person asleep.

The next 28 showed the same sorts of image, mainly activity shots, people on holiday rather than any aesthetic appreciation of the Great Barrier Reef.

An assessment was then made of the popular selection of the collection which had a greater number of reef-orientated images. Of 120 photos sampled the main categories were; underwater images (33%) people and activity images (25%) and aerial panoramic images (25%) with Heart Cay prominent among them. Other images included coastal landscapes and seascapes (9%) the remaining 8% being a mix of boats, approaching dive stations and other paraphernalia associated with tour boat trips. Five photos were taken in an aquarium. Most of the images had no specific location attached to them.

A search of the Flickr site (www.flickr.com) on 5th October 2012 under 'Great Barrier Reef' produced a grand total of 99,553 results. This was based on everyone's upload. An analysis of the first 250 images posted on the site exhibited a whole range of images expressing different aesthetic experiences of the reef. They included:

- Aerial panoramas – views of reef patterns and cays in clear waters of various shades of blue as well as general shots of clouds and sea. One set of images referred to a flight taken as an additional activity to the Whitsunday's Knuckle Reef day cruise from Airlie Beach, "...*the Great Barrier Reef is awesome from the air, you appreciate the size and beauty...*"
- Beach vistas – often unpopulated white sandy beaches and bays.
- People on yachts or tour boats – either as single portraits or in group's usually on deck but with no specific backdrop.

- Seascapes from water level – portraying a wide horizon of blue sea and sky with no specific backdrop.
- Underwater 'reefscapes' – coral reef as landscape with perspective of reef receding into blue distance.
- Underwater 'blueness' – views of large fish or shoals against a blue backdrop, some looking deep into the blue ocean but many looking up to the surface and light. Quality and subtle range of colour of the water a standout feature along with the perceived enormity of the ocean and experience of being underwater.
- Underwater portraits – close-up portraits of fish and / or coral features featuring a myriad of shapes, textures and colours.
- Underwater abstract patterns – images featuring extreme close-ups of fish or coral groups often from unusual angles with no contextual background.
- Underwater encounters – images of fellow divers examining the coral reef or posing next to glancing fish.

The webpage also provides a link to a Great Barrier Reef members group that revealed just over a 1000 photographs of which 490 were taken by 'Flotsam' in the GBR sub-group. A mapping link reveals that the majority of the photographs were taken in the northern section of the GBRWHA, particularly around the Cairns area (48%). Other clusters included the Whitsundays (18%) Lizard Island (14%) the Port Douglas area (13%) the Capricorn Bunker Group (6%) Keppel Islands (4%) the Townsville area (2%) and the Cooktown area (2%).

An analysis of these images revealed that the overwhelming majority (70%) were taken underwater. The images types included:

- Underwater portraits of fish, turtles and other marine species against a backdrop of 'blue' ocean or sandy seabed (33%) Several of these were taken during night dives accentuating the colours of the fauna against a black backdrop.
- Underwater details of the coral reefs and smaller fish and other marine species, often forming colourful abstract kaleidoscopic patterns (33%)
- Underwater coral 'reefscapes' (25%) illustrating the relative scale and perspective of the reef against a backdrop of the ocean.
- Underwater fish and marine fauna against a total coral reef backdrop (5%).
- Underwater divers either against a blue ocean backdrop or alongside a coral reef or even posing with fish (3%).
- Underwater pure and simple capturing the pure blue expanse and the awe of simply being in a totally different and foreign environment (1%).

Aerial panoramas formed the next highest image type (12%). The vastness of these aerial seascapes capturing the mosaic pattern of reefs within the sparkling turquoise waters are a popular reoccurring image. Heart reef in the Whitsundays is a particular favourite.

Images that could be termed collectively as 'seascapes' formed the next popular group of photographs (7%). Half of these were pure panoramas of ocean and sky taken from boats or at the water's surface with no other detail in the frame and half were taken from beaches looking out to sea. These seascapes are often very composed images, illustrating wide horizons with a sense of infinity and remoteness.

Coastal landscapes form 6% of the images taken along beaches particularly amongst the main island groups. Sunsets are a particular favourite along with placing or capturing beachcombing objects in the foreground. Finally, 5% of the images can be described as people shots; often groups on boats or in the water with no particular scenic backdrop. The joy of just being in

that environment or possibly the logistics of taking photos in the water or on a moving boat make the aesthetic backdrop less important.

Examples of photographs taken by the GBR members, illustrating the range of image types are included in Table 4.5.

Islands and cays

The majority of the photographs tagged 'Great Barrier Reef' illustrated a range of underwater images, with aerial panoramas taken on scenic flights or from tourist flights to and from the island groups the next popular category. To broaden the range of potential images a further search was undertaken of well known locations within the Great Barrier Reef World Heritage Area as identified in the initial search and corroborated by GBRMPA staff knowledge of special areas holding aesthetic values.

Locations chosen included Lizard Island, Hinchinbrook, the Whitsundays, the Keppel Islands, and the Capricorn Bunker Group. Of all the images viewed 75% were taken at water or ground level with the remainder equally divided between aerial panoramas and below water images.

Lizard Island

A search of 'Lizard Island Great Barrier Reef' produced 851 results of which the first 250 were viewed. Well over half (59%) were images taken at the water or ground level. Panoramic shots accounted for a quarter of the images (24%) and below water images accounted for the remaining 17% of the photos viewed.

Beach vistas were the most popular image taken at water level. The images are generally unpopulated contrasting the expanse of white sand with the blue waters beyond and were either orientated along a bay or out to an island group. Rocky foreshores were also popular and captions sometimes used terms such as paradise. Other image types included portraits of terrestrial fauna, seascapes, beach and water activities, landscapes – mostly forest, heath, grassland, island trails etc., people shots on land or in bars, beach close-ups forming abstract patterns of sand or rock, and terrestrial flora.

Of the panoramic images 50% were panoramas of the islands from the air. Of the remainder 35% were island panoramas taken from a land based high spot and 15% were aerial images of reef patterns. Portraits of large fish or megafauna against the blue ocean, sandy bottom or reefscape formed the main image type for below water photographs. Close-up portraits, reefscapes and diving activity accounted for the rest.

Hinchinbrook

A search of 'Hinchinbrook Great Barrier Reef' revealed to 25 images, 6 not specific to Hinchinbrook. Of these; 6 featured close-up details of coral shingle and boulders on Garden Island; 7 were landscape images of Hinchinbrook Island with water channels or beach in the foreground, mangrove fringes in the middle ground and a backdrop of jagged peaks as represented by the image below; 4 were beach vistas; and 2 were close-ups of terrestrial flora.

A further search was made under Hinchinbrook Queensland which revealed a further 1,871 images. The first 300 were studied resulting in the following types of images:

- Inland waterfalls and hiking parties
- Beach vista or seascape with parts of the island or mangroves in the background
- Boat trips in the Hinchinbrook Channel
- Pristine, unpopulated sandy beaches, or with a single, distant visitor emphasising the remoteness of the scene
- Seascapes, (or 'skyscapes' really) with sea and islands low on the horizon emphasising the blueness and vastness of the location

- Images taken on the Thorsborne Trail (over a 100 photos uploaded) featuring mangroves, channels, forested streams, waterfalls and panoramic landscapes
- The Hinchinbrook landscape featuring Diamantina Creek, Nina Peak and Ramsay Bay

Many of the images were artistically composed particularly of the panoramic landscape or of the sinuous water channels. The human presence was only occasionally within the frame and not surprisingly there were no underwater photos. Many images give a general location but no further description. Occasionally a caption succinctly captures the aesthetic qualities of the image such as *Hinchinbrook Channel by Shelley A, "...the water was so still the boat seemed to move through the water like honey. We woke early for the passage through the Hinchinbrook Channel, it was so still and quiet and beautiful it was really breathtaking..."*

Whitsunday Islands

A review of the first 500 images for Whitsunday Great Barrier Reef', out of a total of 37,511 uploaded, produced 335 with aesthetic content. Of these 26% were panoramas, 57% water or ground level photos, and 17% below water photos. The aerial panoramas were roughly divided between those taken from the air and those from an elevated ridge or lookout on the islands.

The two largest categories from a water level or ground level perspective were either seascapes or beach and water activities. Many of the seascape images were taken from boats or sailing yachts looking across the water to a distant island backdrop with some just capturing the blueness of the sea and sky. People walking or posing on the beach or on boats or swimming next to the boat – but not sunbathing - were also popular snapshots and unpopulated sandy beach vistas accounted for the next popular type of image. Other images included terrestrial flora and fauna, some landscape shots and a visitor's photo essay of Daydream Island resort.

Of the small number of underwater images half were reefscapes and half portraits of megafauna, fish schools or close-up views of the corals.

Keppel Islands

Of the 189 results for 'Keppel Islands Great Barrier Reef' 46 images were dismissed as having no aesthetic content (resort site condition critique for example). Of the remaining 143; 6% portrayed panoramic views – mainly from an elevated ground position; 6% were underwater images – mainly fish portraits and coral reefs; and by far the largest group were a range of image types taken at the ground or water level (88%). Of these the majority were scenes of largely deserted sandy beaches such as at Pumpkin Island followed by various beach and water activity shots. Seascapes, again formed a sizeable representation of the images viewed including several looking out from rocky shores or fringing reefs. There were a number of landscape and terrestrial flora and fauna photographs and several sand or rock abstracts.

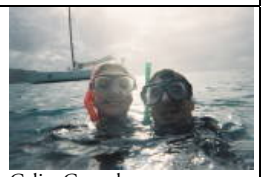
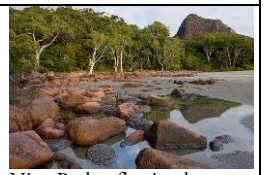
Capricorn Bunker Group

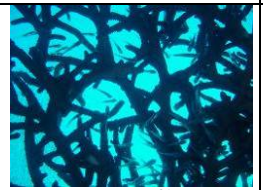
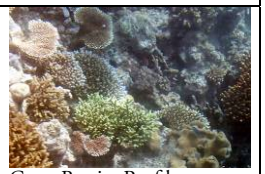
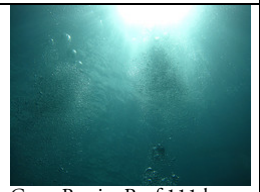
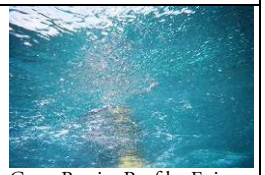
The search for 'Capricorn Bunker Great Barrier Reef' produced 23 images from two locations; Lady Musgrave coral atoll and Heron Island. Photographs included: 4 aerial views of the islands taken from flights to the area; 7 snorkelling and other water activities; 2 group photos; 5 snapshots of a gantry and jetty; and one each of a seabird, flower and a Heron Island sign. Of the two underwater shots, one was a close up of the coral and one of a 'semi-submersible' observing the reef.

A selection of images taken from the island group sample and their aesthetic attributes are included in Table 4.5.

Table 4.5: Snapshot images taken by visitors to the GBR

Perspective	Main Elements	Evidence of aesthetic values and attributes	www.flickr.com images (unless otherwise stated)		
Panoramic					
	Reefs, sand cays and small islands	Images depict the pleasing patterns formed by the coral reefs visible in the clear blue waters. Images often contrast the turquoise waters of the shallow reef with the deep blue channels in between. Abstract patterns are captured and a great sense of beauty and remoteness is portrayed.	 Wistari Reef Copyright© Darren Jew	 Whitsunday Island from the air by Colin_K	 Great Barrier Reef by 2minutes
	Main island groups, beaches and reefs	Aerial views of forested islands fringed with white sandy bays and fringing reefs often forming abstract patterns and promoting a sense of remoteness and natural beauty.	 Whitsunday Islands by rikpiks	 Whitsunday Islands, a little abstract detail by rikpiks	
(Taken from island high spots)	Headlands, bays, distant islands	Images depict islands and coastal headlands often with distant mountain range or further island groups. The green of the islands contrast with the white sandy beaches and the deep blue sea beyond. Images portray a sense of beauty and naturalness.	 Lizard Island by Philip Morton	 Hill Inlet Whitsunday Island by cemebamo	

Perspective	Main Elements	Evidence of aesthetic values and attributes	www.flickr.com images (unless otherwise stated)		
At Water / Ground Level					
	Beach vistas	View along deserted white sandy beaches or out to sea presenting an unpopulated natural idyll and romantic retreat. Sense of solitude and tranquillity.	 Lizard Island by Philip Morton	 Keppel Island by kleinerWeltenbummler	 Cape Tribulation by Heidi.wolfaardt
	Seascapes	Sky and water – blue on blue – portraying an elemental expansiveness. Occasional single feature on the horizon is included to emphasise the vastness or remoteness of the visitor experience.	 Keppel Island by kleinerWeltenbummler	 Great Barrier Reef – 05 by darranrussell	 Hinchinbrook Channel by Shelley A
	Water activity, swimming, sailing	Delight in being in another realm and the sense of tranquillity. Clarity and colour of water an essential ingredient to the experience.	 Whitsunday Island by Vanessa (EY)	 Whitsunday Islands by Double Dimension	 CalicoCupcakes www.photobucket. com
	Coastline	Views along the coast or over reef and mudflats emphasise the natural beauty of the scenery as well as a sense of naturalness and scenic beauty of the GBR coastline.	 Double Head, Yeppon by Dig the Tropic	 Mangrove tree and Hinchinbrook by jennyboduk	 Nina Peak reflection by Scott_E_Gibson

Perspective	Main Elements	Evidence of aesthetic values and attributes	www.flickr.com images (unless otherwise stated)		
Below Water					
	Reefscapes and coral gardens	Underwater landscapes -expansive, diverse, colourful, disappearing into the blue. Clarity of water essential in capturing the sense of beauty and naturalness of the underwater reefscape.	 Outer barrier by Michael Bok	 Great Barrier Reef _4562 by Alice & Seig	 Great Barrier Reef off Cairns by rotheche
	Portraits of large fish and other megafauna	A sense of excitement and discovery promoted by encounters with marine life. Snapshots taken quickly to record the event.	 Minke Whale -6- @ Coral Sea by Miquel Armengol	 Great Barrier Reef Turtle by k.w.wong	 Great Barrier Reef (14-7-09) (102) by lemoncookies
	Close-up photography of fish and reef coral	Images depict gleaming colour combinations and abstract patterns of the natural world. Intimate portraits of great beauty and often wonder.	 Great Barrier Reef by Heidi_K	 Great Barrier Reef 003 by babasteve	 Great Barrier Reef by hisglassworks
	Blueness of water	Blueness of the ocean and light penetrating the depths throwing shadows and inspiring a sense of solitude and maybe fear too.	 Great Barrier Reef 111 by sigma constable	 Great Barrier Reef by Kaitlyn92_2008 www.photobucket. com	 Great Barrier Reef by Eoin O'Sullivan

Perspective	Main Elements	Evidence of aesthetic values and attributes	www.flickr.com images (unless otherwise stated)		
	Observing the reef	Images show divers directly observing the underwater reefscapes and marine life showcasing different textures, colours and forms.	 Agincourt Ribbon Reef by kelliejane	 Malin and the turtle by world was beautiful	 Shells-Bells www.photobucket. com

Videos

Both the Flickr and Photobucket websites have links to short videos uploaded by visitors from their smart phones or from professional / semi-professional sources. For example, one such example listed on Photobucket (ref: EncycloMedia.com) ran for 2.57 minutes moving from an initial aerial perspective to the underwater scene followed by a map of the whole area and further images of coral and the species diversity of the reefs.

In the light of this increasing trend to post video clips a separate search was made of the most popular website for posting videos – YouTube. An initial assessment (on 9/11/12) revealed an enormous number of videos available with 16,200 results under 'Great Barrier Reef Australia'.

The videos range from professional productions to shaky camera phone records of fishing trips and from 4 minute promotions to 1 hour documentaries. One of the most popularly viewed videos with 450,157 hits is National Geographic's *Exploring Oceans – Great Barrier Reef*. Running for just over 4 minutes it starts with an aerial panorama before diving underwater to explore the '*lazy living wall'* of the reef and the fish schools and predatory sharks that circle. The biology of the reef and the pressures upon it are then summarised.

YouTube also has a promotional video for the recently launched *Caitlin Seaview Project*. This scientific survey of the Great Barrier Reef is a joint venture between Google, the University of Queensland Global Change Institute, and the insurance company Caitlin. The Caitlin Seaview Survey camera, developed for the expedition will capture 50,000 360 degree underwater panoramas from the reef, which will then be uploaded to Google Earth and Google Maps.

The survey was launched as recently as September 2012 and it will also be broadcast on a dedicated YouTube channel. Although mainly a scientific survey operating at 3 levels – shallow reef, deep reef, and megafauna – '...the visual nature of the project will also help bridge the gap between scientific knowledge and public awareness...' according to the projects chief scientist, Professor Ove Hoegh-Gudberg.

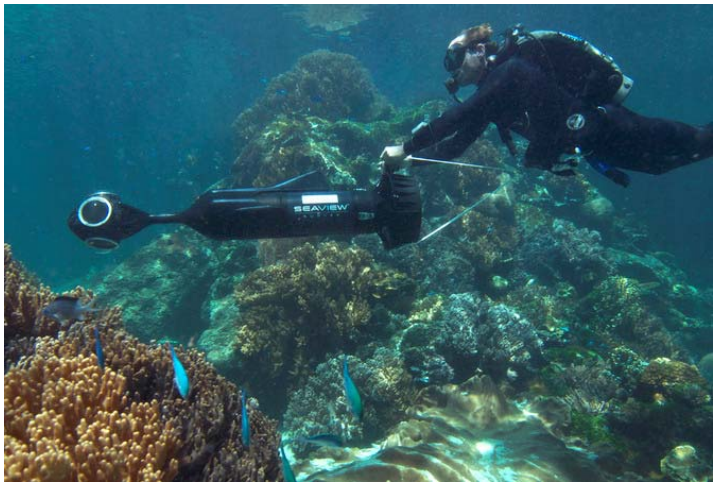


Image from article posted on The Conversation, www.theconversation.edu.au 24th February 2012

Selecting the short videos and partner videos only (less than 4 minutes) reduced the total number on YouTube to 990. These shorter videos tended to focus on videos of visitor's experiences (of varying length and quality) plus a fair number of professional productions. Of the 'amateur' videos the undersea adventure of friends' scuba diving or snorkelling is a reoccurring theme along with short videos from helicopter or seaplane flights of the blue waters and reef patterns below. Fishing trips are often recorded together with the occasional 15-second cameo of waves lapping on the deserted Whitehaven Beach.

A search for videos of island locations within the GBRWHA revealed the same range of images as those found in the snapshots searches. The Whitsundays, for example, include sailing experiences, beach vistas, resorts as well as the stunning aerial panoramas, and Hinchinbrook,

videos that feature sea kayaking, hiking and exploring the mangrove channels and the nearby Solitare underwater wreck.

The videos posted on YouTube portray the same type of images and experiences captured by photographs. The moving image however does allow some of the scenes to come alive. Underwater videos are particularly good at enabling the viewer to observe the movement of the smaller species, particularly those that are camouflaged, and a fair number appear to be so. Observations of weather patterns, such as the random movement of a local whirlwind on the horizon, are also enhanced by video. Sound and commentary can add to the experience too – the peculiar blocked sounds of being underwater or the whistle of wind when sailing are obvious examples. It can also be a possible distraction for some – the loud background noise of helicopter blades or the un-edited swearing of excitable fishermen.

Great Barrier Reef documentaries

One of the major documentaries on the reef in recent years was a three-part television series "*Great Barrier Reef – A portrait of a biological miracle*" made in 1996 as part of the BBC Earth series. It was a BBC / Discovery Channel / Digital Dimensions Co-Production in association with the Nine Network Australia and used special filming equipment, including macro and time-lapse photography. Episodes comprised: 'Nature's Miracle', 'Reef to Rainforest' and 'Reef and Beyond' and the programmes explored the diversity of the coral reefs and the marine life that inhabit them. In 2012 the series was re-edited with an additional 24 minutes of material added, and issued on DVD and Blu-ray by BBC Worldwide.

As part of the BBC Worldwide catalogue of programmes the "*Great Barrier Reef – A portrait of a biological miracle*" has access to over 130 territories throughout the world including North America, Australia and Japan. The programme has further exposure via the BBC's Discovery Channel that broadcasts in the United States, Australia, Canada, Denmark, Europe, Finland, Flanders, France, Germany, Hungary, Italy, Ireland, Mexico, Middle East, Netherlands, Norway, Poland, Romania, Russia, South-East Asia, Sweden and the UK.

The BBC Earth documentary is just one of many television programmes and DVDs embracing the aesthetic values of the Great Barrier Reef. A search of Amazon.com and Amazon.co.uk found a wealth of documentaries many exploring the reef's aesthetic qualities and experiences. There are DVDs in German, Spanish and several English language productions are subtitled in Japanese. There are even VHS editions still for sale as well as up to date direct downloads.

Productions often champion the aesthetic side of the GBR experience. An IMAX production (Great Barrier Reef – take the experience home (2006) 39 minutes) promises the "most colorful and diverse undersea world known to man" with viewers experiencing "the enchanting beauty of the reef". Other films provide statements such as "view the undersea world's brilliant colors and extraordinary inhabitants" (Treasures of the Great Barrier Reef 2006) or "explore the turquoise waters" (Nature's Beauty – the Great Barrier Reef 2004) or even "witness the extraordinary colours and patterns of the amazing life forms inhabiting this jewel of the natural world" (Secrets of the Great Barrier Reef).

A list of some examples of Great Barrier Reef documentaries is included in Appendix 7.

Comparing professional and amateur images

The images taken by professional photographers share similar aesthetic characteristics to the images presented on the snapshot sites. Professional photographers show a greater range of above water images particularly aerial panoramas showcasing the enormity and the colour and patterns of the reefs below the clear water. Professional photographers are also able to exploit the wide angle horizons used in landscape photography - a reflection of experience, opportunity and having a greater control of how they present their image. Snapshot photos feature many of the same types of image but many more 'people' shots that capture the delight of just being in the Great Barrier Reef enjoying the experience.

The aesthetic values expressed in the contemporary images for the most part continue to reflect those aesthetic values of the reef that have been identified under Criterion vii of the Retrospective Statement of Outstanding Universal Value (RSoOUV). In particular images capture the 'superlative natural beauty above and below the water' and 'some of the most spectacular scenery on earth'. From the air images of the reef formations are numerous, the 'unparalleled aerial panorama of seascapes' being recorded on many scenic flights to and from the islands. Both professional and amateur photographers capture the 'myriad of brilliant colours, shapes and sizes' on thousands of images taken underwater, no doubt proliferated by advances in digital photography, underwater disposable cameras and the like. Often these are intimate images of marine life presented as colourful abstract patterns emphasising the camouflage effects of the multi-dimensional reefs.

Images of 'green vegetated islands and white sandy beaches spread over azure water are also common. The majority of beach vistas and seascapes recorded however often lack a human presence. In some cases a solitary figure or feature, often at some distance, is captured to emphasise the sense of scale and the remoteness of the view.

The overwhelming blueness of being on the water or even underwater showcasing the quality of light or the clarity of water is also a recurring theme and there seems to be an increasing interest in nature and in capturing encounters with fauna both on the land and underwater. There are few images however that witness breeding colonies of seabirds or turtles and other superlative natural phenomena, probably reflecting conservation management requirements and difficulties of timing and access.

4.3.3 Selling the Reef: tourism websites

Tourism websites present the most charismatic and appreciated images of a place as a way of attracting visitors. Analysis of these images enables an appreciation of both the ways in which visitors expectations are shaped, and of the experiences known to be valued by past visitors. Section 2.4.4 refers to the use of this type of data in aesthetic values assessment in Australia.

Through tourism websites, we see 'expert' opinion about the aesthetic values of the Great Barrier Reef expressed through carefully crafted words and photographic images and short videos.

Within the scope of this project a number of Government websites were looked at to assess how the aesthetic values of the Great Barrier Reef are portrayed; the websites included the Australian and Queensland government tourism websites and local tourism websites. The content of each is briefly described below.

Australian tourism website – *www.australia.com*

This official national tourism website leads with an underwater photograph of the Great Barrier Reef as the primary background image to the site. The photo highlights small colourful fish and a large turtle swimming over an expansive coral reef. The angle of the photograph is upwards towards the daylight filtering through the blue water capturing two snorkelers in the phosphorescent light. The image, which is likely to have been composed from several photographic sources, conjures up the relatively easy accessibility of the diverse and colourful underwater experience.

Background image taken from main page of the national government tourism website www.australia.com

The website invites the visitor to explore '14 amazing places' of which two are associated with the Great Barrier Reef: Lizard Island off Cooktown in the Far North, and Hayman Island off Gladstone in the south.

The website link to Lizard Island describes it as a "*...ruggedly beautiful island in the clear blue ocean...*" and "*...fringed by powdery white private beaches where clear turquoise waters lap the shore...*" Hayman Island is described as "*...a private sanctuary of astonishing natural beauty, tranquillity and indulgence on the doorstep of Australia's Great Barrier Reef...*" Both share two short video introductions to the Great Barrier Reef and Queensland respectively. The 1 minute 35 second video follows a seaplane journey over the reefs and cays below before descending below water to explore the reef and its varied fauna and exploring the beaches and seascapes.

This aesthetic appreciation last for half of the video before seductive images of accommodation, food and various activities are highlighted. No specific localities are given in the video.

The link to 'Explore – things to see and do' leads to 16 Australian icons with the Great Barrier Reef topping the list. Five categories of activity are promoted each accompanied by an individual image. They include:

1 - From the top, island hop – aerial panorama of the Whitsunday Islands.

Images used to promote this experience include both aerial and underwater photos portraying the diversity and vastness of the reef. For Hinchinbrook Island a promotion for the Thorsborne walking trail is accompanied by a visually stunning aerial panorama of the Hinchinbrook Channel. Other images include two beach and coastal landscape photos of Banksia Bay and Mulligan Bay. The web page provides further links to Cairns, Hinchinbrook, Hayman and Lizard Island.

2 - With flippers and a wetsuit – underwater image of a coral reef and divers above.

The text refers to '*technicolour coral and marine life*' seen through a glass bottom boat from the main tourist hubs and refers to experiencing the *reef's smooth seas, deep drop offs, underwater tunnels and caves* with a dive school or day trip operator. Specific mentions go to:

- The edge of the continental shelf at Agincourt Reef off Cairns.
- SS Yongala shipwreck off Magnetic Island.
- The Llewellyn shipwreck off Mackay.
- Fitzroy, Capricorn and Bunker Reefs near Gladstone.
- Vivid coral canyons near Lady Elliot and Lady Musgrave Islands.

3 - With wind in your sails – beached yacht.

Information given under this heading references a number of locations but majors on a 10 day sailing itinerary around the Whitsunday Islands. A variety of images are used to promote each day of the trail including; Whitehaven beach, South Malle Island at sunset, and aerial panoramas of Cid harbour, Heart Cay and Abel Point marina. Images also present sailing experiences at Hook Island and Hamilton Island and water activity at Lanford Reef, Butterfly Bay and Luncheon Bay.

4 - Smelling rainforest air – image of sitting under the rainforest canopy at Daintree National Park.

Although essentially promoting the region's national parks the text refers to great views on the Whitsundays, precious rock art by the Ngaro people at Nara Inlet, Hook Island and the fragrant rainforest air on Hook, Long, Cid, North and South Molle islands of the GBR.

5 - With your adrenalin pumping – helicopter pilot overlooking Whitehaven beach.

Location checks include the spectacular Heart Reef at Hardy Reef, Whitsunday best experienced from a seaplane or helicopter and scenic helicopter flights to Green Island.

***National Landscapes** – www.australia.com*

The Great Barrier Reef is one of the 14 national landscapes showcased by this site. Images accompanying the explanatory text include:

- Spectacular Islands – the accompanying aerial image of Vlassof Cay shows an expanse of white sand and turquoise reefs fading away to a far horizon of deep blue
- Coral Reef and Marine Life – image of a clownfish displaying an intense colour contrast between fish and coral
- Sailing – photo of sailing boat in tranquil waters against a backdrop of Hamilton Island at sunset

- Unique experiences – sublime aerial image of a ribbon reef with intense colours and graphic reef patterns.

A changing photo gallery also showcases four aesthetic experiences to engage in on the GBR including the aerial panorama of Whitehaven Beach from a seaplane flight; a beach scene at Daydream Island; a water level view of snorkelling on Hardy Reef; and another beach idyll on Lizard Island.

The site also has a 2 minute video which provides an ever changing display of images from aerial shots to beach scenes, back to aerial shots (Heart Reef) and underwater images of the coral reefs and varied and spectacular marine life. The video images are accompanied by the testimony of a fashion designer, a diver and a professional tennis player.

Australian Government – www.australia.gov.au

The search engine of this government website links to a number of sites the two most prominent being the Great Barrier Reef Marine Park Authority (GBRMPA) website and the Department of Sustainability, Environment, Water, Population and Communities website – www.environment.gov.au/coasts/gbr/index.html This site outlines four themes each accompanied by an iconic image illustrating the subject:

- World Heritage – underwater reefscape
- comprehensive strategic assessment – half and half image of an underwater reef with the coastline on the horizon
- managing and Protecting the Reef – turtle swimming in the blue ocean
- World Heritage Committee – aerial panorama.

A 9 minute video link highlights the work of GBRMPA, poste on YouTube on 1st October 2012. Like all videos it starts with compelling panoramas of the patterns of reefs and islands from the air followed by underwater reefscapes and then by coastal landscapes again from above. Talking heads refer to spectacular encounters with marine life, as well as the importance of mangroves and seabirds. Traditional owners refer to saltwater country and the importance of the mudflats and fishing. Three minutes into the video the complexity of the various management issues such as water quality are explored and the images become less to do with the aesthetic values of the GBR.

The website gives a further link to a Photo Gallery which showcases images from the Australian Heritage Photographic Library (part of the Dept.) The first page shows 14 images of great artistic merit. They include underwater portraits of marine species, aerial panoramas, pristine beach scenes, a coastline with a mountainous backdrop, and a close up of mangroves.

This page then links to 56 images held by the library of equally stunning images. Almost half are underwater shots, with 12 reefscapes, 10 detailed close-ups and 9 portraits of marine life. Beach scenes, seascapes and the coast landscape make up 19 of the images, leaving 6 aerial panoramas.

Queensland Government – www.queenslandholidays.com.au

The main page of this website features a changing photo gallery of eight images representing the best of Queensland including three of the Great Barrier Reef area. They include turtle viewing on the Low Isles, a beach scene at Palm Cove and fun with friends on Whitehaven beach in the Whitsundays. They all contain people smiling and enjoying the specific location or activity.

A link to 'experiences' brings up the Great Barrier Reef with six changing images reflecting Tourism Queensland's view of what makes the GBR special. They include:

- an aerial panorama of the reefs portraying the untouched vastness of the GBR.
- a diver close up to the colourful and varied reef.

- swimming with fish in an intensely blue ocean.
- turtle travelling over a shallow reef.
- visitors snorkelling over the underwater reefscape.
- detailed close-up of clownfish within the coral 'forest'.

The GBR page has a series of drop down headings with each topic accompanied by photographic images. A variety of underwater images are used to portray; *Great Barrier Reef facts; World's best marine life: World's best managed reef; and reef knowledge*. Underwater landscapes are also used to promote 3 of the 5 tourism precincts; *The Wild North – marine wilderness expedition; Cairns and Port Douglas – adventures in nature; South Great Barrier Reef – characters and uncrowded getaways*. Sailing images are used to promote *Whitsundays and Mackay* and seascapes to promote *Townsville – history and learning*.

A variety of images including aerial photos of a reef station, clear blue seas, divers on the reef, sailing against an island landscape, panorama of an island coastline and a seaplane are used to promote *Getting to the Reef*.

The main page of the website under the changing photo gallery provides a link to 'more photos' which opens up a separate tab to *EyeonQ* an interactive image, audio and video gallery of Queensland. Main headings include Destinations, Experiences, Qld on TV, and Your Pics. The latter category leads to a link to 'Overall Most Popular' for the Great Barrier Reef revealing 23 images. Interactions on or in the water account for ten of the images including snorkelling, diving, sea walking and viewing by glass bottom boat. Seven of the images portray aerial panoramas from helicopter or seaplane excursions. The remaining six images include two portraits of fish, 2 beaches, 1 sailing boat and 1 view of a reef at low tide.

The site also points to a number of destinations associated with the GBRWHA including Capricorn, Gladstone, Mackay, Townsville, Tropical North Queensland and the Whitsundays. The Whitsundays are promoted as;

> *74 islands in the heart of the Great Barrier Reef...cruise, sail, snorkel or dive in Australia's best aquatic playground. Get a bird's eye view by scenic flight or helicopter of magical islands fringed by white coral sand or indulge yourself at a luxurious resort.*

The Whitsundays page presents 773 entries, mostly photographic images such as 'sunset at Airlie Beach' or 'Golden sailing' but also 36 videos such as those promoting Hamilton and Daydream Islands. There are also several audio podcasts from Ben Southall (best job in the world successful candidate).

Local Government websites - *www.cairnsgreatbarrierreef.gov.org.au*

This is the official website of Cairns and the Great Barrier Reef. The homepage features 4 changing images conveying what the area has to offer in terms of visitor activities. They include:

- Snorkelling over a colourful reefscape.
- Aerial zip-line flight through the rainforest canopy at Cape Tribulation.
- Running along a white sandy beach at Palm Cove.
- Jumping into the sea from the back of a cruise boat at Fitzroy Island.

At the foot of the homepage a further link to the Great Barrier Reef is presented;

> *Cairns is the closest gateway to the Great Barrier Reef – the world's largest, most spectacular coral reef system – where diving, snorkelling, sailing, cruising and island hopping are a part of everyday life.*

The webpage offers a number of popular activities appealing to a wide range of visitor types including; reef diving; reef snorkelling; rafting; kayaking; spas; sightseeing; scenic flight; off

road 4WD safari; wilderness (in effect a day trip to Cape York); bush walking; nature park; guided tour; water sports; whale watching; wildlife spotting; learn to dive; overnight dive; reef cruise; and world heritage (basically a link to cruises).

The page also highlights 3 GBR unique experiences:

3. Cairns seaplane scenic reef flight.
4. Seawalker @ Green Island (specifically for those not confident with snorkelling or diving – a walk along the seabed in a diving bell suit).
5. Fly dive Cod Hole to Lizard Island.

The site has a live webcam to the Great Barrier Reef (down when visited 14/10/2012) and Green Island - a static shot of a landing stage which was not especially revealing or indeed portrayed any particular aesthetic merit.

Summary

The images selected by the government tourism websites all capture the aesthetic values of the reef identified under Criterion vii of the RSoOUV for the GBR World Heritage property. The vastness of the reef from above, the underwater landscape of abundant diversity of reefs and marine life, and the majestic scenery of the islands are all effectively promoted by the tourism agencies.

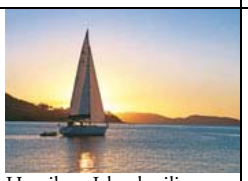
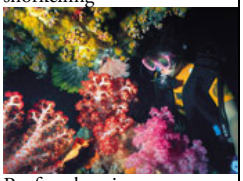
There are few images that portray the superlative natural phenomena of seabird colonies, coral spawning or migrating whales. However, images of underwater encounters with turtles and large fish are popular and there is one link to supervised turtle watching on the Low Isles.

What the tourism website images do successfully portray is the range of aesthetic experiences on offer to the reef visitor. Representations of scenic flights to witness the sheer scale and patterns of the coral reefs, as well as opportunities to observe, hike, dive or sail within the spectacular natural beauty of the area, are all successfully promoted by the tourism websites and in ways that cater for all ages, abilities and interests.

Table 4.6 below presents a sample of the images from some of the above mentioned websites, illustrating the use of the three lenses and the aesthetic values presented in the images.

Table 4.6: Images presented by tourism websites

Lens	Evidence of aesthetic values	Aust Tourism	Heritage Landscape	National Government
Panoramic	Pleasing patterns formed by the coral reefs visible in the clear blue waters. The green of the islands contrast with the white sandy beaches and the deep blue sea beyond. Images portray a sense of beauty and naturalness.	 Whitsunday Islands  Hinchinbrook Island	 Vlassof Cay	 Slashers Reef, GBRMPA Library

Lens	Evidence of aesthetic values	Aust Tourism	Heritage Landscape	National Government
Water Level	Water activity, particularly sailing in clear blue waters with distant views of islands. Pristine sandy beaches and sunsets promote a 'get away from it all' appeal.	 Hook Island Whitsundays  Whitsunday Islands	 Hamilton Island sailing	 Horseshoe Bay, Magnetic Island
Below Water	The rich diversity of the reef, with its colourful coral and myriad fish species are waiting to be discovered or encountered.	 Reef snorkelling  Reef exploration	 Clownfish	 Seastar and Ascidians, GBRMPA Library

4.3.4 Visitor perceptions

Introduction

The Great Barrier Reef attracts visitors globally. From its early beginnings in the 1950s, when visitor numbers were low, the 1970s and 80s saw a rapid increase in numbers and, in parallel, development of tourism infrastructure. Since 1994 the number of reef tourists has stabilised (CRC Reef Research Centre 2003).

In 2003, it was reported that about 85% of tourism activity on the GBR occurred in the Cairns and Whitsunday areas, representing about 7% of the total area of the Marine Park (CRC Reef Research Centre 2003). This pattern continues today.

The vast size of the reef means that there are fewer visitors per area compared to overseas coral reefs, and much of the reef adjoins coastal areas that are less densely populated than regions adjoining overseas reefs (CRC Reef Research Centre 2003).

Tourism statistics based on exit surveys at Cairns airport indicate that in 2007 and 2008 around 60% of visitors were international and 40% Australian. Many factors contribute to the holiday choices that people make and economic factors in Australia and globally will strongly influence the balance of local and overseas visitors. This data for 2007 and 2008 for example indicates that just over 70% of visitors to 'tropical north Queensland' visited the GBR, and for international visitors it was more than 87% (McNamara & Prideaux 2009:3,17-18).

Research on visitor expectations and perceptions of the reef has been undertaken over many years and some of this work helps illuminate the aesthetic values of the reef.

In this section, we look at research on the GBR (or parts of the GBR) that has sought to understand:

- **Visitor motivations:** that is, what motivates someone to visit a particular place or 'destination'
- **Benefits:** the benefits that visitors gain from their participation in activities and experiences are another way of examining why people participate.
- **Place attachment:** this refers to the emotional or affective ties or bonds that people have with particular places that they have experienced.
- **Perceptions of and response to the environment:** the interaction of the visitor with the physical environment and their response.

Some studies provide data that can be generalised across types of places, whereas other studies provide specific information about particular destinations. For example, Ormsby et al (2004) summarises overseas literature on recreation and tourism uses of 'protected areas'; this work was done to provide a framework for developing a research program for the GBR and it is used extensively below.

We have presented our analysis under a series of sub-headings designed to focus the readers attention on different aspects of visitor perceptions. Four sections look at different attributes: the natural environment as a tourism attractor, viewing coral, interacting with wildlife, and beauty. The next looks at data on the perceptions of fishers and boaters, and the following section looks at data related to specific locations. Finally, we examine data related to perceptions of places designated as 'one of the wonders of the world' and at the perceptions of tourism planners as revealed in submissions, reports and websites. At the end of this section (4.3.4), conclusions are drawn about visitor perceptions from the range of data presented.

A framework for considering the multi-dimensional nature of the visitor *experience* is provided by Sherl et al (1997: 1), suggesting four dimensions:

- the self dimension – their feelings and what the experiences represent to the visitor
- the activity dimension – what the visitors has actually been doing
- the social dimension – perceptions of their interaction with other people
- the physical dimension – perceptions and interactions with nature and the physical environment.

For the present project two dimensions of experience are particularly important – the self dimension, recognising that aesthetic value is in essence an emotional response and the physical environment which has the attributes which embody the values.

Elsewhere in this report we examine the internet and promotional films and documentaries as sources of information about and as influences on perceptions of the GBR. International visitors reported guidebooks, friends and relatives, internet, travel agents as the most important information sources, with TV documentaries at around 8%. For domestic visitors 'having been before' and 'friends and relatives' were the two most important sources (McNamara & Prideaux 2009:14)

The natural environment as a tourist attractor

In 2004 GBRMPA commissioned a *Review of Research into Tourist and Recreational Uses of Protected Natural Areas* (Ormsby et al 2004) and a companion volume on the development of a social indicators monitoring system (Moscardo & Ormsby 2004). The former provides an interesting review of international literature focusing on both methods and results, while the latter examines what was known about tourist and recreational use of the GBR at that time and then proposes a program of research designed to provide data for a monitoring system.

Ormsby et al (2004: 29) identifies and summarises a variety of overseas studies of recreation and tourist activities that reveal a variety of general motivations for participating in activities in the natural environment. Of potential relevance to this investigation of aesthetic values are the following motivations, particularly those emphasised:

- Solitude, privacy, escape from noise and crowds
- Freedom and control
- Adventure, risk taking and excitement
- Escape from physical and social pressures of work and daily routines
- Enjoyment of nature and scenery
- Learn about nature.

In summarising tourist perceptions about the GBR, the latter report notes for example that to 'see the beauty of the GBR' is the most important visitor motivation and expected benefit from a reef trip (followed by 'see coral in its natural surroundings', 'see/swim close with marine life', get close to nature'), noting that most research confirms that 'experiencing nature' is the greatest benefit visitors consider they gain from a reef experience. (Moscardo & Ormsby 2004:9-10).

An earlier study of tourist perceptions of the GBR (Vanclay 1988) involved surveys of 354 visitors in winter and summer of 1986 at several locations along the length of the GBR; this study provides an interesting analysis of the differences in expectations and perceptions of first time visitors and repeat visitors, noting that most international visitors fall into the first category. First timers come to 'discover' see the reef, whereas return visitors come for 'relaxation' and 'the weather' (Vanclay 1988:1). This study also examined the relationship between coral quality and visitor satisfaction. Amongst the reasons given for visiting North Queensland, 'the reef' is the most important reason for international visitors and for those who have experienced other coral reefs in other parts of the world, and more important for first time visitors that return visitors (Vanclay 1988:10). Asked about the best experience in this holiday, 'seeing the reef" was most common answer for international, Australian and local visitors, and for first time visitors, and those with no other experience of visiting a coral reef or who had visited reefs elsewhere in the world.

Lady Musgrave Island in the Capricorn Bunker group was the focus for Sherl et al's research which involved 208 visitor surveys. Motivations for visiting were primarily 'contemplating nature', scuba diving', and 'experiencing the Great Barrier Reef and the general reef community'. Asked about the 'sort of experience' they had during their visit, the idea that it was 'new and unique experience' was strongly expressed, including by those who had visited other parts of the GBR.

Content analysis of the responses against each of the four *dimensions* (see above) revealed that many people felt excitement and a smaller percentage experienced peace/tranquillity. The attributes of the natural environment that were strongest were: the reef community, the ocean and reef, fish, corals, naturalness, and other marine animals (Sherl 1997: 32-34). These included references to aesthetics and naturalness as increasing one's enjoyment of the place, and intimate encounters with nature (Sherl 1997: 38, 46). To quote one visitor:

> *Everything was just so beautiful and unspoilt and friendly. You seemed to move not in as an intruder but as a sort of part of the environment and you feel very much at one with nature and the environment'* (Sherl 1997: 38).

Overall reflections on their experiences 'revealed the natural environment, their appreciation and enjoyment of the natural environment' and their emotional responses to the experience as being the most important (Sherl 1997: 37-38).

In 2007 a further review of tourism research on the GBR resulted in development of a framework for future data collection, with the result that a standard survey has been used in tourist surveys (reported as 'barometers') since November 2006 (Prideaux & Coghlan 2007). The data collection focuses on motivations for visiting North Queensland, not just on the GBR.

Reporting on the results to December 2008 McNamara & Prideaux noted that visiting the Great Barrier Reef was the strongest motivation, followed by visiting rainforest. Other strong motivators linked to the GBR include 'experiencing the natural environment', seeing Australian wildlife, snorkelling and diving, visiting beaches and visiting islands. Comparing domestic and international visitors revealed that visiting the GBR was consistently a stronger motivator for international tourists, ranking as their number 1 motivation (McNamara & Prideaux 2009:11-13), reflecting the level of global recognition of the GBR.[1]

Viewing coral

Coral and coral quality was important, with a strong majority recognising the important place coral viewing had in this holiday. The colour and abundance of fish was also very important (Vanclay 1988:47). Interestingly, the researchers then compared the AIMS rating of the quality of coral based on the amount of live coral cover with the aesthetic perceptions of visitors, concluding that visitors can distinguish high quality corals (and that some actively choose their destinations accordingly). Further, satisfaction with viewing of coral related to the quality of the coral seen, although the correlation was not strong (AIMS 1986, in Vanclay 1988: 51, 55). Vanclay notes that many factors can influence perceptions of the aesthetic nature of the reef including 'amount of sunshine, wind, currents, turbidity of the water, cleanliness of the viewing surface plus the affect state of the visitor' (Vanclay 1988:51).

Fenton et al (1998) examined the extent to which 'ideal' images of the reef influenced visitors' expectations of their experience on the reef and their evaluation of coral reef quality. Inevitably, all visitors bring preconceived ideas about the place they are visiting, and other research has demonstrated that media images are often idealised and sometime contrived.

Most visitors had limited direct experience of reef environments, with 60% having not visited another coral reef previously and 73% not having visited the GBR before (Shafer et al 1997, in Fenton 1998:178). The reef experience they set out to encounter is therefore in an unfamiliar and potentially alien setting.

Prior to visiting the reef, the visitors were shown 20 images of reef environments, four of reefs and cays from the surface, the rest below water. There was considerable agreement about what constitutes an ideal reef environment, even comparing visitors with no previous reef experience to those with, suggesting to the researchers that the images 'provided by the media and tourism industry are instrumental in shaping the experiential expectations of visitors (Fenton 1998:189). Further the research demonstrated that these ideal images become the 'comparative standard for evaluating the experience of the reef environment', with this having important implications for those who present images to attract visitors (Fenton 1998:189-190). The place visited, Agincourt Reef did not meet these idealised expectations and was therefore judged to be 'poorer'.

A study of factors influencing reef experiences for day-trip visitors to the reef (Shafer et al 1998) concluded that natural environmental factors were 'some of the most important features'. The purpose of this study was to start to establish the "Limits of Acceptable Change" (LAC) by understanding the natural and aesthetic conditions desired by visitors, and what influences their perceptions of environmental quality (Shafer et al 1998:iii).

This study examined the reef experiences for 1922 day trippers, explored settings and their influence on the experience: natural environmental factors such as the types, numbers and colours of fish seen, the size, amount and colour of corals seen, the clarity of the water were all important factors, however visitors showed little discrimination among sites with substantially different coral assemblages and settings (Shafer et al 1998: v, 40).

[1] Subsequent data has not yet been presented in an 'annual report' format; the RRC advises this is underway following the conclusion of the MTSRF program concluded in June 2011. The last airport exit survey is April-June 2010 and it shows similar responses to those reported by McNamara and Prideaux in 2009.

Interacting with wildlife

Observing wildlife is considered to be one of the primary motives people have for engaging in outdoor recreation activities, and encountering wildlife is rated highly and is often a critical satisfier amongst wilderness recreationists (Ormsby et al 2004:34 -35).

Moscardo et al (2001) reports that the importance of wildlife viewing and interaction opportunities for international visitors increased in the 10 years from 1985/86 to 1995/96, with the percentage rating it as important 'often' or 'always' in travel decisions, being 75% of German, 69% of Japanese, 62% of UK and 98% of Dutch international tourists (Moscardo, Woods & Greenwood 2001:19).[2]

Other studies reported in Moscardo et al (2001: 19) include a 1996 survey of 600 Australian domestic holiday travellers, with 21% saying that 'a place where I can get close to nature and wildlife' was essential in their choice of a holiday destination and another 42% identifying this characteristic as 'very appealing' in a holiday destination. A study of 2200 international and domestic visitors to the Whitsunday region found that 34% of visitors rated 'opportunities to see wildlife/birds I don't normally see' as very important in their choice of a holiday destination, and a similar result was reported in a study of Far North Queensland. Destinations where viewing wildlife is part of the anticipated experience naturally attract people for whom such experiences are more important (Moscardo et al 2001:20). Other research into the preferred setting for wildlife experiences demonstrates the importance of opportunities to see wildlife behaving naturally and in a natural environment (Moscardo et al 2001: 22).

Key factors from across the studies about wildlife interactions reported by Ormsby et al (2004:35) appear to be:

- the variety of animals seen
- Being able to get close to wildlife
- Seeing large, rare or new species
- The natural setting.

A study into social and economic values of key marine species in the GBR examined the degree to which interactions with key marine species contribute to visitor satisfaction, employing several different approaches including a willing to pay approach. The highest satisfaction was accorded to opportunities to interact with a wide variety of species, followed by whales and dolphins, other wildlife, large fish, sharks and rays and marine turtles, that is the rarer animals. Large fish were also highly rated as satisfiers. Seeing seabirds was given a far lower rating. A slightly different ranking resulted for the willingness to pay for a guaranteed sighting, although all of these species rated highly. Relative rarity positively influences willingness to pay (Stoeckl et al 2010: 2, 34, 44, 48, 58).

Beauty

Ormsby et al (2004: 31-32) points out that much of the research about visitors and the physical environment focuses on the impact of the visitor on that environment, rather than the visitor's perceptions of or response to the environment. Recognising that seeing and experiencing the natural environment is an important motivator, overseas studies have shown that 'features of an environment such as its vegetation, geology, scenic beauty, views and wildlife can be important natural attributes', with a large US study concluding that 'the quality of scenery at natural settings' is the third most important factor in recreation experiences (USDA Forest Service 1998, in Ormsby et al 2004: 32).

Other studies have looked at the 'aesthetic dimensions of viewing landscape and experiencing scenic beauty', although some of those reported by Ormsby et al (2004:34) use the more

[2] There is a massive amount of research on wildlife tourism: an excellent source is http://www.crctourism.com.au/BookShop/.

narrowly defined 'scenic beauty' definitions from US studies dating from the 1980s and 90s (see discussion in Section 2.2). The key factors they identify as linked to perceptions of scenic beauty are:

- perceived naturalness
- presence of water, and land-water edges
- extent of wider and more distant views.

Some of these studies use a frame of reference derived from images rather than from the experience of actual places, and have been criticised for over-emphasising topographic variation.

As well, other qualities or features associated with scenic beauty may be unique to a particular type of landscape or even an individual place, and potentially missed in the application of a narrowly defined frame.

In reviewing these studies Ormsby et al (2004:34) notes that cultural background, personal experience and familiarity, and socio-demographic characteristics can be an influence on perceptions of beauty.

As discussed in Section 4.2, no specific studies looking at the aesthetic qualities and visitors responses to the GBR have been identified to date.

For fishers and boaters

Some research has focused on people undertaking particular recreational activities in the GBR region. For example, recreational anglers were studied in 2004, with a large sample size of 2061 surveys. Motivations for participating included both 'catch' and 'non-catch', with psychological motivations and 'natural environment experiences' being more important that catching fish (Ormsby 2004: 1-2). Another study of recreational boaters in Shoalwater Bay in South Queensland showed that amenity – meaning the scenery and the peace and solitude that the environmental setting provided – along with fish stocks was the reason this location was chosen (Jennings 1996, in Moscardo & Ormsby 2004: 11). Offshore Ingham boaters site preferences were also strongly influenced by the 'aesthetic qualities offered by the surrounding environment' (GBRMPA 1998, in Moscardo & Ormsby 2004: 11).

Focusing on selected locations

There have been in-depth studies in a few selected locations to better understand the qualities of the place most valued by visitors. A study of Lady Musgrave Island has already been discussed above.

Another example is a study of Whitehaven Beach in the Whitsundays, one of the most popular tourist destinations within the Marine Park asked a sample of 583 visitors (around 50/50 domestic and international visitors) and 20 local interest groups their perceptions of this place. Asked why Whitehaven Beach might be valuable, the strongest responses were for its 'natural and ecological processes', conservation and educational opportunities. Spiritual values did not rate highly across the whole group, but international visitors expressed 'great value towards Whitehaven Beach as a place of spirituality' (Ormsby & Shafer 2000 25-26).

Asked to choose from a list of 'benefits' gained from their visit to Whitehaven Beach, 'seeing the beauty of Whitehaven Beach', 'being in a natural place' and 'viewing outstanding scenery' gained the strongest responses out of the 18 benefits offered (Ormsby & Shafer 2000:26).

A question designed to understand the perceptions ('images') people have of Whitehaven Beach after their visit, asked them to respond using 3 words or phrases. The most commonly used word or expression was 'beautiful, pretty', followed by 'relaxing, calming', 'quiet, tranquil', and with many other words and phrases reflecting aesthetic qualities and emotional responses to the experience of the place (e.g. unspoiled, panoramic, natural, paradise, secluded). Local interest groups used a similar set of words: natural, beautiful, pristine, pure white sand, crystal clear water, and a visual icon (Ormsby & Shafer 2000: 24, 74).

Other studies may have been undertaken to contribute to one of the four GBRMPA Plans of Management which cover the Cairns Area, Hinchinbrook, Shoalwater Bay (Dugong) and Whitsundays. Another source would be management plans developed by the Queensland Parks & Wildlife Service. These offer an opportunity for further consideration of aesthetic values at a more local level.

For example, the *Whitsunday and Mackay Islands Visitor Management Strategy* (QPWS 2007:18) includes a list of high use sites, suggesting in the text some of the reasons why these places are valued, although no underpinning research on values or satisfiers was referred to. These 'high use sites are special places that showcase the natural values of island and marine environments' and examples mentioned include:

- South Whitehaven Beach – 'Whitehaven Beach is an iconic visitor destination, one of the most recognisable tourism sites in Australia' (QPWS 2007:18)
- Chance Bay
- Tongue Point and Lookout Beach – 'After Whitehaven Beach, Tongue Point is the most popular visitor destination in the planning area ... Visitors to Tongue Point can walk along a short walking track of less than 1km to a lookout that provides world-class views of Hill Inlet' (QPWS 2007:19)
- Beaches at Blue Pearl Bay, Black Island and Langford Island (Spit) – 'Blue Pearl Bay, Black Island and Langford Spit are three of the most popular snorkelling and diving sites in the Whitsundays. The beaches are used as platforms to begin underwater exploration' (QPWS 2007:20)
- Brampton Island walking track circuit, Brampton Peak lookouts and Western Bay picnic area (QPWS 2007:20)
- Refuge Bay at Scawfell Island - Scawfell Island is the largest island in South Cumberland Islands National Park. Granite cliffs line the coast with large areas of rainforest on steep mountain slopes ... The island is largely undisturbed and highly attractive. (QPWS 2007:20-21).

One of the wonders of the world

Global awareness of the GBR as a place with outstanding natural values can be seen to be expressed through its World Heritage Listing, through some of the 'wonders of the world' designations and through its high level of recognition as a destination for international visitors. Some research has sought to look at the esteem in which the GBR is held by visitors, and to compare visitors' experience of GBR to their experiences of visiting other reefs.

Alongside questions about the importance of coral and coral quality, two statements were included in the 1988 Vanclay study which sought to measure the importance of the reef and coral and marine life in attracting people to visit North Queensland. The two statements tested were:

- 'Coral and marine life on the Great Barrier Reef is truly beautiful'
- 'The Reef is one of the greatest wonders of the world'.

The first statement had a 92% agree or strongly agree response, and the second a similarly high level of agreement (Vanclay 1988: 47).

The notion of the reef as one of the wonders of the world is explored below.

Shafer (1998:51-52) notes that 'Australian visitors were more likely (than overseas visitors) to have made the GBR a specific destination', and other research has indicated that the GBR is 'a well recognised and important symbol in the eyes of the Australian public', a place that Australians 'plan to visit' and 'recognise as an icon' (Huf & Douglas 1995). The GBR also has a strong international reputation, with the Bureau of Tourism Research (1995) research

indicating that 'international visitors to Australia most frequently nominate the Great Barrier Reef as the thing they most want to experience before leaving the country'.

A comparison of the competitiveness of the GBR with other tourist destination reefs internationally reviewed some of the research discussed elsewhere in this section, undertook further analyses and then did a content analysis of 'reef tourism destination reviews' represented in diving and travel magazines (Coglan & Prideaux 2009:17). The re-analysis of data from a 2003 survey revealed that comparing their visit to a reef in the GBR region with overseas reefs they had visited, 22% indicated that the other reefs were better than the GBR while 37% rated other reefs as worse. Nearly half said that the GBR offers a similar experience to other reefs. (Coglan & Prideaux 2009:17-15, 23). Considering environmental influences, the marine environment and the opportunity to dive or snorkel were the most important factors, with diving /snorkelling providing the best experience on the day, and 'the weather' the worst (Coglan & Prideaux 2009:16-17).

The content analysis of tourism destination reviewed suggests that each of the eight reef tourism destinations positions themselves slightly differently. The reef regions were listed as: Atlantic, Australia, Caribbean, Hawai'I, Indian Ocean, Micronesia, red Sea, South East Asia, and South Pacific (Coglan & Prideaux 2009:18).

The results reported by Coglan & Prideaux (2009) were then compared to the results of archival data collected by Moscardo (2000a, 2000b, 2000c, 2001) and Moscardo and Pearce (2002). The following table provides this comparison, excluding any descriptors or features that are not relevant to aesthetic significance. The media monitoring reported by Moscano occurred over four quarters, and the figures in brackets indicate the number of times the word or phrase appears in the top 10 list; this was a top 5 list in the final quarter.

Table 4.7 summarises the content analysis from these sources, noting multiple mentions in brackets, and where possible aligning similar terms across the sources.

Table 4.7: Summary of content from Moscardo (2000a, 2000b, 2000c, 2001) , Moscardo and Pearce (2002), and Coglan & Prideaux (2009)

Ten most commonly mentioned positive features – 4 quarters	Ten most frequently used descriptive words/phrases – 3 quarters	Descriptive words
Moscardo (2000a, 2000b, 2000c, 2001) and Moscardo and Pearce (2002).		Coglan & Prideaux (2009)
Calm/clear water	Clear/clean water	Clean
Wildlife (4)		
Coastal/island scenery (4)	Beautiful (3), Gorgeous (1), Scenic (1)	Stunningly beautiful Awe and privilege Magic Wonderful
Beaches (4)	Pure/white sand beaches (2) Golden beaches (1)	
	Blue/sapphire/aquamarine/turquoise water (3)	
Underwater scenery		Woodstock underwater Underwater metropolis Wonder
Quality of coral (2)		
Pristine environment	Pristine (2)	
Undeveloped	Secluded (2)	
Relaxing atmosphere	Relaxed/relaxing (2)	Relaxing
	Adventurous	
Shipwrecks	Tropical (2)	
	Diverse	
	Windy/windswept	
	Spectacular (1), Incredible (1)	National symbol
		Familiar yet exotic

Coglan & Prideaux (2009) also extracted words describing marine attractions. These included reference to the waterscape or reef, with most focusing on marine animals:

- Landscape - sand cays and island; pinnacles; bommies, Yongala, reef wall
- Marine animals - Wall-to-wall fish, potato cod, whitetip,; sawfish; banded pipefish, lionfish, bumphead parrot fish, ghost pipefish, seasnake, leafy scorpion fish, giant clams, cuttlefish, crabs, pufferfish, mantis shrimp, decorator crabs, morays, octopus, nudibranchs, daisy corals, seafans
- Large marine animals: whales, grey reef, silvertip, and hammerhead sharks (numerous mentions of sharks), turtles stingray, manta ray, dolphins.

The idea of listing 'the seven wonders of the world' as a guide to travelers is ancient, dating from Herodotus (484 – ca. 425 BC), with the number seven chosen 'to represent 'perfection and plenty' (http://en.wikipedia.org/wiki/Wonders_of_the_World, Retrieved July 31, 2010).

There are now a number of 'wonders of the world' lists, used similarly to guide travelers seeking outstanding locations to visit. Some are directed to the general traveler, while others are for those with specialist interests.

CEDAM International - an organisation dedicated to conservation, education, diving, and marine research - began the Seven Wonders of the World project in 1989 focusing on underwater wonders. (http://www.wonderclub.com/WorldWonders/UnderWaterWonders.html/ Accessed July 31, 2010).

CEDAM chose Palau, the Belize Barrier Reef, the Galapagos Islands, the Northern Red Sea, Lake Baikal, the Great Barrier Reef, and the Deep Sea Vents. Each was selected on the basis of its natural beauty, unique marine life, scientific research value, environmental significance, and whether it is representative of an overall area.

In 1997, CNN declared 7 natural wonders of the world – these were: Grand Canyon, The Great Barrier Reef, The Harbor at Rio de Janeiro, Mt. Everest, Northern Lights, Paricutin Volcano, Victoria Falls ("CNN Natural Wonders". CNN. November 11, 1997. http://www.cnn.com/TRAVEL/DESTINATIONS/9711/natural.wonders/. Retrieved July 31, 2010). This listing is often quoted.

Another 'seven wonders' process has been created through the New7Wonders Foundation, based in Zurich, Switzerland, and founded in 2001 by Bernard Weber. According to their website, an expert panel shortlisted 28 places out of the 'top 77 nominees' in the natural wonders of the world category. The Great Barrier Reef was amongst the shortlisted 28.

In preparing the short-list the expert panel used the following criteria:

- unique beauty of the nominated site
- diversity and distribution (accounted for in 7 groups)
- ecological significance (in terms of either stand-alone eco-systems and/or their significance for human beings)
- historical legacy (relation that human beings and/or indigenous populations have or have had with the site)
- geo-location (even distribution of the 28 Official Finalists between all continents).

A popular vote was held, and 7 places selected in 2011, not including the GBR. The popular vote is strongly influenced by promotion, including active advocacy by governments. The provisional New7Wonders of Nature is pending verification of the voting process.

Through the eyes of tourism planners

Another way of looking at the visitor expectations and perceptions is through the eyes of the tourism 'planner' or 'advocate', that is those who prepare tourism development strategies, often engaging with visitors, tourism operators and others in the process.

In advocating for the inclusion of the GBR into the National Landscapes program, the GBR National Landscapes Steering Group/Committee prepared a submission, drawing from a 'positioning workshop' conducted by LEAP. It argued that the GBR is 'an established iconic, international destination' and notes that the Queensland National Trust has named it a 'state icon' and 'CNN has labelled it one of the 7 natural wonders of the world' (Tourism Queensland, n.d.).

The submission asserts that GBR is an 'integral part of the Australian national identity' and attracts 'expressions of national pride in the visual arts, literature and education, plus during national events', however no evidence is offered. Further the submission notes the following 'selected locations for iconic images' and the types of images that can be obtained there. These locations have been added to the compilation of 'special places' in the present study:

- Whitehaven Beach and Hill inlet (beach shots)
- Hill Inlet (Tongue Point overlooking Hill Inlet)
- Heart Reef (aerial shots)
- Wilson Island (aerial shots)
- Great Keppel Island (aerial shots)
- Hamilton Island (land based shots)
- Hayman Island (land based shots)
- Hinchinbrook Island, from Nina Peak
- Langford Spit
- Reefs throughout Southern Great Barrier Reef of significant shapes (aerial shots).

A Tourism Australia (n.d.) positioning workshop on the GBR as a National Landscape was apparently built on data gathered through extensive consultations. It provides a framework of characteristics. These are placed against axes that represent a spectrum from 'unique' to 'not unique' and content (tangible) and context (experiential, emotive). Clustered, the characteristics that most strongly combine uniqueness and context are:

- mysterious, unrevealed, discovery, unexpected
- complex, intricate, tapestry, contrasting
- biodiversity, conservation
- free spirit, alive, bold
- isolation
- vast.

In another process, 'what the GBR offers' is distilled into a series of character traits: thrilling, diverse, beautiful, mesmerising, free spirited. A series of ideas about the GBR that could motivate brand affection are then generated, and while some of these appear to reflect research referred to elsewhere, it is not clear from the report where these ideas come from.

An experiences audit for the GBR region was undertaken in 2009 for Tourism Queensland by EC3 Global. It describes 'GBR experiences' as being delivered from the air, from the mainland or in the catchments that feed the world's largest reef ecosystem', defining an experience boundary well beyond the scope of the present project.

The concept of the experiences audit is based on the idea that consumers want 'experiences not just activities'. Activities and products are defined as the means by which an experience is delivered, with the example given of the activity being snorkelling whereas the experience sought might be 'seeing the fish and coral close up' or 'coming face to face with a wild marine creature like a whale, turtle or shark' (EC3 Global, n.d.). This aligns strongly with considering both environmental and experiential attributes associated with aesthetic values that is being pursued in the present project.

Tourism Australia has defined its international market as 'experience seeker' – visitors seeking 'authentic interactions, brag-able locations, and immersion in local culture'. Rating the GBR, this report asserts that the GBR rates highly in providing 'authentic natural and cultural experiences', its highly brag-able as a World Heritage Area and 'one of the 7 Natural Wonders of the world', and where its vast scale means visitors can get away from crowds or be right amongst them, depending on their preferences. For domestic tourists, and based on research by Tourism Queensland, it asserts that the GBR offers the four experience categories for domestic tourists – natural encounters, Queensland lifestyle, adventure and islands and beaches. The

audit also introduces the idea of the 'Great 8' – eight marine animals that a visitor might aspire to see – dolphin, shark, manta ray, whale, clown fish, Maori Wrasse, Cod and Turtle.

International visitation to the GBR represents around 30% of total international visitation to Australia (International Visitor Survey, Year ending Dec 2008), indicating that it is a highly known tourist destination internationally. Tourism Queensland has three international campaigns – two are linked to the GBR. The current international campaign - Islands of the Great Barrier Reef - is designed to encourage international visitors to 'immerse themselves in an experience above the reef' (emphasis added).

The Island of the Great Barrier Reef campaign leads with:

> *'Few natural wonders command such attention as the Great Barrier Reef, the world's greatest coral reef system. Those who see it never forget it. Here, after all, is a spectacle so vast that it can be seen from the moon.*
>
> *What makes the reef so great is not just what's beneath the surface but also what's above it - the Islands of the Great Barrier Reef. On an island, you can literally immerse yourself in one of the seven natural wonders of the world. Time spent on a Great Barrier Reef island is time out in one of the most beautiful places on Earth, an opportunity to experience its beauty in an unforgettable way. From the exclusivity and unbridled luxury of five-star resorts to the back- to- nature simplicity of tented accommodation in sublime nature settings, the reef's islands offer a retreat from the demands of everyday life.*

The Islands of the Great Barrier Reef campaign is an international marketing campaign related to all the islands - from Lady Elliott Island in the south to Poruma Island at the northern tip of the Great Barrier Reef. It is designed to:

- Reintroduce the Great Barrier Reef Islands as a key point of difference in the international marketplace
- Repackage the Great Barrier Reef Islands in a new way
- Build upon the strength of the Great Barrier Reef Islands by highlighting different aspects of the reef experience
- Create a defined product in the minds of international consumers
- Coordinate marketing activity under a single campaign to provide strength and cohesion in the marketplace

A website directed at potential visitors from the Middle East was sampled in relation to this campaign (http://www.visit-queensland.com/iss/emerging-markets/travel-trade/islands-of-the-great-barrier-reef-campaign.cfm - accessed 9.10.2012).

The last type of source sampled was the *Central Queensland Tourism Opportunities Plan 2009-2019*, one of several similar plans for segments of the Reef coast. Central Queensland covers the southern part of the GBR and this plan aims to be a forward looking plan for the development of tourism experiences and products that build on the distinctive aspects of the region, including its 'the internationally and nationally significant natural and heritage assets' (Queensland Government 2009:1) but also on industry and geo-heritage.

The Plan is based on new research and market segmentation that seeks to understand the 'emotional drivers' for the ideal holiday for a sample of 6000 Australians. The primary market identified was 'connectors' – meaning connecting to people . As well the following emotional drivers for potential visitors include (emphasis added):

- **"Escape"** Escape to Reality – Real Adventure, Real Experiences, Real Holidays. From snorkelling the reef, fishing and surfing to gem fossicking, outback cattle stations, scenic gorge country, or touring industrial giants – the experience is real in Central Queensland, not manufactured. You can touch and feel everything about it.

- **"Discovery"** Discovering nature, discovering industry, heritage, culture and discovering self. Experiences of exploring, learning, reconnecting, understanding, reflecting, regenerating, rejuvenating.
- **"Learning/Education"** Learning about the lifestyle of the Central Queensland Region, learning about the industry and job opportunities, learning about nature, culture and heritage of the region, and imagining what it would be like to 'live the life'.
- **"Adventure"** Many adventurous things to do, fishing, surfing, snorkelling, visit National Parks, gem fossicking, visit coastal townships (Queensland Government 2009:2).

The Plan places great emphasis on the National Landscapes program to attract international 'experience seekers' who are encouraged to 'immerse themselves in unique natural areas of Australia' with 'both the Sandstone Country and Great Barrier Reef' representing unique experiences (Queensland Government 2009: 31).

In a similar vein the *The Tropical North Queensland Destination Tourism Strategy 2012-2016* sees the GBR and the rainforest as key drawcards, with both reflected in its goal:

> *Globally recognised for its world heritage Great Barrier Reef and ancient rainforest, it is Australia's premier tropical destination, where the spirit of adventure comes alive in a world of natural and cultural wonders*

Conclusions on visitor perceptions

Having reviewed evidence from a wide range of sources on visitors' ' perceptions and responses to their GBR experiences, along with perspectives from the industry, some observations can be made.

First, the GBR has a significant profile in the minds of international visitors and Australians generally. It is an iconic, international attraction, and this is closely associated with the range of natural environments and experiences it offers.

A majority of visitors haven't visited the Reef before, nor another coral reef; they are 'discoverers' and typically experience excitement and wonder. Visiting the reef is a more important motivator for first time visitors than return visitors. Repeat visitors more commonly seek peace and tranquillity (Sherl 1997: 32-34; Vanclay 1988:1, 10)

'Seeing the reef' itself is typically a 'best' holiday experience and offers natural beauty and wildlife encounters that are highly sought after (Fenton 1998: 178, Vanclay 1988:10, Moscardo & Ormsby 2004:9-10). The most highly valued activities are those that enable people to gain certain experiences – that is snorkelling and diving, visiting beaches, visiting islands (McNamara & Prideaux 2009:11-13).

Visiting the GBR is a stronger motivator for international tourists than for locals (McNamara & Prideaux 2009:11-13) and observing or encountering wildlife behaving naturally and in natural settings likewise (Moscardo, Woods & Greenwood 2001:19). International visitors have named the GBR as the place they want to experience before leaving Australia (BTR: 1995). That said, Australians still make the GBR a specific destination and it is clear that the GBR is well-recognised and an iconic place for Australians to visit (Huf & Douglas 1995).

Considering the framing concepts in Section 3.2, the following points are made.

Scale

Visitor data is commonly derived for the whole GBR, while recognising that the majority of tourists access the GBR from northern Queensland – Cairns and Whitsundays – and therefore the data is derived most often from experiences in this part of the GBR. We encountered relatively little locality-based tourism research.

Lenses

Panoramic perspectives on the GBR are not evident in the visitor perception data examined.

On the water and land: Beaches and islands very important. Distinctive colour of the water is highly regarded.

Below water: Reef experiences below water are very important, and are linked to encounters with marine animals and coral health and water clarity. The opportunity for immersive and close up experiences with wildlife in natural settings is a very important motivator and satisfiers

Settings

Mainland: The land setting is important, especially for non-reef activities such as fishing.

Ocean: Water clarity, cleanness and distinctive colour of the water highly regarded.

Summary

Table 4.8 below presents a summary of the main elements and evidence of aesthetic values and attributes from the literature on visitor perceptions reviewed above.

Table 4.8: Visitor perceptions: Summary of expressions of aesthetic value, attributes and sources

Evidence of aesthetic value	Environmental qualities	Experiential qualities	Sources from literature reviewed
Experiencing nature The experience of being in nature Natural environment experiences Being in a natural place Strong connection between natural/naturalness and beauty Contemplating nature Enjoying the natural environment	Pristine Undeveloped Reef community Ocean & reef Fish Corals Marine animals Fishing (non-catch)	Naturalness Discovery Encounters	McNamara & Prideaux (2009:11-13) Moscardo (2000a, 2000b, 2000c, 2001) Moscardo and Pearce (2002) Ormsby & Shafer (2000 25-26) Ormsby (2004: 1-2) Ormsby et al (2004: 29) Ormsby et al (2004:34) Shafer et al (1998) Sherl (1997: 32-34)
Experiencing the GBR and general reef community Seeing the reef See the beauty of the GBR Beauty of coral and marine life Complexity, intricate, tapestry	Reef community Fish Corals	Discovery	Moscardo & Ormsby (2004:9-10) Sherl 1997: 32-34 Tourism Australia (n.d.) Vanclay (1988: 10, 47)
Beauty/aesthetics of the reef underwater Marine environment Underwater scenery	Coral and coral quality (AIMS rating) Colour and abundance of corals Colour, types and abundance of fish Seeing coral in its natural setting Clarity of water	Beauty	Coglan & Prideaux (2009:16-17) Moscardo & Ormsby (2004:9-10) Moscardo (2000a, 2000b, 2000c, 2001) Moscardo and Pearce (2002) Shafer et al (1998: v, 40) Vanclay (1988:47)

Evidence of aesthetic value	Environmental qualities	Experiential qualities	Sources from literature reviewed
Aesthetic qualities in the surrounding environment (above water) Beauty, beautiful, stunningly beautiful, spectacular Outstanding scenery Coastal/ island scenery Beaches – pure white, golden Visiting islands and beaches	Islands Beaches Presence of water and land/water edge Extensive and distant views Coastal scenery	Naturalness Beauty	GBRMPA 1998, in Moscardo & Ormsby (2004: 11) Jennings 1996 in Moscardo & Ormsby (2004: 11) McNamara & Prideaux (2009: 11-13) Moscardo (2000a, 2000b, 2000c, 2001) Moscardo and Pearce (2002) Ormsby & Shafer (2000 25-26) Ormsby et al (2004: 32)
Intimate encounters with nature Seeing Australian wildlife Observing and encountering wildlife Biodiversity The Great 8' Seeing wildlife in a natural setting	The ocean and reef Fish Corals Other marine animals Variety of animals seen Seeing large, rare and new species Birds & other wildlife Natural setting	Encountering - getting close up Discovery	Sherl (1997: 32-34) Ormsby et al (2004:34 -35) Moscardo, Woods & Greenwood (2001:19). Moscardo (2000a, 2000b, 2000c, 2001) Moscardo and Pearce (2002) Stoeckl et al (2010) Tourism Australia (n.d.) EC3 Global (n.d.) Moscardo & Ormsby 2004:9-10) McNamara & Prideaux (2009:11-13).
Water quality Clear, clean, calm water Blue/sapphire/aquamarine/turquoise water (3)	Clean water Calm water Colour		Moscardo (2000a, 2000b, 2000c, 2001) Moscardo and Pearce (2002) Shafer et al (1998: v, 40)
A wonder of the world, icon, symbol The Reef is one of the greatest wonders of the world'.		Discovery	Vanclay (1988: 47). Coglan & Prideaux (2009:17

Evidence of aesthetic value	Environmental qualities	Experiential qualities	Sources from literature reviewed
National symbol Brag-able destination Seven underwater wonders Established iconic international destination, high profile, widely known Integral part of Australian identity			"CNN Natural Wonders". CNN. November 11, 1997. http://www.cnn.com/TRAVEL/DESTINATIONS/9711/natural.wonders/. Retrieved July 31, 2010) EC3 Global (n.d.) Fenton (1998: 178) http://www.wonderclub.com/WorldWonders/UnderWaterWonders.html/ Huf & Douglas (1995) Moscardo (2000a, 2000b, 2000c, 2001) Moscardo and Pearce (2002) Shafer (1998: 51-52) Tourism Queensland (n.d.)
Vast Isolation Solitude		Solitude	Tourism Australia (n.d.) EC3 Global (n.d.)
Discovery, new and unique experience Excitement Learn about nature		Discovery	Ormsby et al (2004: 29) – general motivations not reef specific Sherl (1997: 32-34) Tourism Australia (n.d.) Vanclay (1988:1)
Peace and tranquillity Relaxing, calming Solitude	Fishing (non-catch)	Tranquillity	Jennings 1996, in Moscardo & Ormsby (2004: 11) Moscardo (2000a, 2000b, 2000c, 2001) and Moscardo and Pearce (2002)

Evidence of aesthetic value	Environmental qualities	Experiential qualities	Sources from literature reviewed
			Ormsby & Shafer 2000 25-26) Sherl (1997: 32-34) Vanclay (1988:1)
Spirituality/ spiritual connection		Spiritual	Ormsby & Shafer 2000 25-26)

4.3.5 Community perceptions

Introduction

As part of our examination of aesthetic values in the RSoOUV, this section examines the evidence on community perceptions of the GBR, drawing on a wide variety of types of sources. The materials examined relate to the Queensland community, especially communities living along the Reef coast (referred to as 'GBR communities') and to the Australian community broadly. These sources can be distinguished from the 'visitor perceptions' research as they are not focused on a particular experience of visiting the GBR as is commonly the case with the visitor surveys.

First we look at a series of studies, and discuss the findings by the type of study: recreation use, environment and well-being, and place meanings and attachment. Then we look at studies that have directly examined community-held values, and four different sources are examined. Studies of recreation use

A study of Queenslanders in 1994 (AGB McNair) examined their recreational experiences and views about wilderness, and highlighted a number of experiential qualities enjoyed. The method used was focus groups, with each group representing a range of 'familiarity levels' with the GBR. Six focus groups were held in total, three in Brisbane and three in Cairns. Several distinct values emerged: the first was that the reef was 'a fascinating visual experience' and second that it offered a distinctly different natural environment' and that this underpinned the visual experience.

> *The underwater experience of the Reef … appeared to be unique in carrying with it a sense of isolation or separateness from other human activity. The almost complete lack of auditory stimulation and the restricted field of vision gave participants a very different perception of space from that above water. Attention was focussed on a small area, which encompassed a great diversity of visual experience. A common response from snorkellers was that, as soon as they put their heads under water, the experience was one of entering 'a different world'.*(AGB McNair 1994: 13)

Factors that damaged the experience included 'sparse, damaged marine life', litter and crowding.

For those who had visited the remoter parts of the reef, the attributes of wilderness were: 'marine life in its natural state, untouched and ... undamaged, remote – far from people and signs of civilisation' (AGB McNair 1994:14).

A national household sample survey followed in 1995, shaped by some of the results from the 1994 study and again conducted by AGB McNair. In terms of their awareness of the GBR, most people felt they had been exposed to some information about it over the last 12 months. In terms of visiting the GBR, 42% had visited in the past, with home location and interest in water-based recreation being two influential factors (AGB McNair 1995: 5-6).

Asked about visiting in the future 41% indicated an intention to visit, 10% in the next 12 months, a further 11% within the next 1-2 years, and 20% suggesting it would be more than 2 years. Those who had visited before were five times more likely to be planning a GBR visit than those who had never been before (AGB McNair 1995: 7-8).

Asked to rate the importance of nineteen possible experiences to a reef or island visit, the three highest ratings were given to:

- Scenic beauty of the islands and beaches (rated 4.5)
- Experiencing a natural, unspoilt environment (4.3)
- Variety of fish and coral (4.3).

Clustering the various experiences together, it was concluded that the visual beauty of the reef was linked to the variety of fish and coral and the scenic beauty of the islands and the beaches,

and together these comprised the *most* important aspect of a reef visit (86% and 92% respectively) (AGB McNair 1995:10, 12). Two aspects related to education and learning – 'learning about the reef' and 'something new and exciting' – were each seen as important by 81% (AGB McNair 1995:10, 17).

Wilderness-type of experiences – expressed in the survey as 'seeing few other people or boats', 'experiencing solitude', 'being far away from populated areas' were rated relatively low. However, the experience of 'a natural, unspoilt environment' was rated highly (84% or second overall) (AGB McNair 1995:10, 19). The word wilderness was not used in the 1995 survey as the 1994 study found that people tended to regard wilderness as a land-based environment.

Asked about priorities for protecting the reef, the majority of Australians feel the primary reason for protecting the Reef and islands is due to its role as a unique Australian natural environment; this was the most important reason overall. The Reef's position on the World Heritage List and the duty to preserve it for future generations were amongst the most important reasons for protecting it (AGB McNair 1995:51, 52, 57).

Rolfe et al (2011) investigated aspects of recreation use values associated with beaches, visits to islands and fishing trips of residents in the Bundaberg to Cairns region. The purpose of the research was to determine factors influencing visits, and the potential impact of changes in water quality/visibility or fish catch on people's current patterns. In terms of beach visits, 'relaxing & views' and 'observing nature' were both in the top six activities (out of seventeen activities) at participants favourite beach, with key beach features sought including cleanliness, not crowded and good water quality in the top six. Other features related primarily to management and facilities. A third of those surveyed had visited island in the last two years, with activities ranked as very important or important including 'relaxation (>80%), viewing fish and corals and snorkelling/diving (>50%), and boating/sailing and fishing (>40%). Information was not sought on desirable island features (Rolfe et al 2011: 21, 22, 31).

Studies on the connection between environment and well-being

As can be understood from the above research, there is a potentially strong connection between environment and well-being. Preliminary results of a survey investigating individual wellbeing of residents in the catchments of the Great Barrier Reef in Australia are presented in some research by Larson (2009). The wellbeing factors were grouped into domains of: Society, representing family and community issues; Ecology, representing issues related to the natural environment; and Economy, dealing with economic issues and provision of services. The relative perceived importance of factors was quantified, allowing for a creation of Individual Wellbeing Functions.

Water quality was the ecology domain factor that received highest scores. This methodology offers an interesting way to link aspects of people's ecological, social and economic values.

Another project currently underway through JCU is also looking at what is 'valued' about the GBR and how it links to feelings of well-being. This research is described below (Stoeckl, in preparation).

Studies of place meanings and attachment

Within the heritage framework, place attachment is usually considered to be related to social significance rather than aesthetic significance. However, given the broader interpretation of aesthetic significance as emotional and experiential response to place, the concept of place attachment is of relevance. That said, place attachment is unlikely to arise from a single visit to or experience at a place, and therefore the concept may be valuable in interpreting research on return or repeat visitors, or on resident communities. From the overseas literature, Ormsby et al (2004: 30) identify several features or elements associated with place attachment of possible relevance to aesthetic significance as including:

- a strong emotional response to the place
- a belief that the place expresses some aspect of the individual's identity

- the place provides the individual with a sense of control, privacy and serenity.

Wynveen et al (2010) used 20 semi-structured interviews to discern place meanings associated with the GBR; this qualitative approach was chosen because of the paucity of data place research in marine settings and the researchers desire to understand the richness of such meanings. The informants chosen had extensive association with the GBR through recreational uses. Unlike the majority of tourists, none were first time visitors.

Ten themes emerged from the interviews; of these six are relevant to the present project and demonstrate a strong consistency with other data reviewed in the present project:

- aesthetic beauty
- pristine environment (lack of built infrastructure)
- abundance and diversity of coral and other wildlife
- unique natural resource
- curiosity and exploration
- connection to the natural world.

Other themes included the facilitation of a desired recreation experiences, safety and accessibility, escape from the everyday, and family and friends.

Given the limited research into aesthetic beauty on the GBR, the key words used to capture aesthetic beauty of the GBR from this study are of great interest: 'amazing', 'fabulous' and 'spectacular', 'vastness'. Aesthetic beauty is linked to several of the other themes: to pristineness, to the richness of nature, and the idea of wilderness. The idea of the GBR as a 'unique natural resource' was linked to its natural richness, and the 'otherness' of the marine environment, with a 'connection to the natural world' enhanced by the immersive quality of experiences on the GBR where one is part of an interconnected natural world (Wynveen et al 2010: 274-280).

Reflecting on the results the researchers noted some differences between meanings identified within the marine environment and those associated with terrestrial environments. These are linked to the particular physical attributes of the marine setting which contributed significantly to place meanings:

- aesthetic beauty included references to the beauty of the water including colour and clarity whereas in terrestrial settings the presence of water is linked to aesthetic beauty but the qualities of the water are rarely described.
- the abundance and diversity of wildlife emerging as a separate theme compares to other research where this theme has not emerged separately but has been linked to other place meanings. It is suggested that this may be because of the intensity and continuous experience of wildlife interactions in the marine environment compared to relatively rare contact with wildlife on land.
- last, the concept of the GBR as a unique resource was interpreted as being closely aligned with its intrinsic value and the level of consensus implies a 'culturally shared meaning'. (Wynveen et al 2010: 284).

Investigations of place connections and meanings usually focuses on smaller-scale studies. Two examples reviewed within the GBR are of interest because they bring somewhat different perspectives, illustrating the potential for more detailed studies in future.

A case study about place attachment to the landscape and seascape of the GBR undertaken by Susan McIntyre-Tamwoy in 2004 was based on Bowen, selected because of its location, closeness to the reef, and its identity as a coastal regional centre with country connections. The 'My Barrier Reef' project was designed to inform a broader study on the cultural heritage values of the GBR.

Primarily through two workshops and some targeted interviews, 40 places were recognised as 'special'. Places included reef-based, coastal and inland examples, with only six identified against an aesthetic value: Rose Bay (scenic, unspoilt, natural ... beautiful coral), Bald Hills (beauty), Stone Island (beautiful reef), mouth of the Don River (aesthetic), Mother Beddock (aesthetic, spiritual place, striking landscape feature), big Banyan tree at Queens Beach (magnificent old tree) (McIntyre-Tamwoy 2004:27-28).

Interpreting the results McIntyre-Tamwoy notes that:

- The Bowen case study emphasises the emotional attachment to places in the land and seascape are based on a combination of highly personalised experiences and distilled understanding on the part of individual members of the community of 'community history'.
- Intensely personal experiences and collective or shared events are important. For Bowen people, their places are 'concentrated along the coastline and only rarely extend beyond the visual limits of a person standing on the shore' (McIntyre-Tamwoy 2004:24-25).

Jane Harrington's doctoral thesis includes a study of the social values of the Magnetic Island community, one of three case studies used to examine ideas about people and place connections. In relation to Magnetic Island Harrington notes its attraction to those seeking a particular way of life, one imbued with ideas of simplicity. She writes about the community's appreciation of the beauty of the island and records the sensory responses people have to this place and that forms part of their 'sense of place' (Harrington 2004:189-190). She notes that the bays around the island, and especially Florence Bay stand out as valued places with their expressions of attachment link aesthetics to 'the *experience* of nature, of being absorbed within the bays' ambience'. As she goes on to point out, such special places have distinctive meanings for individuals and communities and are closely tied to layers of personal and shared identity (Harrington 2004:192-193).

Harrington asserts, based on the evidence gleaned from Magnetic Island community members that 'experiential relationships with the environment more closely link place, nature and community in a network of collective meanings and categories than do biological (scientific) values ... (as) Nature is an integral component of lived and embodied experience'. She suggests that this is a 'spiritualisation of the natural environment that values (re-values) the surrounding land and sea in a non-economic and non-material terms' (Harrington 2004:193-195).

She also explored the perceived relationship between perceptions of Magnetic Island and the World Heritage Area, revealing that there was a general disconnection. The World Heritage Area was 'valued but elsewhere' (Harrington 2004:196-197).

Studies on community-held values

While all of the above studies have discerned expressions of value and aesthetic value in particular, other studies look more directly at values. Four examples are discussed below, concluding with the latest work undertaken by GBRMPA through a series of stakeholder workshops.

Community perceptions of the GBR: 1999 and 2007

In 1999 a substantial study into community perceptions of the GBR was undertaken, with phone interviews conducted with a sample of 1003 people. There were two distinct sample groups - people living near the GBR and those in Melbourne, Canberra and Sydney. The survey asked about people's experience with the GBR, reef images, perceived current and future state of the reef, threats and attitudes towards reef protection.

Interviewees were asked to list the three words or phrases that came to mind when asked to describe the GBR. Across the whole sample, the 3 most popular words or phrases were:

- Beautiful (41%)
- Splendid (33%)

- Unique (20%).

The ten most popular words or phrases are shown in the table below; these responses were not reported separately for each location.

Table 4.9: Popularity of words and phrases

Words or phrases	Percent
Beautiful	41%
Splendid	33%
Unique	20%
Colourful	18%
Pristine/untouched	10%
Amazing/awesome	10%
Large/huge/big	10%
Wonder of the world	9%
Interesting	6%
Needs protection	6%

NB: Responses may add to more than 100% due to multiple responses

The authors note that several of these words - beautiful, unique, pristine/untouched, large, wonder of the world and needs protection - are all consistent with the World Heritage status and the OUV of the GBR (Green et al 1999:23).

Comparing the words chosen by those who had been to the GBR and those who hadn't, the following subtle differences were noted. Respondents who had been to the GBR most often used words like Beautiful/pretty (51%), Splendid/tremendous (47%), Pristine/untouched (29%) and Unique/exotic (28%) to describe the GBR. Respondents who hadn't been were most likely to use words such as Beautiful/pretty (52%), Colourful (31%), Pristine/untouched (28%) and Unique/exotic (25%) (Green et al 1999:41).

They also compared 'optimists' and 'pessimists', noting that both groups most often used words such as beautiful/pretty and splendid/tremendous to describe the GBR. Those identified as pessimists were more likely to describe it as Colourful (29%), Needing protection/valuable/important environment (24%), and a Wonder of the world/GBR/World Heritage area (14%). Optimists were slightly more likely to use Unique/exotic/inspirational (36%) and Amazing/awesome/great (23%) as descriptors (Green et al 1999:49).

There was wide recognition of the World Heritage status of the GBR across the whole sample (91%). Asked why the GBR should be protected, overall 77% answered as 'a unique part of Australia's natural environment' a finding consistent with that of AGB McNair (1995).

Table 4.10 below compares responses by residential location, with the strongest response in bold. Recognition of the economic benefits of the GBR is unsurprisingly strongest amongst those living within the region.

Table 4.10: Comparison of responses by residential location

	Reef region	Brisbane	Sydney	Canberra	Melbourne	Total
Unique Australian natural environment	**69%**	**82%**	**83%**	**68%**	**82%**	**77%**
Important economic resource	15%	7%	5%	18%	10%	11%

	Reef region	Brisbane	Sydney	Canberra	Melbourne	Total
Good setting for leisure and recreation	13%	10%	8%	13%	6%	10%
None, as I am not concerned about GBR	1%	1%	2%	1%	1%	1%
Don't know	2%		2%	1%	1%	1%

In 2007 another study by Young and Temperton examined community attitudes towards the GBR through a survey directed to Queensland coastal regions and southern capital cities (Brisbane, Sydney, Melbourne), plus six focus groups with residents from five GBR regions. The research was designed to understand the relative level of awareness of the GBR, the zoning plan and what is allowed within Green Zones, satisfaction with management of the GBR, and whether the GBR is perceived to be under threat and what are the predominant threats.

When asked about the good things that come to mind about the Great Barrier Reef Marine Park responses included reference to the environmental and aesthetic qualities of the GBRMPA such as: 'unique/absolute beauty', 'romantic',' internationally acclaimed', 'only living thing that is visible from space', 'makes us proud. It's unique and it's ours ... beautiful', 'pristine nature/beaches', 'blue', sight seeing' (Young & Temperton 2007: 21).

There was a high level of awareness across the sample that the GBR is a World Heritage Area, slightly higher in Queensland than in the southern capitals, and slightly higher amongst those who had visited in the last 12 months compared to the rest of the sample (Young & Temperton 2007: 25).

The Marine Park was considered extremely important by Queensland coastal residents. A sample of quotes is provided in the report including:

"It is extremely important to us…it is an integral part of Queensland and iconic to Australia."

"It's as Australian as the Melbourne Cup"

"It is to Australia as the Grand Canyon is to the U.S."

"It typifies and defines us as Queenslanders…natural beauty…sun filled life style…it is part of who we are."

"We take it for granted, it is just down the road, but we don't go there enough."

"We claim ownership, it is our own backyard."

"Part of our lives."

"Very important…part of Australia…part of Queensland."

"One of the natural wonders of the world."

"Something to be proud of."

"We are proud of the reef. It is part of our identity…part of the natural environment….beauty."

"It connects us to the past…our ancestors and how we used to live."

"It is very important…our future, present and past."

"It's a national treasure."

"Brings in tourist dollars." (Young & Temperton 2007:25-26).

In relation to the World Heritage status of the GBR, Queenslanders expressed pride and concern for its protection for future generations. Its value to the world seemed closely aligned to its value in their own lives as expressed above.

"The rest of the world is watching us."

"There needs to be rules about what we can and can't do."

"It has got to be protected for future generations."

"It is the eighth wonder of the natural world."

"Irreplaceable and priceless."

"Proud and unique." (Young & Temperton 2007:27).

Stakeholder response to the Term of Reference for the comprehensive strategic assessment

Two recent processes associated with the current comprehensive strategic assessment on the GBR have provided interesting perspectives on reef community values. First, community responses to the Terms of Reference of the comprehensive strategic assessment have highlighted important values of the GBR including: the values of heritage (world heritage values including cultural heritage), biodiversity (species and habitats), ecosystem health (including water quality), commercial uses and recreation (GBRMPA, 2012).

A 'word cloud' depiction of values (below) indicates beauty and protection as the two predominant values, with words such as unique, pristine, treasure, and amazing capturing other expressions of value which could be attached to specific environmental attributes that are valued – biodiversity, habitat, coral reef, ocean, nature, species for example.

Figure 3a: Quantitative summary of terms raised by respondents relating to the Great Barrier Reef Region's values

GBRMPA stakeholder workshops

During August to October 2012, GBRMPA held a series of stakeholder workshops to explore what people valued about the Great Barrier Reef (focusing on natural elements), what they saw as potentially impacting on what they value and what they would like to see in the Great Barrier Reef in 25 years, including future management arrangements. Three broad stakeholder workshops were held in Townsville, Cairns and Rockhampton, two Traditional Owner workshops were held, one in Cairns and the second in Rockhampton, and a workshop was held with each of the 12 LMACs (Local Marine Advisory Committees).

Subsequently, participants were invited to respond to a survey to further clarify the views expressed through all of the workshops.

A summary table showing the values attributed to natural elements has been prepared by GBRMPA and is included in their overall report. It highlights that three components of the Great Barrier Reef attracted expressions of aesthetic value:

Table 4.11: Aesthetic values of natural elements - summary

Natural element	**Aesthetic value** (from GBRMPA 2012b)
In combination – islands, beaches and coastlines, estuaries, deep water, bays, inlets and coral reefs	Reefs and islands can be seen from space Place of natural wonder Spectacular pristine beauty Awesome Spiritual Majestic and calming Looked upon with pride Unique habitats
Marine species, particularly the larger animals – fishes, crocodiles, whales, dugong, sharks, rays, sea snakes, turtles	'Wow' factor
Water quality	Water clarity Colour of water

In reporting on each workshop, GBRMPA has prepared more detailed tables of values and associated natural elements or attributes. An integrated table has been prepared to enable us to discern the expressed values (Appendix 6).

At most of the workshops, participants identified specific places that are imbued with particular values. These have been added to the 'special places' list (Appendix 4).

The table below summarises Appendix 6. It indicates the number of workshops at which aesthetic value was identified against each natural element ('mentions'), and presents relevant words and ideas used to express this value. It has been sorted to present natural elements that gained the highest number of mentions first. While this cannot be considered a quantitative measure, it does provide a clear flavour of the range and consistency of expressed values.

Table 4.12: Natural elements and aesthetic values – from the workshops

Natural element	**Mentions**	**Expressions of value**
Coral Reefs	14	Iconic – international image – a 'natural wonder' Diversity of life, colour, richness, beauty Naturalness, healthy Remote cays & islands
Island & cays	13	Beauty – from the water and from the islands Iconic Pristine Distinctive island forms, vegetation, associated reefs
Total ecosystem	12	Integrity Largest coral reef in the world – OUV Wonder of nature Natural beauty, diversity

Natural element	Mentions	Expressions of value
		Majestic, calming, remote, solitude Experience of place
Beaches, coastline & coastal vegetation	10	Pristine, natural beauty Iconic Beaches: clean, white sands, colours Seascapes Sensual, calming
Megafauna	9	Visible, iconic, recognisable, 'wow' Empathic response to large creatures Unique experiences
Species diversity	7	Visual beauty Reef Iconic
Water quality	6	Clear, healthy, beautiful
Estuaries, bays and inlets	6	Beautiful, dramatic Highly diverse: sandy beaches, water, rainforest Views and vistas
Bony fish	6	Iconic, beautiful, diverse and colourful Relaxing & fishing
Seagrass meadows	4	Experiencing (but not pretty)
Mangroves	4	Vital ecosystem Smelly, beauty
Deep/open water	4	Wilderness, open ocean, good for the soul Beautiful
Fish habitat	3	Natural and healthy
Connectivity	3	Whole interconnected GBR, natural beauty
Wetlands	2	Natural beauty, visually diverse
Threatened/protected species	2	Visitor expectation Iconic
Terrestrial landscapes	2	Coastline Variety, beauty
Sea birds & shore birds	2	Beautiful, iconic, part of the experience for visitors
Salt marsh, salt flats, mud flats, intertidal	2	Important but low aesthetic
Ocean currents	2	Important process

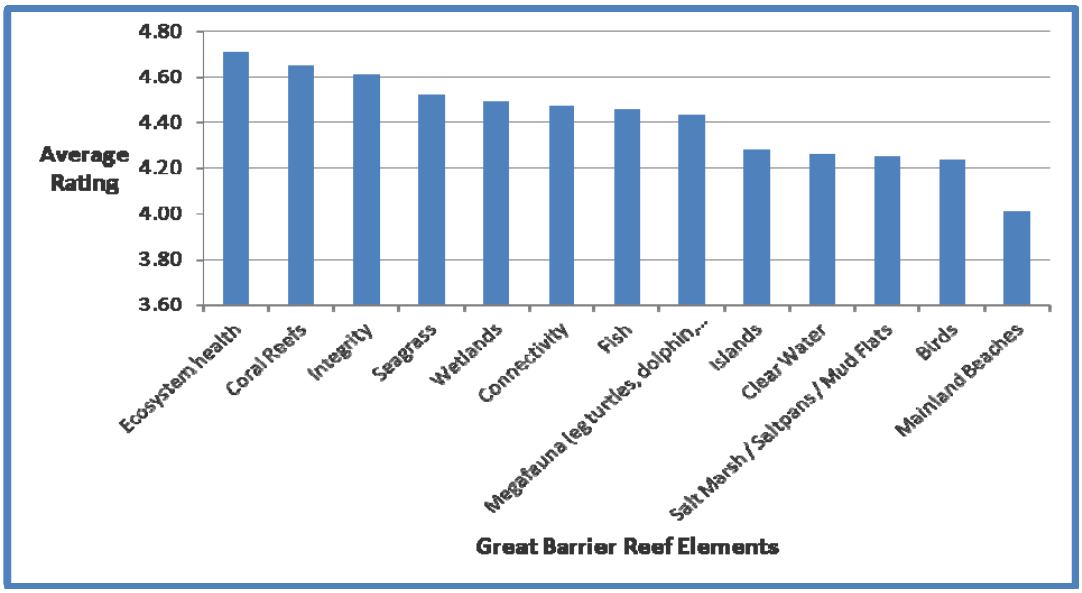
Natural element	Mentions	Expressions of value
Catchments	2	Scenic
Spawning	1	Unique and amazing
Sedimentation	1	Process

Post-GBRMPA workshop survey

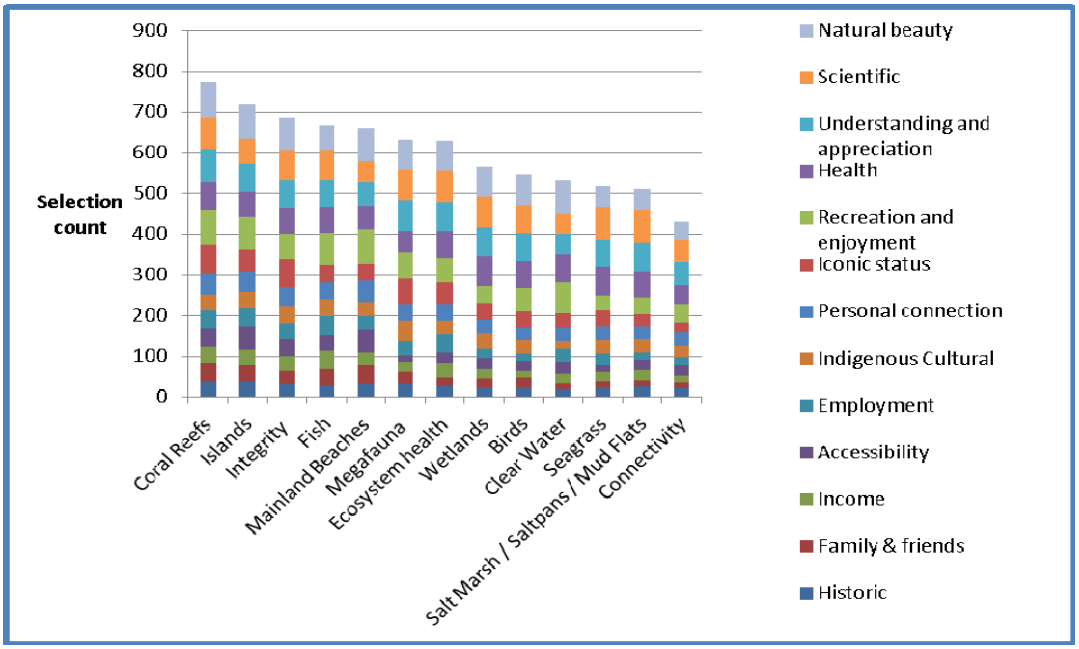
The post-workshop GBRMPA survey was available as either an on-line or hard copy survey. Of the 290 workshop participants, 135 or 47% responded to the survey. The analysis of residential location, age and interests indicate that a diverse set of respondents; nevertheless it is a small sample.

The first survey question asked respondents to rate the importance (from 'not important' to 'extremely important')of a series of elements of the GBR that were identified by workshop participants as being 'important'. The strongest responses were to:

- *ecosystem health* (rated by 77.5% as extremely important);
- *coral reefs* (rated by 75.4% as extremely important); and
- *integrity* (ie whole of Great Barrier Reef) (rated by 73.6% as extremely important) (p. 17)



Asked why each element is important, the most common reason chosen across all categories was *natural beauty*, then *scientific*, *understanding and appreciation*, *health* and *recreation and enjoyment*. Respondents were able to select as many reasons as they wished, including 'not important'. Therefore while natural beauty, for example, was the most common reason selected across all attributes, it may not be the most important reason overall. Rather it may means that that natural beauty is a reason that can be applied to most of the important elements (GBRMPA 2012b).



Natural beauty was the most common reason selected against all of the important elements.

A second mode of analysis applied by GBRMPA rated the thirteen elements based on the number of positive responses to each. The table below shows the reasons most linked in the present study to aesthetic values against the elements selected by more than 50% of responses against '*natural beauty*'. For natural beauty, the actual % of responses is indicated, while for the other reasons, their relative ranking is given. Colour is used to highlight the top five under each reasons, indicating a spread of values depending on the context indicated by the reason.

Table 4.13: Rating of elements by reason

Element	Natural beauty	Understanding & appreciation	Recreation & enjoyment	Iconic status
Coral reefs	71.9%	1	2	2
Islands	70.8%	6	3	4
Clear water	68.6%	13	5	11
Mainland beaches	67.8%	11	1	7
Integrity (whole of Reef)	66.7%	8	7	1
Birds	62.2%	5	9	8
Wetlands	61.5%	4	11	9
Megafauna (turtles, dugongs, whales, dolphins)	60.8%	2	6	3
Ecosystem health	60.5%	7	8	5
Fish	50.4%	9	4	6

NOTE: Connectivity, seagrass, salt marsh/ saltpans/ mud flats were all below 50% against natural beauty.

An interesting difference between Reef residents and visitors is recognition of natural beauty linked to wetlands. Attributes that may be of aesthetic importance for their *natural beauty* were only included in the survey if they were raised at the workshops; thus the survey sought to test the views expressed at the workshops.

Conclusions

Overwhelmingly, aesthetic appreciation of the GBR is focused on the elements described in Table 4.14 below. Interestingly, the whole World Heritage property has emerged strongly in this analysis.

Table 4.14: Community perceptions: Summary of expressions of aesthetic value, attributes and sources

Evidence of aesthetic value	Environmental qualities	Experiential qualities	Sources from literature reviewed
The reef itself as an environment that offers an outstanding opportunity for aesthetic experiences that are outside of everyday experiences on land, that are immersive, and that are filled with the natural beauty of a vast variety of corals, fishes and other creatures. Iconic	Reef Reef community Diversity and abundance of fish, corals and other creatures	Sense of beauty Sense of naturalness	AGB McNair (1994 & 1995) Rolfe et al (2011) GBRMPA (2012b)
Abundance of wildlife: intensity and continuous experience of wildlife interactions in the marine environment Opportunities to observe nature Wow factor. Iconic	Wildlife	Sense of beauty Sense of naturalness Sense of discovery - encounter	AGB McNair (1995) Wynveen et al (2010) Rolfe et al (2011) GBRMPA (2012b)
The islands and beaches, coastline, estuaries, bays are stunningly beautiful, distinctive in forms and composition, viewed from the water and from land. Iconic.	Islands and island groups Cays Coastline, bays and estuaries Associated reefs Seascapes	Sense of beauty	AGB McNair (1995) Harrington (2004) re Magnetic Island GBRMPA (2012b)
Natural, pristine environment An interconnected natural world being particularly evident in a marine environment Immersive experience of being 'in nature' on both land and water	Whole property	Sense of naturalness	AGB McNair (1995) Wynveen et al (2010) Harrington (2004)

Evidence of aesthetic value	Environmental qualities	Experiential qualities	Sources from literature reviewed
World Heritage status Unique resource Unique part of Australia's natural environment Part of Australia's identity Wonder of the world – wonder of nature Intrinsic value Vast, spectacular, amazing, interconnected Beautiful	Whole property	Sense of beauty Sense of naturalness Sense of solitude	AGB McNair 1995 Wynveen et al (2010) Green et al (1999) Young & Temperton (2007) (GBRMPA, 2012) GBRMPA (2012b)
Water quality Beauty of the water: colour, clarity			Larson (2009) Wynveen et al (2010) GBRMPA (2012b)
Attachment to specific places based on personal experiences and distilled collective understandings			McIntyre-Tamwoy (2004) Wynveen et al (2010) Harrington (2004)

4.3.6 Expert perceptions

The evidence presented in the Experts Table is derived from a study undertaken by Lucas et al (1997) to expand and clarify the values and attributes of outstanding universal value for which the property was inscribed on the World Heritage List. The findings of this report provided the evidence on which the Retrospective Statement of Outstanding Universal Value (RSoOUV) for the GBR was subsequently drafted. As such the evidence of values provided in the table closely aligns with the values statements in the RSoOUV.

The study by Lucas et al.(1997) involved consultation and interview with experts who provided opinion as to the natural heritage attributes justifying each of the three natural world Heritage criteria against which the property was successfully inscribed. In relation to the aesthetic values and attributes under Criterion iii (now Criterion vii), the authors found that little work on the full range of aesthetic values of the Great Barrier Reef World Heritage Area had been completed (1997:106) and that no individual expert was a source of the information provided in the study. Rather a number of people assisted the authors in providing references, other information and comments (1997:103). The authors concluded that this was primarily due to the lack of method and rigour in the assessment of aesthetic values in the world Heritage system noting that while the aesthetic values of the Great Barrier Reef are significant and incorporate visual and seen attributes as well as community held perceptions, the attributes are difficult to measure (ibid).

Further evidence is provided in the Experts Table by GBRMPA staff who during a workshop held in August 2012 as part of this aesthetic values assessment study were asked to map special places based on their own personal aesthetic experiences of the Great Barrier Reef World Heritage Area. The exercise was carried out on an individual basis allowing places and their attributes to be multi-listed. Their response elicited a whole range of locations throughout the area, but particular clusters or concentrations did emerge and these reflect those aesthetic values put forward by Lucas et al (1997) and by the values statements in the RSoOUV. These areas include the Far Northern section of the GBR, Cod Hole and Lizard Island, Hinchinbrook and the Whitsundays.

Further clusters of places with aesthetic value also became clear through the GBRMPA staff workshop exercise. The stretch of coastline between Cairns and Port Douglas and in particular Cape Tribulation, 'where the rainforest meets the reef' was seen to have high scenic value. The Capricorn Bunker Group of Islands were noted for 'solitude, serenity, peace and tranquillity" and the Keppel Islands for their views and 'visual appeal from the mainland'. The last two areas were also endorsed by the Great Barrier Reef Steering Group / Committee submission for National Landscape listing, along with the outer reefs in this southern area. The National Landscape steering group / committee also included images of Hinchinbrook and the Whitsundays, the two most popular areas cited by all expert bodies.

The 'crystal clear waters' and 'relaxation' of Magnetic Island was also noted in the GBRMPA workshop exercise but this probably reflects its position close to Townsville, GBRMPA's base.

4.4 Results

4.4.1 Analysis of aesthetic values data

The next step was to distil and analyse the studies, images and other data examined in Sections 4.2 and 4.3 against the RSoOUV. This is done through four tables:

- Table 4.15 brings together the historical and contemporary images
- Table 4.16 presents the visitor perceptions data
- Table 4.17 the community perceptions data, and
- Table 4.18 the expert perceptions.

These tables bring together a large amount of data, and are included in Appendix 5 to provide the reader with an overview and synopsis. They also reveal one of the key steps in our analysis.

Each table presents each of the components of the RSoOUV, with the black text indicating the components that relate to 'aesthetic value and natural beauty' and red text indicate those that relate to the 'superlative natural phenomena' parts of Criterion vii.

Against each component of the RSoOUV, the tables present the evidence, in the form of example images in Table 4.15 and descriptive text for Tables 4.16, 4.17 and 4.18. Subsequent columns indicate the relevant lenses (P panoramic, WL water level or BW below water), suggest some exemplar places and distil the environmental and experiential attributes revealed.

4.4.2 Definition of attributes

Environmental attributes and the qualities that enhance aesthetic value

Using the typology of marine and coastal ecosystems and species presented in Table 3.1, and considering evidence of aesthetic values presented in Section 4.3 and 4.4.1, Table 4.19 (below) defines the qualities of each of the environmental attributes that, from the evidence assembled, enhance aesthetic value.

The relevant lens is indicated in brackets after each dot point describing the relevant qualities:

- panoramic (P)
- water level (WL)
- below water (BW).

Table 4.19: Environmental attributes & enhancing qualities

Attribute	Qualities that enhance aesthetic value	Image
Reef as entity	• Vast scale (P) • Patterning of shapes and forms of reefs, cays, islands and water (P) • Intensity and variety of colours of reefs, cays, islands and water(P) • Intensity of sun light transmitted through or reflected on the water	

Attribute	Qualities that enhance aesthetic value	Image
Coral reefs	• Diversity of form and colour (P,BW) • Patterned relationship to each other, the coast, islands and cays (P) • Visibility/clarity of water (P,WL,BW) • Proximity to coastline or island (WL) • Complexity of the reef shapes and formations (BW) • Diversity of forms, textures and colours of marine life (BW) • Abundance of marine life (BW) • Quality of the coral (BW) • Adjacent to deep ocean drop off (BW)	  
Continental islands	• Variety of landforms (P, WL) • Patterned relationship to and intervisibility of reefs, cays and other islands (WL) • Ruggedness (WL) • Height (WL) • Contrast of form and colour with surrounding water (P, WL) • Presence of white sand beaches (P, WL) • Presence of fringing reef (P, WL, BW) • Associated variety of inlets and channels (P, WL) • Isolated, remote individual islands or island groups (P, WL)	  
Beaches	• Extensive (P, WL) • Sweeping (P, WL) • Pristine appearance (WL) • Uniform white sand (WL) • Framed by vegetation (WL) • Form and colour contrasting with adjacent landforms, vegetation, reef flats, rocky shores and water (WL)	 
Coral cays	• Isolated, remote from other land features (P, WL) • Patterned relationship of form and colour to adjacent reefs, other cays (vegetated and unvegetated) or islands (P, WL) • Contrasting colour with surrounding water (P, WL)	

Attribute	Qualities that enhance aesthetic value	Image
		
Water	• Clarity (WL, BW) • Calmness (WL) • Intensity of colour (WL) • Intensity of sun light transmitted through or reflected on the water (WL, BW)	
Marine animals	• Abundance (BW) • Diversity (BW) • Colour (BW) • Size (BW) • Large, iconic and rare species (WL, BW) • Signature fish species (BW) • Accessibility (BW)	 
Blue holes	• Size (WL, BW) • Depth (BW) • Richness of colour (WL, BW) • Contrast with surrounding forms and colours (WL, BW)	
Lagoon floors	• Visibility (WL, BW) • Water clarity (WL) • Extent (WL)	
Mangroves	• Scale of mangrove forests (WL) • Density (WL) • Unusual form of individual specimens (WL)	
Seagrass meadows	• Extent (WL, BW) • Diversity (BW) • Association with dugong (BW) • Visibility at water level (WL) • Clarity of water (WL, BW)	
Shoals	• Clarity of water (WL, BW) • Light reflection through water (WL, BW)	

Attribute	Qualities that enhance aesthetic value	Image
Cliffs and rocky shores	• Diverse rock formations and colours (WL) • Steep and/or high cliff faces (WL) • Contrast with adjacent colours and forms of beach and water (WL)	
Bays	• Scale and extent (large and sweeping or small and intimate) (P, WL) • Framed by vegetation (WL) • Associated with white sand beach (WL) • Absence of evidence of human intervention (P, WL)	
Estuaries	• Patterned relationship of channels and inlets (P, WL) • Contrasting colours of waters and vegetation (P, WL) • Absence of evidence of human intervention (P, WL)	
Rainforest	• Extent and uniformity of cover (WL) • Intensity of colour (WL) • Contrast of colours and forms at interface of rainforest, coastline and sea (P, WL) • Elevated, sloping landform (WL)	
Birds	• Size of breeding colony (WL) • Variety of forms and colours (WL) • Size of flock in flight (WL)	
Butterflies	• Size of aggregation (WL) • Variety of forms and colours (WL)	

Experiential attributes and the qualities that enhance aesthetic value

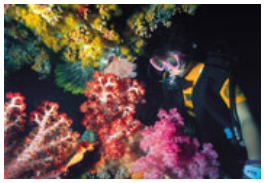
Using the broadly based typology of experiential attributes presented in Table 3.2, and considering the evidence of aesthetic values presented in Section 4.3 and 4.4.1, Table 4.20 (below) defines the qualities of each of the experiential attributes that, from the evidence assembled, enhance aesthetic value.

The relevant lens is indicated in brackets after each dot point describing the relevant qualities.

For ease of expression, these attributes are expressed as one word, rather than using the phrase 'sense of ... ' as was done in Table 3.2.

The experiential attribute 'sense of spiritual' proved difficult to assess, based on the available data and scale of the GBR. It was therefore been excluded from further consideration at this point in our analysis.

Table 4.20: Experiential attributes & enhancing qualities

Attribute	Qualities that enhance aesthetic value	
Beauty	• Spectacular scale and vastness (P) • Richness of colour, patterns and movement from the panoramic to the intimate scale (P, WL, BW) • Sensually rich and engaging (P, WL, BW) • Abstract compositions of nature (P, BW) • Distinctive (P, WL) *In the GBR, perceptions of beauty are strongly connected to naturalness*	 
Naturalness	• Sense of being within a vast interconnected natural world (BW) • Immersion in and engagement with nature (WL, BW) • Sense of the power of nature – wind, weather, waves, currents, large marine animals (WL, BW) • Pristine (WL)	  
Tranquillity	• Sensory immersion in nature - sights, sounds, smells, ambience (BW) • Stillness, reflective qualities (WL) • Intimacy (BW)	
Solitude	• A sense of seclusion (WL, BW) • Lack of intrusions in the experience of the place (WL, BW) *In the GBR, perceptions of solitude and remoteness appear closely related.*	
Remoteness	• 'Untouched' land and water scapes (P, WL, BW) • A sense of isolation (WL) • Vastness, expansive and untrammelled land and seascapes (P, WL) • Apart from 'civilisation' and in the 'wilderness' (P, WL) • Sense of freedom (WL, BW)	 
Discovery	• Intensity of the experience of interacting with wildlife (WL, BW) • Witnessing and learning about 'remarkable nature' (WL, BW) • Discovering an unfamiliar and exciting environment (BW) • Engaging with a real, authentic experience (WL, BW)	

Attribute	Qualities that enhance aesthetic value	
		
Inspirational	• Experiencing a place esteemed as an icon – a natural wonder of the world (P, WL, BW) • Dramatic, powerful, spectacular (P) • Unique (P) • Breathtaking (P, WL, BW) • Experiencing this 'imagined' destination (WL, BW)	 

4.4.3 Extended description and conceptual mapping of RSoOUV

An extended description of the aesthetic values that comprise each aspect of OUV in relation to the RSoOUV is presented below, with the conceptual mapping. This is based on our analysis of the evidence presented in Section 4.3 and in Tables 4.15, 4.16, 4.17 and 4.18.

This integrated presentation contains the aesthetic values, their extent and the lens through which this value is appreciated, along with the environmental and experiential attributes associated with that value. It also lists exemplar places.

The geographic extent (column 1) of each extended descriptions of OUV (column 2) is an important elaboration of the aesthetic values in the RSoOUV. Further, the evidence examined reveals that some aesthetic values described in the RSoOUV are more extensive than indicated in the RSoOUV. For example, there is strong evidence that the aesthetic values described in the following statement 'The Whitsunday Islands provide a magnificent vista of green vegetated islands and white sandy beaches spread over azure waters' apply to a far wider extent than the Whitsundays, and we have indicating this by detailing how this aesthetic value might be considered to apply to 3 different geographic extents: to 'all islands', 'large continental islands' and 'small continental islands and coral cays'.

Retrospective Statement of Outstanding Universal Value (Criterion vii)

Criterion vii: contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance

1 The GBR is of superlative natural beauty above and below the water, and provides some of the most spectacular scenery on earth.

Extent	Extended description of OUV (see Section 4.3 and Tables 4.15 to 4.18).	Lens	Environmental Attributes	Experiential Attributes	Exemplar Places (Places from App 3 Special Places list are shown as *)
Reef wide	1.0.1 The aesthetic importance of the property is underpinned by a connection between the naturalness – lack of human intervention - and beauty, and the experience of being in a vast natural place.	All	Coral reefs Marine animals Water	Beauty Naturalness Tranquillity Sense of remoteness	GBR wide
	1.0.2 The exceptional natural beauty and aesthetic importance of the property is associated with the visual contrast of patterns of reef formation the white cays and deep blue sea visible from above.	P	Coral reefs Coral cays Water	Beauty Naturalness Remoteness	
	1.0.3 The exceptional natural beauty and aesthetic importance of the property is associated with the diverse forms and colours of the underwater reef landscape.	BW	Coral reefs Marine animals Water	Beauty Naturalness Tranquillity Remoteness Discovery	
Northern Reef	1.0.4 The exceptional natural beauty and aesthetic importance of the property is associated with the vast and relatively unpopulated extent of the northern section of the Great Barrier Reef, described as 'breathtaking' and a 'wilderness' characterised by islands and island groups, sharks, birds, monsoon storms, clear water, diversity of fish and coral, and a sheer continental shelf dropping to 1000m.	All	Coral reefs Marine animals Water	Beauty Naturalness Remoteness Solitude	Northern section of the GBR

Statement of Values (RSoOUV)

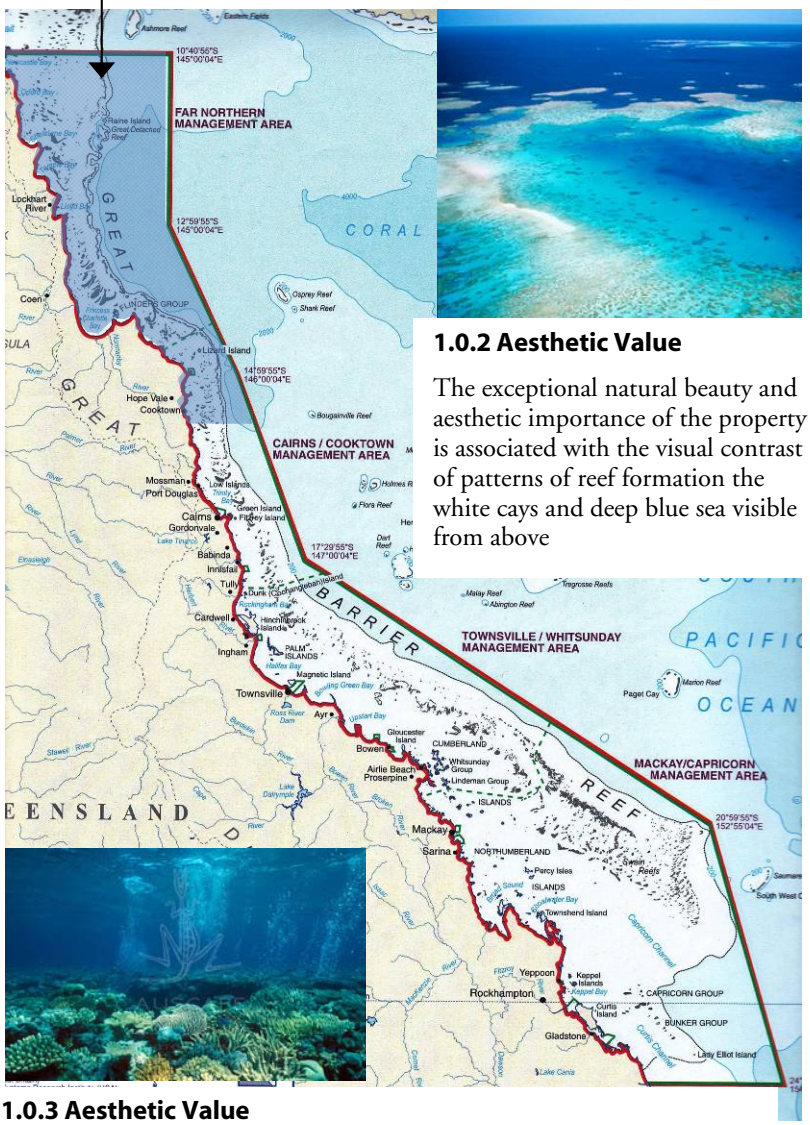
1 The GBR is of superlative natural beauty above and below the water, and provides some of the most spectacular scenery on earth.

1.0.4 Aesthetic Value

The exceptional natural beauty and aesthetic importance of the property is associated with the vast and relatively unpopulated extent of the northern section of the Great Barrier Reef, described as 'breathtaking' and a 'wilderness' characterised by islands and island groups, sharks, birds, monsoon storms, clear water, diversity of fish and coral, and a sheer continental shelf dropping to 1000m

1.0.1 Aesthetic Value

The aesthetic importance of the property is underpinned by a connection between the naturalness – lack of human intervention - and beauty, and the experience of being in a vast natural place



1.0.2 Aesthetic Value

The exceptional natural beauty and aesthetic importance of the property is associated with the visual contrast of patterns of reef formation the white cays and deep blue sea visible from above

1.0.3 Aesthetic Value

The exceptional natural beauty and aesthetic importance of the property is associated with the diverse forms and colours of the underwater reef landscape

Retrospective Statement of Outstanding Universal Value (Criterion vii)

Criterion vii: contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance

1.1 It is one of a few living structures visible from space, appearing as a complex string of reefal structures along Australia's northeast coast.

Extent	**Extended description of OUV** (see Section 4.3 and Tables 4.15 to 4.18).	**Lens**	**Environmental Attributes**	**Experiential Attributes**	**Exemplar Places** (Places from App 3 Special Places list are shown as *)
Reef wide	1.1.1 The exceptional natural beauty of the property is associated with the Great Barrier Reef being visible from space as a vast and complex interconnected whole.	P	Reef as entity	Beauty Naturalness	GBR wide

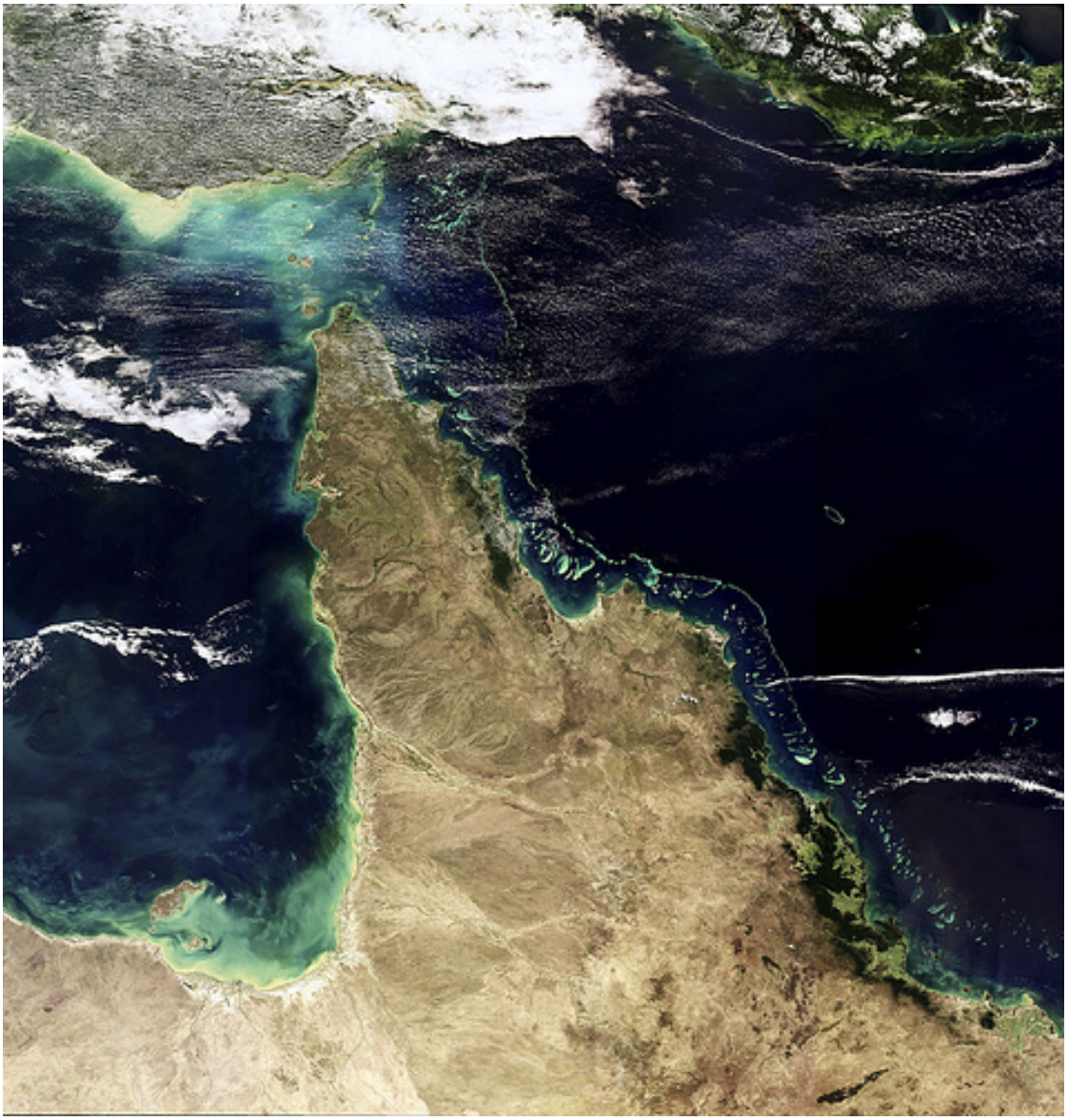
Statement of Values (RSoOUV)

1.1 It is one of a few living structures visible from space, appearing as a complex string of reefal structures along Australia's northeast coast.

1.1.1 Aesthetic Value

The exceptional natural beauty of the property is associated with the Great Barrier Reef being visible from space as a vast and complex interconnected whole

Satellite image of northern section of GBR by European Space Agency (GBRMPA satellite image of WHA?)



Retrospective Statement of Outstanding Universal Value (Criterion vii)

Criterion vii: contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance

1.2 From the air, the vast mosaic patterns of reefs, islands and coral cays produce and unparalleled aerial panorama of seascapes comprising diverse shapes and sizes.

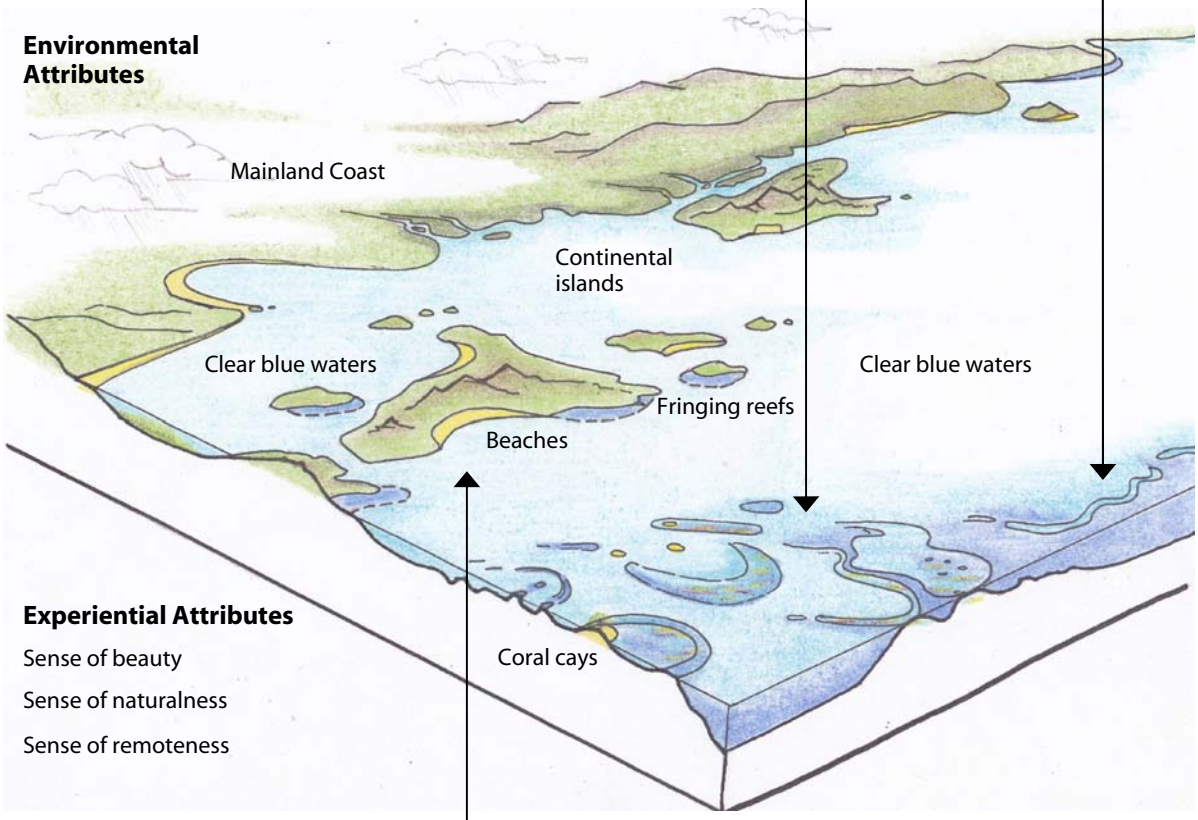
Extent	**Extended description of OUV** (see Section 4.3 and Tables 4.15 to 4.18).	**Lens**	**Environmental Attributes**	**Experiential Attributes**	**Exemplar Places** (Places from App 3 Special Places list are shown as *)
Reef	1.2.1 The exceptional natural beauty of the property is associated with the contrasting colours and shapes of reefs, cays and water that form often vast, abstract and mosaic patterns when viewed from above.	P	Coral reefs Coral cays Continental islands Water	Beauty Naturalness Remoteness	Capricorn Bunker Group* Swains Reef* Ribbon Reefs*
Islands	1.2.2 The exceptional natural beauty of the property is associated with contrasting colours and forms of green islands, coastlines, sweeping white sands, fringing reefs and patterns of blue waters that are visible from above.	P	Continental islands Beaches Coral cays Water	Beauty Naturalness Remoteness	Flinders Group* Lizard Island* Whitsunday Islands* Keppel Islands*

Statement of Values (RSoOUV)

1.2 From the air, the vast mosaic patterns of reefs, islands and coral cays produce an unparalleled aerial panorama of seascapes comprising diverse shapes and sizes.

1.2.1 Aesthetic Value

The exceptional natural beauty of the property is associated with the contrasting colours and shapes of reefs, cays and water that form often vast, abstract and mosaic patterns when viewed from above.



1.2.2 Aesthetic Value

The exceptional natural beauty of the property is associated with contrasting colours and forms of green islands, coastlines, sweeping white sands, fringing reefs and patterns of blue waters that are visible from above.

Environmental and Experiential Attributes

The qualities that enhance the environmental and experiential attributes labelled on the concept diagram are outlined in preceding tables 4.19 and 4.20

Retrospective Statement of Outstanding Universal Value (Criterion vii)
Criterion vii: contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance

1.3 The Whitsunday Islands provide a magnificent vista of green vegetated islands and white sandy beaches spread over azure waters.

Extent	Extended description of OUV (see Section 4.3 and Tables 4.15 to 4.18)	Lens	Environmental Attributes	Experiential Attributes	Exemplar Places (Places from App 3 Special Places list are shown as *)
All Islands	1.3.1 The Whitsunday Islands exemplify the exceptional natural beauty associated with the diverse and distinctive combinations of landforms, textures and colours created by the islands, island groups and the sea that are visible from water level throughout the property.	WL	Continental islands Beaches Fringing reefs Coral cays Water	Beauty Naturalness, Tranquillity	GBR wide
Large Continental Islands	1.3.2 The exceptional natural beauty of the property is associated with spectacular scenery within the continental island groups visible from above, and at water level and characterised by rugged mountains with dense and diverse vegetation, sweeping beaches and adjacent pristine fringing reefs and the absence of human presence.	P,WL	Continental islands Beaches Bays Cliffs and rocky shores Mangroves Fringing reefs Water	Beauty Naturalness Tranquillity	Whitsundays* Flinders Group* Keppel Islands*
Small Continental Islands and Coral Cays	1.3.3 The exceptional natural beauty and aesthetic importance of the property is associated with remote island groups, sand and vegetated coral cays surrounded by reef formations within a vast expanse of blue water and sky, characterised by lack of human presence and visible at sea level	WL	Continental islands Coral cays Coral reefs Lagoon floors Blue holes Water	Beauty Naturalness Remoteness Solitude	Lizard Island* Capricorn Bunker Group* Raine Island*
Northern Reef	1.3.4 The exceptional natural beauty of the property is associated with sweeping pristine and remote bays.	P,WL	Bays Beaches Water	Naturalness Remoteness	Princess Charlotte Bay*

Statement of Values (RSoOUV)

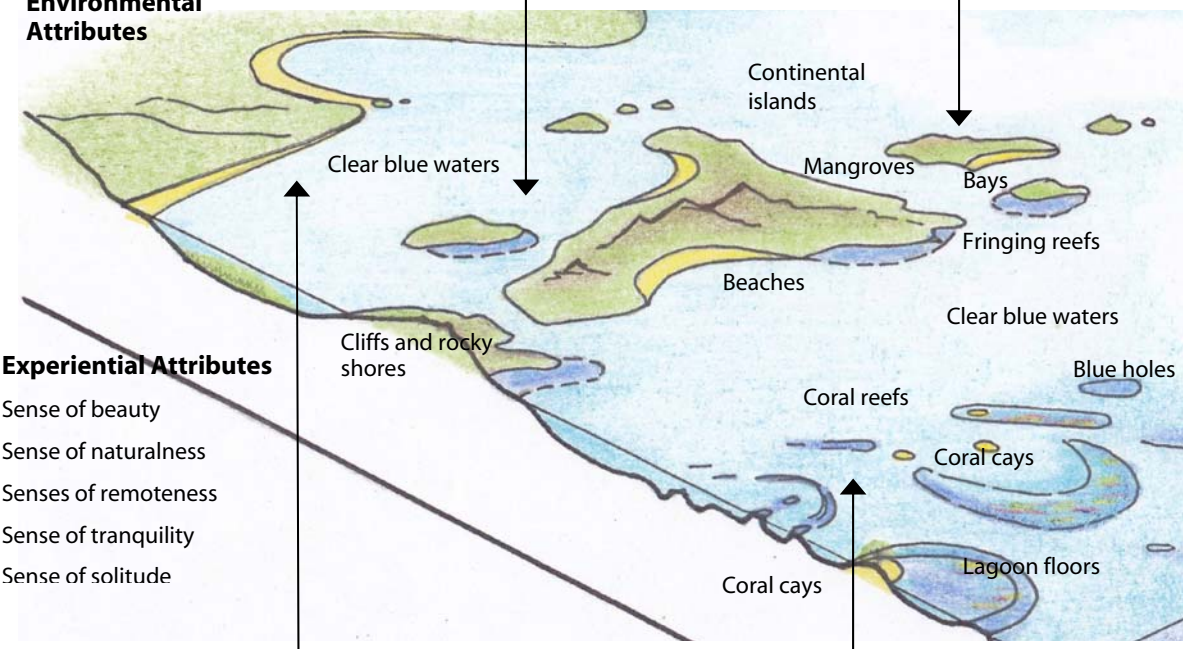
1.3 The Whitsunday Islands provide a magnificent vista of green vegetated islands and white sandy beaches spread over azure waters.

1.3.1 Aesthetic Value

The Whitsunday Islands exemplify the exceptional natural beauty associated with the diverse and distinctive combinations of landforms, textures and colours created by the islands, island groups and the sea that are visible from water level throughout the property.

1.3.2 Aesthetic Value

The exceptional natural beauty of the property is associated with spectacular scenery within the continental island groups visible from above, and at water level and characterised by rugged mountains with dense and diverse vegetation, sweeping beaches and adjacent pristine fringing reefs and the absence of human presence.



1.3.4 Aesthetic Value

The exceptional natural beauty of the property is associated with sweeping pristine and remote bays.

1.3.3 Aesthetic Value

The exceptional natural beauty and aesthetic importance of the property is associated with remote island groups, sand and vegetated coral cays surrounded by reef formations within a vast expanse of blue water and sky, characterised by lack of human presence and visible at sea level.

Environmental and Experiential Attributes: The qualities that enhance the environmental and experiential attributes labelled on the concept diagram are outlined in preceding tables 4.19 and 4.20

Retrospective Statement of Outstanding Universal Value (Criterion vii)
Criterion vii: contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance

1.4 This contrasts with the vast mangrove forests in Hinchinbrook Channel, or the rugged vegetated mountains and lush rainforest gullies periodically cloud-covered on Hinchinbrook Island

Extent	**Extended description of OUV** (see Section 4.3 and Tables 4.15 to 4.18).	**Lens**	**Environmental Attributes**	**Experiential Attributes**	**Exemplar Places** (Places from App 3 Special Places list are shown as *)
Coastal Islands	1.4.1 Hinchinbrook Island exemplifies the exceptional natural beauty associated with the large mountainous and forested coastal islands that rise steeply from sand beaches to high peaks visible from above and at water level.	P,WL	Continental islands Beaches Bays Cliffs and rocky shores Mangroves Water	Beauty Naturalness Tranquillity Solitude	Hinchinbrook Island* Curtis Island*
	1.4.2 The exceptional natural beauty of the property is associated with the extensive mangroves, mudflats and channels of the coastal islands visible from above and from high points on the islands.	P,WL	Continental islands Mangroves	Beauty Naturalness	Hinchinbrook Island* Curtis Island*
Coastline	1.4.3 The exceptional natural beauty of the property is associated with coastal landscapes where the rainforest meets the Great Barrier Reef.	P,WL	Estuaries Cliffs and rocky shores Beaches Rainforest Mangroves	Beauty Naturalness	Wet Tropics Coast* Cape Tribulation*

Statement of Values (RSoOUV)

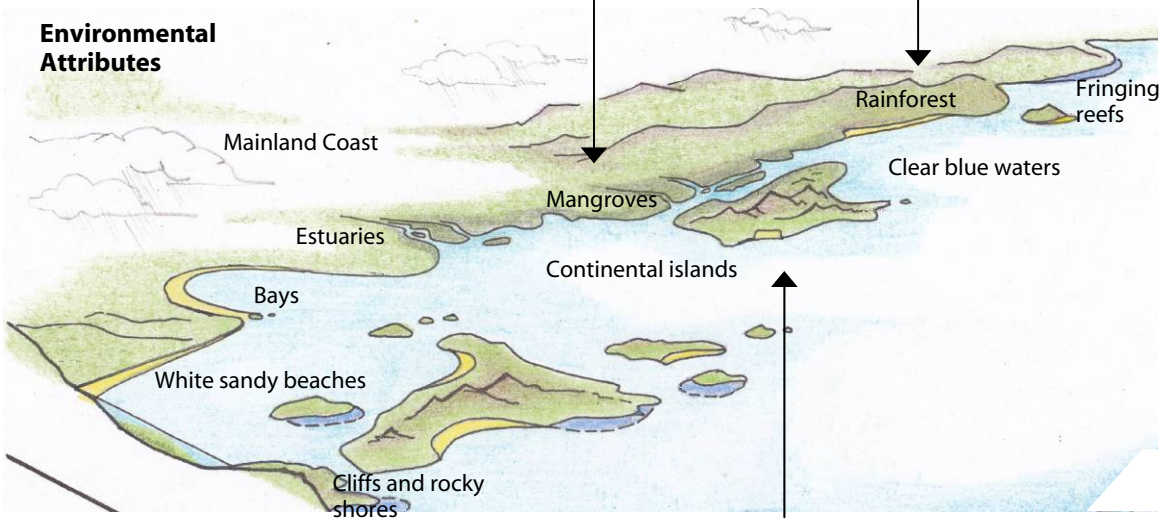
1.4 This contrasts with the vast mangrove forests in Hinchinbrook Channel, or the rugged vegetated mountains and lush rainforest gullies periodically cloud-covered on Hinchinbrook Island

1.4.2 Aesthetic Value

The exceptional natural beauty of the property is associated with the extensive mangroves, mudflats and channels of the coastal islands visible from above and from high points on the islands.

1.4.3 Aesthetic Value

The exceptional natural beauty of the property is associated with coastal landscapes where the rainforest meets the Great Barrier Reef



1.4.1 Aesthetic Value

Hinchinbrook Island exemplifies the exceptional natural beauty associated with the large mountainous and forested coastal islands that rise steeply from sand beaches to high peaks visible from above and at water level.

Experiential Attributes

Sense of beauty

Sense of naturalness

Sense of tranquility

Sense of solitude

Environmental and Experiential Attributes:
The qualities that enhance the environmental and experiential attributes labelled on the concept diagram are outlined in preceding tables 4.19 and 4.20

Retrospective Statement of Outstanding Universal Value (Criterion vii)

Criterion vii: contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance

1.7 Beneath the ocean surface, there is an abundance and diversity of shapes, sizes and colours: for example spectacular coral assemblages of hard and soft corals, and thousands of species of reef fish provide a myriad of brilliant colours, shapes and sizes.

Extent	**Extended description of OUV** (see Section 4.3 and Tables 4.15 to 4.18).	**Lens**	**Environmental Attributes**	**Experiential Attributes**	**Exemplar Places** (Places from App 3 Special Places list are shown as *)
Reef wide	1.7.1 The exceptional natural beauty and aesthetic importance of the property is associated with experiencing the complexity, colour, abundance and diversity of animals, forms and shapes of the underwater world.	BW	Coral reefs Marine animals Seagrass meadows Shoals Water	Beauty Naturalness Discovery Sense of inspiration	GBR wide
Reefscape	1.7.2 The exceptional natural beauty and aesthetic importance of the property is associated with experiencing and exploring the vivid colours and textures and patterns of expansive, diverse reefscapes through clear light illuminated water.	BW	Coral reefs Water		Ribbon Reefs* Hook & Hardy Reefs, Whitsundays* Swains Reef* Capricorn Bunker Group*
Open Water	1.7.3 The exceptional natural beauty and aesthetic importance of the property is associated with the blueness of the ocean and the effects of light creating shimmering patterns within the water or on the seabed.	BW	Coral reefs Water Lagoon floors	Solitude Remoteness	Ribbon Reefs* Hook & Hardy Reefs, Whitsundays* Swains Reef* Capricorn Bunker Group*

Statement of Values (RSoOUV)

1.7 Beneath the ocean surface, there is an abundance and diversity of shapes, sizes and colours: for example spectacular coral assemblages of hard and soft corals, and thousands of species of reef fish provide a myriad of brilliant colours, shapes and sizes.

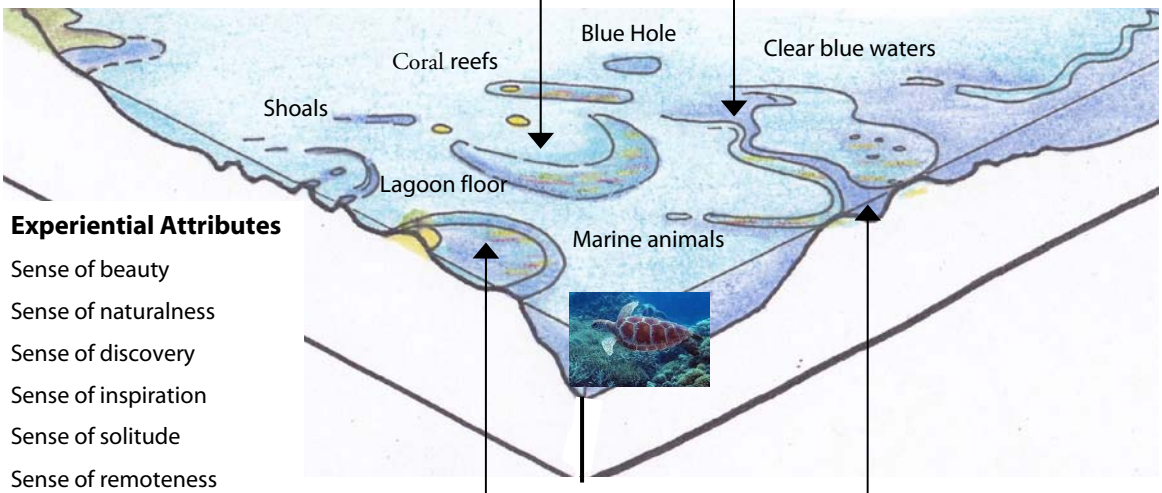
1.7.1 Aesthetic Value

The exceptional natural beauty and aesthetic importance of the property is associated with experiencing the complexity, colour, abundance and diversity of animals, forms and shapes of the underwater world.

1.7.2 Aesthetic Value

The exceptional natural beauty and aesthetic importance of the property is associated with experiencing and exploring the vivid colours and textures and patterns of expansive, diverse reefscapes through clear light illuminated water

Environmental Attributes



Experiential Attributes

Sense of beauty

Sense of naturalness

Sense of discovery

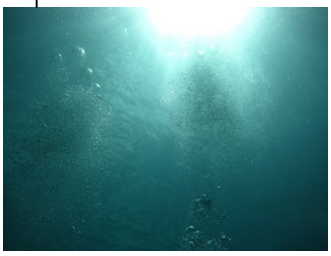
Sense of inspiration

Sense of solitude

Sense of remoteness

1.7.3 Aesthetic Value

The exceptional natural beauty and aesthetic importance of the property is associated with the blueness of the ocean and the effects of light creating shimmering patterns within the water or on the seabed.



Environmental and Experiential Attributes: The qualities that enhance the environmental and experiential attributes labelled on the concept diagram are outlined in preceding tables 4.19 and 4.20

Retrospective Statement of Outstanding Universal Value (Criterion vii)
Criterion vii: contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance

1.8 The internationally renowned Cod Hole is one of many significant tourist attractions.

Extent	Extended description of OUV (see Section 4.3 and Tables 4.15 to 4.18).	Lens	Environmental Attributes	Experiential Attributes	Exemplar Places (Places from App 3 Special Places list are shown as *)
Reef wide	1.8.1 The aesthetic importance of the property is associated with the experience of seeing, discovering and being close to an abundance and diversity of marine fauna.	WL, BW	Marine animals Water Coral reefs	Naturalness Discovery Sense of inspiration	Lizard Island* Yongala Wreck
	1.8.2 The aesthetic importance of the property is associated with encountering iconic, large and rare marine species in their natural environment.	WL, BW	Marine animals	Naturalness Discovery Sense of inspiration	

Statement of Values (RSoOUV)

1.8 The internationally renowned Cod Hole is one of many significant tourist attractions.

1.5 On many of the cays there are spectacular and globally important breeding colonies of seabirds and marine turtles and Raine Island is the world's largest green turtle breeding area.

1.6 On some continental islands, large aggregations of overwintering butterflies periodically occur.

1.9 Other superlative natural phenomena include the annual coral spawning, migrating whales, and significant spawning aggregations of many fish species.

1.8.1 Aesthetic Value

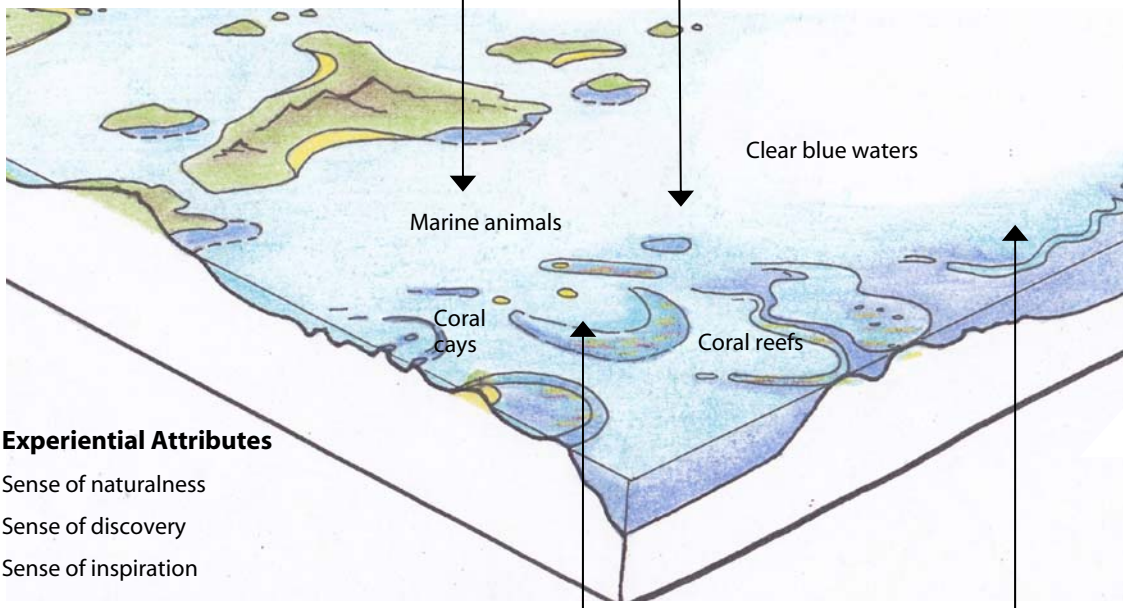
The aesthetic importance of the property is associated with the experience of seeing, discovering and being close to an abundance and diversity of marine fauna

1.8.2 Aesthetic Value

The aesthetic importance of the property is associated with encountering iconic, large and rare marine species in their natural environment

Environmental Attributes

Butterflies



Experiential Attributes

Sense of naturalness

Sense of discovery

Sense of inspiration

1.5.1 Aesthetic Value

The aesthetic importance of the property is associated with the witnessing of superlative natural phenomena including breeding colonies of turtles, aggregations of overwintering butterflies, migrating whales, annual coral spawning and spawning aggregations of fish species

Environmental and Experiential Attributes: The qualities that enhance the environmental and experiential attributes labelled on the concept diagram are outlined in preceding tables 4.19 and 4.20

Retrospective Statement of Outstanding Universal Value (Criterion vii)

Criterion vii: contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance

1.5 On many of the cays there are spectacular and globally important breeding colonies of seabirds and marine turtles and Raine Island is the world's largest green turtle breeding area

1.6 On some continental islands, large aggregations of overwintering butterflies periodically

1.9 Other superlative natural phenomena include the annual coral spawning, migrating whales, and significant spawning aggregations of many fish species.

Extent	**Extended description of OUV** (see Section 4.3 and Tables 4.15 to 4.18).	**Lens**	**Environmental Attributes**	**Experiential Attributes**	**Exemplar Places** (Places from App 3 Special Places list are shown as *)
Reef wide	1.5.1 The aesthetic importance of the property is associated with the witnessing of superlative natural phenomena including breeding colonies of turtles, aggregations of overwintering butterflies, migrating whales, annual coral spawning and spawning aggregations of fish species.	WL, BW	Birds Butterflies. Marine animals	Beauty Naturalness Discovery Sense of inspiration	Heron Island Michaelmas Cay, Green Island

5 REFINING AND APPLYING SENSITIVITY IMPACT ASSESSMENT METHOD

5.1 Introduction

Section 3 .3 describes the development of the overall methodology for assessing the impact of activities on aesthetic values and attributes, and concludes with a diagram showing the steps involved.

This section explains how the sensitivity and impact analysis method, was refined (Section 5.2) and then applied (Section 5.3).

Section 5.4 provides a worked example to illustrate the application of the tables presented in Section 5.3. Section 6 illustrates aspects of this approach through one case study.

5.2 Refining the method

The method described in Section 3.3 was refined to enable its application through a process of trialling different approaches, and progressively refining the steps.

There were a number of challenges that needed to be addressed including:

- different methodologies, terminology and definitions of activities currently in use
- availability of and unevenness of data available
- complexity of considering the sensitivity of the two types of attributes – environmental and experiential.

The refined method involves three steps, each of which has a number of components. The steps are:

1. Define the **risk** or **exposure**
2. Assess the **sensitivity**
3. Determine the **potential impact**

Each of these steps is described below.

5.2.1 Step 1: Define the risk or exposure

Risk relates to the impact or threat posed by an activity. We used the risk assessment contained in the Outlook Report (GBRMPA 2009) to define the level of risk and its geographic scale. We then applied this to a list of activities and impacts (see Section 3.3.1).

The concept of risk is discussed in Section 3.3. It involves consideration of likelihood and consequences, that is:

- likelihood - is the damaging event or activity likely to occur?
- consequences – if it occurs, how serious are the consequences?

The Outlook Report considered consequences in terms of severity, geographical extent and the timescale within which an effect is 'likely to start' (GBRMPA 2009: 168).

The Vulnerability Assessments being prepared by GBRMPA for species, groups of species and habitats uses the concept of **exposure**, but identifies that this is equivalent to **risk**. The assessment of **exposure** examines whether a species, group of species or habitat is:

- likely to be exposed to an Activity (called a 'driving factor' in the Outlook Report), and
- the likelihood and consequence of exposure to that Activity.

In the present project we have considered the potential value of these vulnerability assessments for considering impacts on environmental attributes of aesthetic value and consider that they are highly valuable.

The steps that we took were first to review the Outlook Report 'driving factors', the vulnerability assessment list of 'pressures' and the comprehensive strategic assessment list of 'activities', generally matching them through the specific 'threats' or impacts defined for each. In our analysis we have used the comprehensive strategic assessment activity categories, however it is important to recognise that we have relied on analyses and data derived from these different frameworks. Development of a consistent structure for the analysis of impacts - one that accommodates consideration of aesthetic values - is a recommendation arising from the present project.

We then matched the comprehensive strategic assessment list of 'potential impacts' (or 'threats) with the Outlook Report's risk assessment (Figure 8.1). This provided us with:

- an exposure or risk rating using a four point scale – Low, Medium, High, Very High scale
- a geographic extent – that is whole of reef, regional or local.

Where an impact or threat is not assessed in the Outlook Report, we used our professional judgement based on the information to hand. The different terminology used in the Outlook Report and comprehensive strategic assessment – vis 'threat' and 'potential impact' – offers the potential for confusion.

Figure 8.2 in the Outlook Report also indicates when the effects of a threat are likely to start using the categories 'current', 'next 1-2 years', 'next 10-20 years' and 'next 20-50 years'. This has not been included in the present project, but through the use of a consistent set of 'threat's (or activities) it would be possible to built this into an impact analysis process.

The application of these steps to an Activity can be seen in the 'Activity Analysis Tables' in Section 5.3.2 where both likelihood and consequence are documented, along with the resultant level of 'overall risk'.

A further refinement was to group the 'threats' or 'impacts' arising from the Activity to assist with identify the environmental and experiential attributes likely to be impacted. For example, within a particular Activity the threats likely to impact on species, habitats or biodiversity were grouped. In part this was a response to the detailed list of 'impacts' or threats in the comprehensive strategic assessment, particularly compared to the Outlook Report risk assessment list.

5.2.2 Step 2: Assess the sensitivity

Sensitivity relates to the nature of the attribute, and is a way of anticipating the relative effect of an activity on an attribute. Sensitivity can be considered for both environmental and experiential attributes. We adapted the sensitivity approach used in the Vulnerability Assessments, and have represented the GBRMPA sensitivity statements for **environmental attributes** in Table 5.3.

It is important to note that this set of sensitivity statements are based on the sensitivity of living organisms and may not fully address the sensitivity of attributes of the physical environment to impacts. Generally such physical features may be considered as being more robust: for example 'rocky shores and cliffs' and in other instances an impact on a physical feature such as a muddy or sandy sea bottom is likely to have biological consequences that therefore be addressed. However, it seems apparent that there will not always be a completed alignment between biological, physical and aesthetic impacts, and further work is desirable to bring the aesthetic values of environmental attributes into the Vulnerability Assessment approach.

Given this limitation, in applying the sensitivity statements for **environmental attributes**, it is suggested that the specific qualities that enhance aesthetic values (Table 4.19) should be considered. This is illustrated in the worked example in Section 5.4 and in the case studies.

A set of sensitivity statements was developed for the **experiential attributes** (Table 5.4) using a four point scale – Low, Medium, High, Very High – mirroring the statements for environmental attributes.

The next step was to identify which environmental and experiential attributes could be impacted. Our approach was to include all of the attributes that we considered may be impacted, recognising that an Activity in a specific location may in fact impact on a narrower range of attributes. The actual attributes impacted would need to be determined through an impact assessment process for a proposed Activity. The present project can only provide a framework for such an assessment.

As is illustrated in Section 5.3.2, we have framed the list of attributes potentially impacted as 'may impact on' or 'likely to impact on' to indicate to future users of the need to identify aesthetic values and attributes in relation to their study area before applying these tables.

Again mirroring the GBRMPA Vulnerability Assessment, the **experiential attribute sensitivity table** was applied to the whole of the Activity, rather than to the individual 'impacts' or 'threats'. The four point rating scale is – Low, Medium, High, Very High.

The format used is illustrated below.

Activity	**Beauty**	**Naturalness**	**Tranquillity**	**Solitude**	**Remoteness**	**Discovery**
Shipping	(level)					
Marine tourism						

As will be illustrated in the worked example in Section 5.4, it was apparent that these sensitivity statements will only represent the minimum likely sensitivity of each activity in relation to each experiential attribute. Defining the actual sensitivity level requires consideration of the actual amount of the activity. **This is an important caution,** and demonstrates the need for further development of this approach.

The application of the **environmental attribute sensitivity table** is more problematic, as the set of vulnerability assessments which will provide the foundation for this work are still being prepared by GBRMPA. Table 5.1 below shows the environmental attributes identified for aesthetic values, with those completed or planned by GBRMPA shown in blue shading. It would be valuable if vulnerability assessments could be completed for all environmental attributes.

Table 5.1: Environmental attributes and vulnerability assessments underway by GBRMPA

Environmental attribute	**Vulnerability Assessment?**	**Available?**
Reef as entity		
Coral reefs	GBRMPA vulnerability assessment for coral reefs	Soon
Continental islands	GBRMPA vulnerability assessment for islands	Soon
Beaches		
Coral cays		
Water	GBRMPA vulnerability assessment for open water	Soon
Marine animals	GBRMPA has a set of vulnerability assessments for a range of marine species and groups of species. The vulnerability assessments relevant to species present should be applied.	Some are available

Environmental attribute	Vulnerability Assessment?	Available?
Blue holes		
Lagoon floors	GBRMPA vulnerability assessment for lagoon floor	Soon
Mangroves	GBRMPA	Soon
Seagrass meadows	GBRMPA vulnerability assessment for seagrasses	Yes
Shoals		
Cliffs and rocky shores		
Bays		
Estuaries	GBRMPA vulnerability assessment for estuaries	Soon
Rainforest		
Birds	GBRMPA has a set of vulnerability assessments for a seabirds and shorebirds, and the relevant ones should be applied.	Yes
Butterflies		

5.2.3 Step 3: Determine the potential impact

The third step is to combine the two measures – **risk** (or exposure) and **sensitivity** to determine **potential impact**.

Again using the logic of the Vulnerability Assessment method, the following approach can be applied for each environmental and experiential attribute potentially affected to establish a combined rating.

Table 5.2: Combining Risk/Exposure and Sensitivity

Sensitivity		Risk or Exposure			
		L	**M**	**H**	**VH**
	L	L	L-M	M	M-H
	M	L-M	M	M-H	H
	H	M	M-H	H	H-VH
	VH	M-H	H	H-VH	VH

Environmental sensitivity statements

In considering the environmental attributes, we have adopted the GBRMPA sensitivity statements used in the vulnerability assessments of species, groups of species and habitats. These statements consider the extent of exposure, and the impacts on mortality, ecosystem services, disturbance, habitat, food source and population growth consequences. As noted above, they do not reflect morphological changes to land and water forms.

Table 5.3 below shows the GBRMPA sensitivity statements modified so that the factor is shown in the left hand column and explained in column 2.

Table 5.3: Environmental attributes: Sensitivity statements

	Factor	Low	Medium	High	Very high
Exposure	*Exposure to the source of the pressure across range of species, group of species, habitat*	Species rarely interacts with or is exposed to the source of pressure	Species is exposed to source of pressure across <30% of its range/distribution	Species exposed to source of pressure between 30% and 50% of its range/distribution	Species exposed to source of pressure over >50% of its range/distribution
Mortality & Ecosystem services	*Mortality of individuals or disruption to ecosystem services*	Interaction with source of pressure is unlikely to cause mortality of individuals or disrupt ecosystem services provided by the species	Exposure to the pressure is known to cause mortality or disrupt ecosystem services provided over the short-term	Exposure to the pressure usually results in mortality of the individual or affects their health to such a degree that the risk of mortality from other sources (such as parasites or disease) is increased or reduces the ecosystem services provided over the long-term	Exposure to the pressure is almost certain to result in the mortality of the individual or removes the ecosystem services provided by the species or habitat permanently
Reproduction	*Reproductive potential*	Exposure to the pressure will not impact on the reproductive potential of individuals	Exposure to the pressure impacts the species to such a degree that it may occasionally be displaced from critical habitat and/or disturbed to the level that access to forage or prey species is interrupted which could lead to an impact on the fitness and/or reproductive potential of the individual, which has the	Exposure to the pressure impacts the species to such a degree that it is regularly displaced from critical habitat and/or disturbed to the level that access to forage or prey species is disrupted which leads to an impact on the fitness and/or reproductive potential at the community-level	Exposure to the pressure impacts the species to such a degree that it is permanently displaced from critical habitat and/or disturbed to the level that they are denied access to forage or prey species which leads to an impact on the fitness and/or reproductive potential at
Displacement Disturbance	*Displacement or disturbance*	Exposure to the pressure will cause minimal displacement or disturbance			

	Factor	Low	Medium	High	Very high
			potential to lead to community-level impact in the long-term		the population-level
Habitat or prey	*Critical habitat or prey*	Exposure to the pressure will not impact on critical habitat or prey that the species relies upon			Exposure to the pressure directly removes resources (critical habitat) that the species relies upon (e.g. loss of seagrasses due to reclamation)
Population growth	*Population growth or decline*	Current knowledge indicates that exposure to this pressure will have no impact on population growth	Exposure to the pressure is unlikely to contribute to population decline through direct impacts on the species itself or indirect impacts on critical/sensitive habitats upon which this species relies	Exposure to the pressure is likely to contribute to a population decline through direct impacts on the species itself or indirect impacts on critical/sensitive habitats upon which this species relies	The impact of this pressure will almost certainly cause population decline through direct impacts on the species itself or indirect impacts on critical/sensitive habitats upon which the species relies

Experiential sensitivity statements

In relation to experiential attributes, the factors considered are drawn from the Table 3.2. In developing these sensitivity statements, reference was made to the physical setting and the social setting attribute guidelines for WALROS (2009: 38-41).

Table 5.4: Experiential attributes: Sensitivity statements

	Factor	Low	Medium	High	Very high
Exposure	*Frequency of exposure to the activity*	Not exposed or rarely exposed	Occasionally exposed or exposed in key visitor locations	Frequently exposed	Always exposed
Beauty	*Visually and sensually pleasing in terms of colour, form, pattern, movement (etc).*	No intrusions or minimal disruptions in the visual environment	Occasional or small or background intrusions in the visual environment	Frequent small intrusions or occasional larger middle ground intrusions in the visual environment	Frequency, large-scale middle and foreground intrusions in the visual environment
Naturalness	*Absence of human modification including changes to land and water forms, species disturbance, visible impacts, conflicting land uses*	Absence of human modifications	Occasional evidence of modifications	Frequent evidence of modifications	Highly modified environment
Tranquillity	*Degree that natural ambience dominates: extent to which a sense of tranquillity is conveyed through nature. Absence of intrusive or discordant sounds, smells and sights*	Absence of intrusions or very minor or short-term intrusions	Occasional intrusions	Frequent intrusions	Constant intrusions
Solitude	*Absence of people (and their paraphernalia) other than one's companions*	Complete absence of others and no evidence of visitors impacts	Occasional evidence of others, but not intrusive	Other people often there, and may be evidence of visitors too (rubbish, equipment)	Always other people often there along with evidence of visitors too (rubbish, equipment)
Remoteness	*Absence of or distance from settlement, permanent*	Absence of settlement, structures and infrastructure	Occasional evidence of or sense of nearby settlement,	Frequent evidence of settlement, structures and	Evidence of settlement, structures and

	Factor	Low	Medium	High	Very high
	structures or infrastructure, and evidence of human presence	and human presence	structures and infrastructure or occasional human presence	infrastructure or frequent human presence	infrastructure and human presence dominates
Discovery	*Opportunities explore, discover and encounter other species*	Absence of curtailment (on the ability to explore, discover, encounter)	Occasional limits on the ability to explore, discover, encounter including limited species presence	Frequent limits on the ability to explore, discover, encounter including limited species presence	Highly constrained ability to explore, discover, encounter with limited availability of other species
Inspirational	*Profound emotional response to being in a place*	Powerful or unique qualities of the places are not interrupted or intruded upon.	Small intrusions causing some interruption to or disturbance of the powerful or unique qualities of the place.	Frequent and intrusive interruptions to or disturbances of the powerful or unique qualities of the place.	Severe intrusion on or destruction of the powerful or unique qualities of the place.

5.3 Applying the method

5.3.1 Activities

The following Activities, which include those being assessed through the Strategic Assessment are considered in this section. Each is considered in relation to Risk in 5.3.2, Sensitivity in 5.3.3.and Potential Impact in 5.3.4.

- Climate change/Extreme weather
- Marine tourism (resorts, marinas, cruise ships and reef-based)
- Shipping
- Commercial fishing
- Recreational fishing
- Recreation (other than fishing)
- Agriculture
- Traditional use of marine resources
- Urban development
- Industrial development (including ports)
- Scientific studies
- Defence
- Aquaculture
- Shark Control Program.

5.3.2 Assessing risk

The analysis below draws information from the Outlook Report and its analysis of risk. Where the project team have made a judgement about likelihood, consequence and resultant risk, this is indicated in blue text and with an asterisk. Generally was done by estimating the likely risk drawing on similar activity/ impacts.

Where it was not possible to estimate the risk, this is shown in brown text as 'not known' and with a double asterisk.

Climate change & extreme weather

Description

Climate change is a significant pressure on the GBR. The extent and speed of climate change can be expected to alter the relative impact of all other Activities. It is therefore considered first; however, it has not been factored into the other Activities.

Climate change is expected to have many impacts on the GBR. The GBR's more than 900 islands – continental islands, sand and coral cays – will be impacted by sea level rise for example. Sea temperature rises can cause a range of effects: fish distributions will change with sea temperature rises, with resultant impacts on seabirds for example. Corals are sensitive to temperature change, and coral bleaching is one consequence (29). Some animal and plant diseases may change in severity or distribution as a result of sea temperature increase (GBRMPA 2009:12, 51).

Cyclones are a natural phenomena that have significant impacts on the GBR; with climate change cyclone activity may change as a result, but the nature of that change cannot as yet be predicted. Similarly, storms create substantial freshwater flows into the reef lagoons, and often carry large sediments loads; with climate change, if storms increase in frequency, the freshwater flows may impact ocean salinity, creating localised impacts (GBRMPA 2009: 40,45).

The Outlook Report assessed the vulnerability of species and habitats to climate change impacts, noting that corals and reef habitats as the most vulnerable, followed by seabirds, fish, marine reptiles, and plankton. Marine mammals, coastal habitats, open water and seabed habitats were considered relatively less vulnerable (GBRMPA 2009: 97).

Risk

Based on the analysis table below, the overall Risk associated with Climate Change ranges from **Very High** to **Medium**, with some aspects of climate change potentially impacting the **whole GBR**, and the consequences assessed as **Catastrophic.**

The primary impacts on experiential attributes are considered to be on **beauty** and **naturalness** based on a perception that both aspects have been or will be diminished by climate change. The opportunities to experience interactions with marine animals (**discovery**) may alter through increases in extreme weather and changes to marine animal locations and migration patterns. The experiential attribute of **inspiration** could also be significantly impacted should substantial impact on the GBR result.

Table 5.5: Climate Change & Extreme Weather Activity Analysis Table

Legend Black text: analysis based on the analysis of risk presented in the Outlook Report

Blue text: project team have made a judgement about likelihood, consequence and resultant risk. This was done by estimating the likely risk drawing on similar activity/ impacts.

Brown text: indicates that the project team was not able to estimate the risk; this is shown in as 'not known' and with a double asterisk.

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	**Overall**			
CLIMATE CHANGE/EXTREME WEATHER							
Ocean acidification	Impact on species, habitat, biodiversity	Almost certain	Catastrophic	**Very High**	Reef Wide	May impact on: Reef as entity Expect to impact on all attributes to some extent: Coral reefs Coral cays Water Birds Marine animals: fish	Likely to impact on: Beauty Naturalness Inspiration
Rising sea level		Likely	Catastrophic	**Very High**	Reef Wide		
Increased air and sea temperature		Almost certain	Catastrophic	**Very High**	Reef Wide		
Altered ocean currents (connectivity ramifications for larvae and food sources)		Unlikely	Major	**Medium**	Reef Wide		
UVB increase		Not known**	Not known**	**Not known****	Not known**		
Increasing variability (rainfall)_altered salinity/conductivity		Not known**	Not known**	**Not known****	Not known**		
Climate change induced alteration of terrestrial ecosystems/habitats		Not known**	Not known**	**Not known****	Not known**		
Climate change induced altered cyclone activity	Impact on a physical features: reef, lagoon	Possible	Moderate	**Medium**	Local	Expect to impact on all attributes to some extent: Coral reefs Coral cays	Likely to impact on: Beauty Naturalness
Changes to erosion and deposition of sand cays	Impact on species, habitat, biodiversity	Likely	Major	**High**	Reef Wide		
Climate change induced flood		Almost	Moderate	**High**	Reef Wide		

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	**Overall**			
events		certain				Water Lagoon floors Seagrass meadows	

Marine tourism

Description

Marine tourism is a diverse activity and includes resorts, marinas, cruise ships and reef-based activities. Marine tourism is primarily focused around a relatively small area of the GBR, predominantly in the Cairns region, although there are other smaller hubs of activity.

Marine tourism does not include water-based recreation undertaken predominantly by local people; also many return visitors to the region may not engage in 'marine tourism' activities as much as first time visitors. The research into visitor perceptions reported previously indicates that there is a difference in the activities undertaken between first time and repeat visitors.

The Outlook Report identifies that marine tourism is focused on into specific locations with 80% of activity occurring on about 7% of the reef; management initiatives and supervision has proven effective in reducing impacts of marine tourism (GBRMPA 2009: 64).

Climate change is expected to impact all aspects of this Activity through consequences such as the degradation of coral reefs due to coral bleaching, poorer recovery from impacts, and more extreme weather (GBRMPA 2009:98).

Risk

Based on the analysis table below, the overall Risk for the Activity of Marine Tourism is **High** to **Medium**, and the potential extent of impacts varies in scale from Local to Regional, but is primarily **Local**, especially given the intense focus of marine tourism into a small number of areas. However, the overall consequence of marine tourism impacts are **minor**, with the most significant impacts associated with development activities involving land/marine reclamation. The experiential attributes of **beauty** and **naturalness** can potentially be impacted, and the attributes of **tranquillity, solitude** , **remoteness** and **discovery** can be impacted through increasing intensity of use.

Table 5.6: Marine Tourism Activity Analysis Table

Legend Black text: analysis based on the analysis of risk presented in the Outlook Report

Blue text: project team have made a judgement about likelihood, consequence and resultant risk. This was done by estimating the likely risk drawing on similar activity/ impacts.

Brown text: indicates that the project team was not able to estimate the risk; this is shown in as 'not known' and with a double asterisk.

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	**Overall**			
MARINE TOURISM							
Vessel strike on marine species	Impact on species, habitat, biodiversity	Likely	Minor	**Medium**	Local	May impact on: Marine animals Coral reefs Coral cays Water	Likely to impact on: Naturalness
Wildlife harassment e.g. night photography		Almost certain*	Minor*	**Low***	Local*		
Habituation		Almost certain*	Minor*	**Low***	Local*		
Introduction of exotic species and diseases through hull fouling		Possible	Moderate	**Medium**	Regional		
Introduction of exotic species and diseases through vessel ballast water discharge		Possible	Moderate	**Medium**	Regional		
Oil and chemical spills	Impacts on species, habitat, biodiversity. Environmental contamination.	Unlikely	Major	**Medium**	Regional	May impact on all of the following: Coral reefs Beaches Coral cays Water Marine animals Mangroves	Likely to impact on: Beauty Naturalness
Vessel-based waste discharge (including litter and sewage)		Almost certain	Minor	**Medium**	Local		
Grounding of large vessels - antifouling contamination		Possible	Moderate	**Medium**	Local		
Dredging - resuspension of dredge spoil		Likely	Minor	**Medium**	Local		
Dredging - habitat disturbance		Likely	Minor	**Medium**	Local		
Dredging - spoil disposal (smothering)		Likely	Minor	**Medium**	Local		

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	**Overall**			
MARINE TOURISM							
Land-based waste discharge (including litter and sewage)		Likely*	Minor*	**Low***	Local*		
Grounding of large vessels - direct physical damage	Impact on a physical feature: reef, lagoon floor etc	Possible	Moderate	**Medium**	Local	May impact on all of the following: Coral reefs Coral cays Blue holes Lagoon floors Seagrass meadows Shoals	Likely to impact on: Beauty Naturalness
Anchor damage		Almost certain	Minor	**Medium**	Local		
Cumulative use at popular sites	Impacts on human experience Impact on species, habitat, biodiversity	Almost certain*	Minor*	**Medium***	Local*	May impact on all of the following: Marine animals Coral reefs Coral cays Blue holes Continental islands Beaches Nesting shorebirds Turtles	Likely to impact on: Beauty Naturalness Tranquillity Solitude Remoteness Discovery
Diving and snorkelling activity		Almost certain	Insignificant	**Low**	Local		
Trampling/recreational vehicle use		Almost certain*	Minor*	**Medium***	Local*		
Coastal infrastructure including island resorts and marinas	Impact on a physical environment and habitats	Almost certain*	Moderate*	**High***	Local*	May impact on all of the following: Beaches	Likely to impact on: Beauty Naturalness
Clearing or modifying coastal habitats - mangroves, wetlands		Almost certain	Moderate	**High**	Regional		

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	**Overall**			
MARINE TOURISM							
Marine reclamation (same as land reclamation/clearing)		Almost certain	Moderate	**High**	Regional	Water Lagoon floors Mangroves Seagrass meadows Shoals Cliffs and rocky shores Bays Estuaries	

Shipping

Description

Shipping refers to the movement and anchoring of large vessels within the GBR. The Outlook Report (2009) and the comprehensive strategic assessment 'Terms for Activities, Pressures and Impacts' (August 2012) have identified that shipping as an activity could potentially have a range of impacts.

Shipping is also closely associated with ports and industry; these are considered separately below. Shipping movements through the GBR are reported to be gradually increasing, in response to industrial and mining development (GBRMPA 2009: 75). While the potential for shipping to have a major impact, especially through groundings and oil or chemical spills, most ships travel safely through the GBR and incidents are relatively few. Other potential impacts include introduction of species for elsewhere, although to date this is mainly in port areas (GBRMPA 2009: 76).

These impacts can be grouped based on the nature of the impact. Some will impact on environmental attributes, some on experiential attributes, and some on both. The actual impacts will depend on the location and amount of the activity. For example, the location will determine which environmental and experiential attributes are present and may be affected, and the amount of the activity may cause an increase in the sensitivity (as indicated in Tables 5.3 and 5.4).

Climate change is expected to impact shipping through consequences such as rising sea levels impacting on infrastructure and more extreme weather impacting on safety and costs (GBRMPA 2009:98).

Risk

Based on the analysis table below, the overall Risk for the Activity of Shipping is **Medium**, and the potential extent of impacts varies in scale from Local to Regional, but is primarily **Local**. Shipping may result in a range of mainly indirect impacts on a range of the environmental attributes – habitats and species – which together reflect a significant array of aesthetic values. The experiential attributes of **beauty** and **naturalness** would be equally impacted. The experiential attributes of **tranquillity, solitude** and **remoteness** would be impacted by the presence of ships, especially through noise, lights at night, the number of ships present at any one time and the overall daily number of ships present or in transit.

Table 5.7: Shipping Activity Analysis Table

Legend Black text: analysis based on the analysis of risk presented in the Outlook Report

Blue text: project team have made a judgement about likelihood, consequence and resultant risk. This was done by estimating the likely risk drawing on similar activity/ impacts.

Brown text: indicates that the project team was not able to estimate the risk; this is shown in as 'not known' and with a double asterisk.

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	**Overall**			
SHIPPING							
Grounding of large vessels - antifouling contamination	Impact on species, habitat, biodiversity	Possible	Moderate	**Medium**	Local	May impact on all of the following: Coral reefs Coral cays Water Marine animals Mangroves Seagrass meadows	Likely to impact on: Beauty Naturalness
Introduction of exotic species and diseases through vessel ballast water discharge		Possible	Moderate	**Medium**	Regional		
Introduction of exotic species and diseases through hull fouling		Possible	Moderate	**Medium**	Regional		
Vessel strike (on marine animals)		Likely	Minor	**Medium**	Local		
Oil and chemical spill	Impacts on species, habitat, biodiversity. Environmental contamination.	Unlikely	Major	**Medium**	Regional	May impact on all of the following: Coral reefs	Likely to impact on: Beauty Naturalness
Coal dust impacts derived from transportation		Not known**	Not known**	**Not known****	Not known**		
Vessel-based waste discharge		Almost	Minor	**Medium**	Local		

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	Overall			
(including litter and sewage)		certain				Beaches Coral cays Water Marine animals Mangroves Estuaries Birds	
Grounding of large vessels - direct physical damage	Impact on a physical features: reef, lagoon floor etc	Possible	Moderate	**Medium**	Local	May impact on all of the following: Coral reefs Coral cays Blue holes Lagoon floors Seagrass meadows Shoals	Likely to impact on: Beauty Naturalness
Anchor damage		Almost certain	Minor	**Medium**	Local		
Light impacts	Impact on human experience. Impact on light-sensitive marine species	Almost certain*	Minor*	**Medium***	Local*	May impact on: Marine animals	Likely to impact on: Naturalness Tranquillity Solitude Remoteness
Vessels at anchor (waiting for berth)	Impact on human experience. Impact on noise sensitive marine species	Almost certain*	Moderate*	**Medium***	Local*	May impact on: Marine animals	Likely to impact on: Naturalness Tranquillity Solitude Remoteness
Noise pollution		Almost certain*	Moderate*	**Medium***	Local*		

Commercial fishing

Description

Commercial fishing is a significant activity in the GBR with 10 major commercial fisheries and the target species reported in 2009. It is a highly managed activity, but many consequences of the activity are poorly understood still. Many targeted species are either top-order predators (sharks) or other smaller predator species. Some species are under pressure from over-fishing, and some species are caught unintentionally, including iconic species such as turtles. Habitat impacts are considered to be low (GBRMPA 2009: 68-70, 72-73).

Climate change is expected to impact significantly on this Activity through changing distribution of species (possibly offering new opportunities as well as restrictions), more extreme weather, impacts of coral reef habitats, and disruptions to shallow-water nursery grounds (GBRMPA 2009:98).

Risk

Based on the analysis table below, the overall Risk for the Activity of Commercial Fishing ranges from **Very High** to **Medium**, and the potential extent of impacts varies in scale from **Local** to **Reef Wide**. Both ratings indicate the diversity of potential impacts, based on the species impacted, with greatest concern being impacts on top-order predators and species that are unintended bycatch, especially where these specific are already under pressure.

The experiential attributes of **beauty, naturalness** and **discovery** are the most likely to be impacted. The most significant impacts on experience appears to be the catching of larger, less common and iconic marine animals and impacts on the abundance of coral reef species. Other possible impacts may result from the presence of and noise associated with large fishing vessels impacting on **solitude** and **tranquillity**.

Table 5.8: Commercial Fishing Activity Analysis Table

Legend Black text: analysis based on the analysis of risk presented in the Outlook Report

Blue text: project team have made a judgement about likelihood, consequence and resultant risk. This was done by estimating the likely risk drawing on similar activity/ impacts.

Brown text: indicates that the project team was not able to estimate the risk; this is shown in as 'not known' and with a double asterisk.

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	**Overall**			
COMMERCIAL FISHING							
Death of discarded catch	Impacts on species, habitat, biodiversity.	Almost certain	Moderate	**High**	Regional	May impact on all of the following: Marine animals	Likely to impact on: Beauty
Extraction of detritivores (e.g.		Almost	Minor	**Medium**	Regional		

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	Overall			
sea cucumbers)		certain					Naturalness Discovery
Extraction of filter feeders (e.g. scallops)		Almost certain	Minor	**Medium**	Local		
Extraction of lower order predators (e.g. coral trout)		Almost certain	Minor	**Medium**	Regional		
Extraction of top order predators (e.g. sharks)		Almost certain	Major	**Very High**	Reef Wide		
Extraction of herbivorous fish		Unlikely	Major	**Medium**	Regional		
Fishing in unprotected fish spawning aggregations		Likely	Moderate	**High**	Regional		
Illegal fishing or collecting		Almost certain	Moderate	**High**	Reef Wide		
Introduction of exotic species and diseases through use of imported bait		Unlikely	Moderate	**Low**	Regional		
Incidental catch (death of)		Almost certain	Moderate	**High**	Regional		
Boat strike (on marine species)		Likely	Minor	**Medium**	Local		
Removal of COTs predators		Possible	Major	**High**	Regional		
Poaching and illegal harvest		Likely	Moderate	**High**	Local		
Lost or discarded fishing equipment (marine debris)	Environmental contamination. Human perception	Likely	Moderate	**High**	Regional	May impact on all of the following: Marine animals Coral reefs	Likely to impact on: Beauty Naturalness Discovery Solitude Tranquilllity
Vessel-based waste discharge (including litter and sewage)		Almost certain	Minor	**Medium**	Local		
Grounding of large vessels - antifouling paint contamination		Possible	Moderate	**Medium**	Local		
Noise associated with vessels		Almost certain	Moderate	**Medium**	Local		
Anchor damage	Impact on a physical	Almost	Minor	**Medium**	Local	May impact on all of	Likely to impact on:

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	**Overall**			
	features: reef, lagoon floor etc	certain				the following: Coral reefs Lagoon floors Seagrass meadows Shoals Marine animals	Beauty Naturalness
Physical impacts of fishing (e.g trawling)		Almost certain	Minor	**Medium**	Regional		
Grounding of small vessels - direct physical damage		Likely	Insignificant	**Low**	Local		
Grounding of large vessels - direct physical damage		Possible	Moderate	**Medium**	Local		

Recreational fishing

Description

Recreational fishing is an important activity across the GBR region, although the percentage of people participating has been declining and the total amount of catch is difficult to estimate. Visitors to the GBR also participate in recreational fishing, and fishing is a valued pastime, enabling people to experience nature and appreciate land and water settings (GBRMPA 2009:68, 72).

Climate change is expected to impact on this Activity as indicated above in relation to commercial fishing

Risk

Based on the analysis table below, the overall Risk for the Activity of Recreational Fishing is probably **Medium**, although a lot of variation in the ratings is indicated in the table, and the extent of impact is probably **Local**, recognising the dispersed nature of the activity and its localisation around population centres.

The potential impact on the experiential attributes is on **naturalness** and **discovery,** if there is a significant impact on fish stocks. There may also be an impact on **solitude** and **tranquillity** associated with the noise of small boats.

Table 5.9: Recreational Fishing Activity Analysis Table

Legend Black text: analysis based on the analysis of risk presented in the Outlook Report

Blue text: project team have made a judgement about likelihood, consequence and resultant risk. This was done by estimating the likely risk drawing on similar activity/ impacts.

Brown text: indicates that the project team was not able to estimate the risk; this is shown in as 'not known' and with a double asterisk.

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	Overall			
RECREATIONAL FISHING							
Extraction of lower order predators (e.g. coral trout)	Impacts on species, habitat, biodiversity.	Almost certain	Minor	**Medium**	Regional	May impact on all of the following: Marine animals	Likely to impact on: Beauty Naturalness Discovery
Extraction of top order predators (e.g. sharks)		Almost certain	Major	**Very High**	Reef Wide		
Introduction of exotic species and diseases through use of imported bait		Unlikely	Moderate	**Low**	Regional		
Extraction of herbivorous fish		Unlikely	Major	**Medium**	Regional		
Fishing in unprotected fish spawning aggregations		Likely	Moderate	**High**	Regional		
Death of discarded or incidental catch		Almost certain	Moderate	**High**	Regional		
Illegal fishing or collecting		Almost certain	Moderate	**High**	Reef Wide		
Boat strike (on marine species)		Likely	Minor	**Medium**	Local		
Removal of COTs predators		Possible	Major	**High**	Regional		
Waste discharge from a vessel (including litter and sewage)	Environmental contamination Human perception	Almost certain	Minor	**Medium**	Local	May impact on all of the following: Marine animals Coral reefs	Likely to impact on: Tranquillity Solitude
Lost or discarded fishing equipment (marine debris)		Likely	Moderate	**High**	Regional		
Noise associated with vessels		Almost certain	Moderate	**Medium**	Local		
Anchor damage by small vessels	Impact on a physical features: reef, lagoon	Almost certain	Minor	**Medium**	Local	May impact on:	Likely to impact on:

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	**Overall**			
Grounding of small vessels	floor etc	Likely	Insignificant	**Low**	Local	Coral reefs	Beauty Naturalness
Trampling/recreational vehicle use		Almost certain*	Minor*	**Medium***	Local*		

Recreation

Description

Recreation includes all other forms of recreation other than fishing: examples include swimming, boating and sailing, snorkelling and diving. These activities are enjoyed by visitors and locals alike. The impacts associated with recreation use are likely to be in the in-shore areas closest to population centres and can include anchor damage to corals and seagrass meadows, boat strikes on marine mammals, littering and potentially the introduction of marine pests (GBRMPA 2009: 78-79).

Climate change is expected to impact significantly on all aspects of marine and coastal recreation through changes to ecosystems/habitats, infrastructure, and weather.

Risk

Based on the analysis table below, the overall Risk for the Activity of Recreation is probably **Medium** and the extent of impact is probably **Local**, recognising the localisation of this activity around population centres. The potential impact on the experiential attributes is on **naturalness, solitude** and **tranquillity** associated with areas where there is a high level of recreation activity.

Table 5.10: Recreation Activity Analysis Table

Legend

Black text: analysis based on the analysis of risk presented in the Outlook Report

Blue text: project team have made a judgement about likelihood, consequence and resultant risk. This was done by estimating the likely risk drawing on similar activity/ impacts.

Brown text: indicates that the project team was not able to estimate the risk; this is shown in as 'not known' and with a double asterisk.

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	Overall			
RECREATION (E.G. SAILING, PWCS)							
Snorkelling and diving activities	Impacts on human experience Impact on species, habitat, biodiversity	Almost certain	Insignificant	**Low**	Local	May impact on: Coral reefs Marine animals	May impact on: Naturalness Solitude Tranquillity
Trampling/recreational vehicle use		Almost certain*	Minor*	**Medium***	Local*		
Cumulative use at popular sites		Almost certain*	Minor*	**Medium***	Local*		
Vessel-based waste discharge (including litter and sewage)	Environmental contamination	Almost certain	Minor	**Medium**	Local	May impact on: Marine animals	May impact on: Naturalness
Marine debris		Likely	Moderate	**High**	Local		

Agriculture

Description

A wide variety of agricultural activities occur throughout the GBR region, some intensive and others such as grazing and forestry at a lower level of intensity. All forms of agriculture may result in nutrient run-off, raising the levels above that naturally flowing to the reef ecosystems. Increased sediment loads are also a consequence of agriculture, particularly as a result of the clearing of native forests and likewise pesticides, herbicides and other chemicals associated with agriculture can be transported into the GBR.

Climate change will impact agriculture everywhere. The consequences in the GBR region could include increased sediment, chemical and pesticide loads washing into the in-shore areas.

Risk

Based on the analysis table below, the overall Risk for the Activity of Agriculture is **High** to **Very High** and the potential extent of impacts is **Reef Wide** to **Regional**. The main impact on the experiential attributes is on **naturalness.**

Table 5.11: Agriculture Activity Analysis Table

Legend Black text: analysis based on the analysis of risk presented in the Outlook Report

Blue text: project team have made a judgement about likelihood, consequence and resultant risk. This was done by estimating the likely risk drawing on similar activity/ impacts.

Brown text: indicates that the project team was not able to estimate the risk; this is shown in as 'not known' and with a double asterisk.

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	Overall			
AGRICULTURE							
Sediment in catchment runoff	Impacts on species, habitat, biodiversity.	Almost certain	Moderate	**High**	Reef Wide	May impact on all of the following: Water Lagoon floors Mangroves Seagrass meadows Shoals Bays Estuaries	Likely to impact on: Naturalness
Nutrients from catchment runoff		Almost certain	Major	**Very High**	Reef Wide		
Pesticides (incl herbicides) from catchment runoff		Almost certain	Major	**Very High**	Regional		
Introduction of pests- weeds and feral animals		Not known**	Not known**	**Not known****	Not known**		
Surface water harvesting		Not known**	Not known**	**Not known****	Not known**		
Artificial barriers to water and estuarine flow (e.g. breakwalls, weirs, dams, gates)	Impact on a physical features: reef, lagoon floor etc	Almost certain	Minor	**Medium**	Regional	May impact on all of the following: Water Lagoon floors Mangroves Seagrass meadows Shoals Bays Estuaries	Likely to impact on: Naturalness

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	**Overall**			
Land reclamation/clearing	Impacts on species, habitat, biodiversity. Impact on a physical features: reef, lagoon floor etc	Almost certain	Moderate	**High**	Regional	May impact on all of the following: Lagoon floors Mangroves Seagrass meadows Estuaries Marine animals	Likely to impact on: Naturalness Beauty
Fire - altered regime	Impact on land only?	Not known**	Not known**	**Not known****	Not known**	No impacts on the GBR's environmental attributes?	No impacts on the GBR's experiential attributes?
Ponded pastures		Not known**	Not known**	**Not known****	Not known**		
Altered salinity		Not known**	Not known**	**Not known****	Not known**		

Traditional use of marine resources

Description

Traditional owner groups have long and enduring economic, cultural and spiritual connections to the land and sea country of the GBR. Traditional owners value and use a range of marine resources, including some of the GBR's iconic species. There are also many places in the GBR that are of cultural and spiritual importance. The Outlook Report considers that the level of take is low, but that some species are still highly vulnerable because of other pressures: examples include turtles and dugong.

Traditional owners are concerned about the impacts of climate change on seasonality of species availability and potential impacts on totemic species (GBRMPA 2009:98).

Risk

Overall the scale of this activity is small and dispersed, so while the risk varies from **Low** to **High**, the level of consequence is generally low to insignificant. A level of **Medium** risk is proposed based on the actual activity of traditional hunting. There is unlikely to be any impact on experiential attributes except where there are significant impacts on iconic species.

Table 5.12: Traditional Use of Marine Resources Activity Analysis Table

Legend Black text: analysis based on the analysis of risk presented in the Outlook Report

Blue text: project team have made a judgement about likelihood, consequence and resultant risk. This was done by estimating the likely risk drawing on similar activity/ impacts.

Brown text: indicates that the project team was not able to estimate the risk; this is shown in as 'not known' and with a double asterisk.

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	Overall			
TRADITIONAL USE OF MARINE RESOURCES							
Illegal poaching and harvesting	Impacts on species, habitat, biodiversity.	Likely	Moderate	**High**	Local	May impact on: Marine animals	Likely to impact on: Naturalness Discovery
Traditional hunting		Likely	Minor	**Medium**	Local		
Death of discarded catch		Almost certain	Moderate	**High**	Regional		
Vessel-based waste discharge (including litter and sewage)	Environmental contamination	Almost certain	Minor	**Medium**	Local	May impact on the following: Beaches Estuaries Lagoon floors Seagrass meadows	Likely to impact on: Naturalness
Grounding of small vessels	Impact on a physical features: reef, lagoon floor etc	Likely	Insignificant	**Low**	Local	May impact on the following: Coral reefs Seagrass meadows	Likely to impact on: Naturalness
Anchor damage by small vessels		Almost certain	Minor	**Medium**	Local		

Urban development

Description

Coastal development is described in the Outlook Report as including 'all development activities such as rural land use, mining and industry, population growth, urban infrastructure and port development'. Coastal development is one of three external significant factors influencing the environmental, social and economic values of the GBR - the others are climate change and catchment run-off. The impacts associated with coastal development is equally expansive in scope ranging from destruction of coastal and in-shore habitats to allow development, catchment run-off, water quality, impacts on marine species through a pollution (chemical, light, noise etc) (GBRMPA 2009: 99-105).

In the comprehensive strategic assessment urban development and industrial development and ports have been separated into distinct activities.

Urban development – meaning towns, cities, residential areas, urban infrastructure – is increasing along the GBR coast. There are four large population centres and many smaller ones. The Outlook Report identifies mining and industrial development as driving population growth in the region (GBRMPA 2009: 101).

Urban development can have a range of impacts: degrading and fragmenting coastal ecosystems, and creating pollution (litter, nutrients, noise and light). As well, population growth will progressively increase the number of people living next to the GBR and recreating there, increasing some risks for marine species and possibly leading to overcrowding at popular recreation locations. The primary impacts are likely to be on in-shore environments.

Climate change is expected to impact significantly on this Activity, particularly through sea level rise and the potential for more extreme weather events. Urban development locations may be constrained by the anticipated impacts of climate change.

Risk

Based on the analysis table below, the overall Risk for the Activity of Urban Development appears to be **High** for coastal and in-shore ecosystems, but probably **Medium** for the balance of the GBR. The potential extent of impacts varies in scale from **Local** to **Regional**, primarily Local.

The experiential attributes of **beauty** and **naturalness** appear to be the most impacted, along with **tranquillity, solitude** and **remoteness** in some locations and as a result of some activities.

Table 5.13: Urban Development Activity Analysis Table

Legend

Black text: analysis based on the analysis of risk presented in the Outlook Report

Blue text: project team have made a judgement about likelihood, consequence and resultant risk. This was done by estimating the likely risk drawing on similar activity/ impacts.

Brown text: indicates that the project team was not able to estimate the risk; this is shown in as 'not known' and with a double asterisk.

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	**Overall**			
URBAN DEVELOPMENT							
Clearing or modifying coastal habitats - mangroves, wetlands	Impacts on species, habitat, biodiversity.	Almost certain	Moderate	**High**	Regional	May impact on the following: Beaches Water Mangroves Seagrass meadows Bays Estuaries Marine animals	Likely to impact on: Beauty Naturalness
Wildlife disturbance - including domestic animals (terrestrial?)		Not known**	Not known**	**Not known**	Not known**		
Introduction of pest species - weeds and feral animals (terrestrial?)		Not known**	Not known**	**Not known****	Not known**		
Coastal infrastructure	Impact on human experience. Impact on a physical features and processes Impacts on species, habitat, biodiversity.	Almost certain*	Moderate*	**High***	Local*	May impact on the following: Beaches Water Mangroves Seagrass meadows Bays Estuaries Marine animals	Likely to impact on: Naturalness Tranquillity Solitude Remoteness
Artificial barriers to water and estuarine flow (e.g. breakwalls, weirs, dams, gates)	Impact on a physical features and processes	Almost certain	Minor	**Medium**	Regional	May impact on the following: Beaches Water Mangroves Seagrass meadows	Likely to impact on: Beauty Naturalness
Land reclamation/clearing		Almost certain	Moderate	**High**	Regional		
Marine reclamation		Almost certain*	Moderate*	**High***	Regional*		

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	**Overall**			
Acid sulphate soils exposed		Not known**	Not known**	**Not known****	Not known**	Bays Estuaries	
Changing groundwater levels		Not known**	Not known**	**Not known****	Not known**		
Surface water harvesting		Not known**	Not known**	**Not known****	Not known**		
Fire - altered regime		Not known**	Not known**	**Not known****	Not known**		
Illegal waste disposal (terrestrial)	Environmental contamination	Not known**	Not known**	**Not known****	Not known**	May impact on the following: Beaches Water Mangroves Seagrass meadows Bays Estuaries	Likely to impact on: Naturalness
Groundwater contamination		Not known**	Not known**	**Not known****	Not known**		
Atmospheric pollution		Not known**	Not known**	**Not known****	Not known**		
Terrestrial point source discharges, incl sewerage		Not known**	Not known**	**Not known****	Not known**		
Chemical spill		Unlikely	Major	**Medium**	Regional		
Nutrients from catchment runoff		Almost certain	Major	**Very High**	Reef Wide		
Sediment in catchment runoff		Almost certain	Moderate	**High**	Reef Wide		
Altered salinity/conductivity		Not known**	Not known**	**Not known****	Not known**		
Pesticides (incl herbicides) from catchment runoff		Almost certain	Major	**Very High**	Regional		
Noise pollution	Impact on human experience. Impact on noise sensitive marine	Almost certain*	Moderate*	**Medium***	Local*	May impact on: Marine animals	Likely to impact on: Naturalness Tranquillity

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	**Overall**			
	species						Solitude Remoteness

Industrial development (including Ports)

Description

As described above, the Outlook Report combines all forms of coastal development and ports and shipping; it pays little attention to industrial development except for mining. The comprehensive strategic assessment separates urban development and industrial development, including ports. The impacts in the table below are presented in the same order as that for Urban Development to allow for comparison.

Industrial development is assumed to encompass all types of industries, including processing or handling of the products of mining. There is little information on industrial development in the Outlook Report with the exception of reference to The Gladstone region where it comments that 'industrial development has affected extensive coastal wetlands, has reclaimed beach and mangrove habitats' (GBRMPOA 2009: 104). Similar consequences might be anticipated for similar types of industrial development that occurs on the coastal fringe.

Ports and the associated shipping activities are an important activity in the GBR, with 10 major trading ports, 3500 ships and 9700 voyages in 2007; increasing ship movements is being driven by industrial and mining activity (GBRMPA 2009: 75). The impacts of port development and use include construction impacts, loss and fragmentation of coastal habitats, dredging and seabed disturbance, changes in coastal processes and water movements. Generally these impacts are localised (GBRMPA 2009: 76).

Climate change is expected to impact significantly on this Activity, particularly through sea level rise and the potential for more extreme weather events. Infrastructure may be at risk, and the costs of shipping may rise (GBRMPA 2009:98).

Risk

Based on the analysis table below, the overall Risk for the Activity of Industrial Development (including ports) appears to similar to Urban Development – that is **High** for coastal and in-shore ecosystems, but probably **Medium** for the balance of the GBR. The potential extent of impacts varies in scale from **Local** to **Regional**. The experiential attributes of **beauty** and **naturalness** appear to be the most impacted, along with **tranquillity, solitude** and **remoteness** in some locations and as a result of some activities.

Given the relationship between ports and shipping, it should be noted that the experiential attributes of **tranquillity, solitude** and **remoteness** are likely to be impacted by the presence of ships, especially through noise, lights at night, the number of ships present at any one time and the overall daily number of ships present or in transit.

Table 5.14: Industrial Development (including Ports) Activity Analysis Table

Legend Black text: analysis based on the analysis of risk presented in the Outlook Report

Blue text: project team have made a judgement about likelihood, consequence and resultant risk. This was done by estimating the likely risk drawing on similar activity/ impacts.

Brown text: indicates that the project team was not able to estimate the risk; this is shown in as 'not known' and with a double asterisk.

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	**Overall**			
INDUSTRIAL DEVELOPMENT – INCLUDING PORTS							
Clearing or modifying coastal habitats - mangroves, wetlands	Impacts on species, habitat, biodiversity	Almost certain	Moderate	**High**	Regional	May impact on the following: Beaches Water Mangroves Seagrass meadows Bays Estuaries Marine animals	Likely to impact on: Beauty Naturalness
Wildlife disturbance - including domestic animals (terrestrial?)		Not known**	Not known**	**Not known****	Not known**		
Coastal infrastructure	Impact on human experience. Impact on a physical features and processes Impacts on species, habitat, biodiversity.	Almost certain*	Moderate*	**High***	Local*	May impact on the following: Beaches Water Mangroves Seagrass meadows	Likely to impact on: Naturalness Tranquillity Solitude

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	**Overall**			
						Bays Estuaries Marine animals	
Artificial barriers to water and estuarine flow (e.g. breakwalls, weirs, dams, gates)	Impact on a physical features and processes	Almost certain	Minor	Medium	Regional	May impact on the following: Beaches Water Mangroves Seagrass meadows Bays Estuaries	Likely to impact on: Beauty Naturalness
Land reclamation/clearing		Almost certain	Moderate	**High**	Regional		
Marine reclamation (same as land reclamation/clearing)		Almost certain*	Moderate*	**High***	Regional*		
Acid sulphate soils exposed		Not known**	Not known**	**Not known****	Not known**		
Surface water harvesting		Not known**	Not known**	**Not known****	Not known**		
Dredging - spoil disposal		Likely	Minor	**Medium**	Local		
Dredging - habitat disturbance		Likely*	Minor*	**Medium***	Local*		
Dredging - resuspension of dredge spoil		Likely*	Minor*	**Medium***	Local*		
Illegal waste disposal (terrestrial)	Environmental contamination	Not known**	Not known**	**Not known****	Not known**	May impact on the following: Beaches Water Mangroves Seagrass meadows Bays Estuaries	Likely to impact on: Naturalness
Groundwater contamination		Not known**	Not known**	**Not known****	Not known**		
Atmospheric pollution		Not known**	Not known**	**Not known****	Not known**		
Terrestrial point source discharges, incl sewerage		Not known**	Not known**	**Not known****	Not known**		
Chemical spills		Unlikely	Major	**Medium**	Regional		
Nutrients from catchment		Almost	Major	Very High	Reef Wide		

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	Overall			
runoff		certain					
Altered salinity/conductivity		Not known**	Not known**	**Not known****	Not known**		
Marine debris		Likely	Moderate	High	Local		
Industrial waste discharge (into marine environment?)		Almost certain*	Major*	**High***	Regional*		
Coal dust impacts derived from transportation		Not known**	Not known**	**Not known****	Not known**		
Noise pollution	Impact on human experience. Impact on noise sensitive marine species	Almost certain*	Moderate*	**Medium***	Local*	May impact on: Marine animals	Likely to impact on: Naturalness Tranquillity Solitude Remoteness
Light impacts	Impact on human experience. Impact on light-sensitive marine species	Almost certain*	Minor*	**Medium***	Local*	May impact on: Marine animals	Likely to impact on: Naturalness Tranquillity Solitude Remoteness

Scientific studies

Description

The GBR has a long history of use for scientific research, and most is focused around the 6 island-based research stations, with 80% occurring on Lizard, Orpheus and Heron Islands. These activities are effectively controlled and the impacts, if any, are considered to be local and low (GBRMPA 2009: 79-89). The comprehensive strategic assessment list of potential impacts in the table below need s to be read in the light of the Outlook Report.

Climate change is now the focus of much of the scientific research on the GBR, with this issue increasing opportunities for new areas of research (GBRMPA 2009:98).

Risk

Based on the analysis table below, the overall Risk for the Activity of Scientific Studies is **Medium**, and the potential extent of impacts is **Local,** and focused around the 6 specific island research localities, and particularly on three localities. The impact on the experiential attributes is on **naturalness**, and this may be experienced by researchers as well as other visitors to the areas where research is undertaken. Research activities may also impact a sense of solitude for visitors.

Table 5.15: Scientific Studies Activity Analysis Table

Legend Black text: analysis based on the analysis of risk presented in the Outlook Report

Blue text: project team have made a judgement about likelihood, consequence and resultant risk. This was done by estimating the likely risk drawing on similar activity/ impacts.

Brown text: indicates that the project team was not able to estimate the risk; this is shown in as 'not known' and with a double asterisk.

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	**Overall**			
SCIENTIFIC STUDIES							
Accidental death through non-lethal sampling	Impact on species, habitat, biodiversity	Almost certain*	Minor*	**Medium***	Local*	May impact on: Marine animals	May impact on: Naturalness
Lethal sampling methods		Almost certain*	Minor*	**Medium***	Local*		
Limited sharing of specimens amongst researchers (leads to additional take)		Almost certain*	Minor*	**Low***	Local*		
Translocation issues - disease, gene flow		Not known**	Not known**	**Not known****	Not known**		
Cumulative collection at specific locations		Almost certain*	Minor*	**Medium***	Local*		
Cumulative collection of species		Almost certain*	Minor*	**Medium***	Local*		
Disturbance e.g. acoustic tagging, diver/snorkeller disturbance, high impact areas -		Almost certain*	Minor*	**Medium***	Local*		

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	**Overall**			
research stations							
Vessel-based waste discharge (including litter and sewage)	Environmental contamination	Almost certain	Minor	**Medium**	Local	May impact on: Marine animals Other habitats	May impact on: Naturalness
Use of chemicals and radioactive markers		Not known**	Not known**	**Not known****	Not known**		
Anchor damage by small vessels	Impact on a physical features	Almost certain	Minor	**Medium**	Local	May impact on: Coral reefs	May impact on: Naturalness
Snorkelling and diving activities	Impacts on human experience	Almost certain	Insignificant	**Low**	Local	May impact on: Coral reefs Marine animals	May impact on: Naturalness Solitude

Defence

Description

Defence as an Activity is not defined in the comprehensive strategic assessment. The Outlook Report (2009) describes defence as a 'non-extractive use' (ii) defence training activities occur within several defined locations of the GBR, and over small areas with the exception of the Shoalwater Bay Military Training Area which is one of the largest in Australia. Activities associated with defence training include dive training, boats, navigation and amphibious landings. The nature of the activities undertaken and the care in management them suggests that the impacts on most parts of the GBR are insignificanct. Explosives are only allowed to be used with the Shoalwater Bay area (GBRMPA 2009: 67-68).

Risk

Based on the analysis table below, the overall Risk for the Activity of Defence is **Low**, and the potential extent of impacts is primarily **Local**. The primary impact appears to be marine environments. The impact on the experiential attributes is primarily on **naturalness** and **tranquillity**, and it appears this would be local in extent and given the closed nature of Defence areas, the main impact would be on the experience of Defence personnel.

Table 5.16: Defence Activity Analysis Table

Legend Black text: analysis based on the analysis of risk presented in the Outlook Report

Blue text: project team have made a judgement about likelihood, consequence and resultant risk. This was done by estimating the likely risk drawing on similar activity/ impacts.

Brown text: indicates that the project team was not able to estimate the risk; this is shown in as 'not known' and with a double asterisk.

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	**Overall**			
DEFENCE							
Defence activities	Impact on species, habitat, biodiversity	Unlikely*	Insignificant*	**Low***	Local*	May impact on: Coral reefs Coral cays Water Marine animals Mangroves Seagrass meadows Bays	Likely to impact on: Naturalness

Aquaculture

Description

Aquaculture in the GBR is predominantly land-based, with a limited amount of marine aquaculture allowed, one of which is commercial (GBRMPA 2009: 69, 74). There may be pressure for new aquaculture facilities into the future. Aquaculture can have impacts on mangrove and inshore habitats through clearing for the establishment of this activity (GBRMPA 2009: 19). Occasionally aquaculture can introduce exotic marine species but it is not regarded as the main pathway (GBRMPA 2009: 52).

Risk

Based on the analysis table below, the overall Risk for the Activity of Aquaculture is **Low to Medium**, and the potential extent of impacts varies in scale from Local to regional, but primarily **Local**. The primary impact appears to be on in-shore marine environments, although a species outbreak may have wider consequences; such an outbreak is regarded as unlikely. The impact on the experiential attributes is on **naturalness**, and it appears this would be local in extent.

Table 5.17: Aquaculture Activity Analysis Table

Legend Black text: analysis based on the analysis of risk presented in the Outlook Report

Blue text: project team have made a judgement about likelihood, consequence and resultant risk. This was done by estimating the likely risk drawing on similar activity/ impacts.

Brown text: indicates that the project team was not able to estimate the risk; this is shown in as 'not known' and with a double asterisk.

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	**Overall**			
AQUACULTURE							
Artificial barriers to water and estuarine flow (e.g. breakwalls, weirs, dams, gates)	Impact on a physical feature or process	Almost certain	Minor	**Medium**	Regional	May impact on: Bays Estuaries	Likely to impact on: Naturalness
Terrestrial point source discharges, including sewerage	Environmental contamination.	Likely*	Minor*	**Low***	Local*	May impact on: Bays Estuaries	Likely to impact on: Naturalness
Introduction of exotic species and diseases from aquaculture operations	Impact on species, habitat, biodiversity	Possible	Moderate	**Medium**	Regional	May impact on: Coral reefs Coral cays Marine animals Lagoon floors Mangroves Seagrass meadows Shoals Bays Estuaries	Likely to impact on: Naturalness
Outbreak of other aquatic species		Possible*	Moderate*	**Medium***	Regional*		

Shark Control Program

Description

Shark control programs are described in the Outlook Report as being designed to provide protection to swimmers at popular beaches. Sharks and rays, important and iconic species, are reported to have come under serious pressure from a range of activities on the GBR, one of which is shark control programs (GBRMPA 2009: 26). Dugongs, inshore dolphins, marine turtles are also reported to be the victims of shark control programs (GBRMPA 2009: 30, 74-75).

Risk

Based on the analysis table below, the overall Risk for the Activity of Shark Control Programs is **High to Very High**, and the potential extent of impacts varies in scale from **Regional** to **Reef-wide**. The primary impacts are on the environmental attribute **marine animals** and on the experiential attribute of **discovery** associated with impacts on the opportunity to interact with marine species, especially the iconic, larger and less frequently encounter marine species.

Table 5.18: Shark Control Program Activity Analysis Table

Legend Black text: analysis based on the analysis of risk presented in the Outlook Report

Blue text: project team have made a judgement about likelihood, consequence and resultant risk. This was done by estimating the likely risk drawing on similar activity/ impacts.

Brown text: indicates that the project team was not able to estimate the risk; this is shown in as 'not known' and with a double asterisk.

Impact (resulting from activity)	Nature of impact	Risk			Scale	Impact on Environmental attributes	Impact on Experiential attributes
		Likelihood	Consequence	**Overall**			
SHARK CONTROL PROGRAM							
Extraction of top order predators (e.g. sharks)	Impact on marine species	Almost certain	Major	Very High	Reef Wide	Will impact on: Marine animals	Will impact on: Naturalness Discovery
Entanglement of bycatch (if species is of conservation concern)		Almost certain	Major	High	Regional		

5.3.3 Assessing sensitivity

Sensitivity of experiential attributes

Applying the sensitivity statements to each of the above Activities, the following minimum levels of sensitivity can be recognised.

Table 5.19: Minimum level of sensitivity: experiential attributes

Activity	Beauty	Naturalness	Tranquillity	Solitude	Remoteness	Discovery	Inspiration
Climate change	High	High	Low	Low	Low	Medium	Very High
Marine tourism	Medium -High	Medium -High	Medium	Medium	Medium	Low	Medium
Shipping	Medium	Medium	Medium	Low	Low	NA	Low
Commercial fishing	Medium	Medium	Medium	Medium	Low	Medium	Medium
Recreational fishing	Low	Low	Medium	Medium	Low	Medium	Low
Recreation (not fishing)	Medium	Medium	Medium	Medium	Low	Medium	Low
Agriculture	Low	Medium	Low	Low	Low	Low	Medium
Traditional use of marine resources	Low	Low	Low	Low	Low	Medium	Low
Urban development	Very High	Very High	High	Very High	Very High	Very High	Very High
Industrial development (incl Ports)	Very High	Very High	High	Very High	Very High	Very High	Very High
Scientific studies	Medium (locally)	Medium (locally)	Medium (locally)	Medium (locally)	Medium (locally)	Medium (locally)	Low
Defence	Low	Low; High (locally)	Low; High (locally)	Low	Low	Low	Low
Aquaculture	Low	Medium	Low	Low	Low	Low	Low
Shark Control Program	Medium (locally)	High (locally)	Low	Low	Low	Low	Low

Sensitivity of environmental attributes

Once the GBRMPA Vulnerability Assessments are completed, and engaging the relevant expertise, it would be possible to create a similar table to summarise the sensitivity of environmental attributes. The example below uses the vulnerability assessments for Seagrass habitat and two iconic species – Dwarf Minke Whale and Indo-Pacific (in-shore) Bottlenose Dolphin to illustrate this.

Table 5.20: Example sensitivity levels: environmental attributes

Activity	Species		Habitats
	Dwarf Minke Whale	Indo-Pacific (in-shore) Bottlenose Dolphin	Seagrass
Climate change/Extreme weather	Medium (within GBRMP)	High	High to Low
Marine tourism	Low	Low	Low
Shipping	Low	Ports & Shipping – Medium (locally); Low (reef-wide)	Low
Commercial fishing	Low	Medium	Low
Recreational fishing	Low	Medium	Low
Recreation (ex fishing)	Low	Medium	Low
Agriculture	See catchment run-off	e catchment run-off	See catchment run-off
Traditional use of marine resources	Low	Low	Low
Urban development	Low	High	High to Low
Industrial development (incl Ports)	Low	High Ports & Shipping – Medium (locally); Low (reef-wide)	Very High
Scientific studies	Not assessed**	Not assessed**	Not assessed**
Defence	Low	Low	Low
Aquaculture	Not assessed**	Not assessed**	Not assessed**
Shark Control Program.	Not assessed**	Not assessed**	Not assessed**
Catchment runoff	Low	High	High to Low

5.3.4 Potential impact

Combining the key assessments using Table 5.2 results in the following simplified picture of the potential impact of the listed Activities on experiential attributes, combining the sensitivity levels in Table 5.19 and using a median level.

Table 5.21: Potential Impact: Experiential attributes only

	Risk	Scale	Sensitivity (Experiential)	Potential impact
Climate change	Medium-Very High	Reef Wide	High	High–Very High
Marine tourism	Medium-High	Local	Medium	Medium-High
Shipping	Medium	Local	Low-Medium	Medium
Commercial fishing	Medium-Very High	Local - Reef Wide	Low-Medium	Medium-High
Recreational fishing	Medium	Local	Low-Medium	Medium

	Risk	Scale	Sensitivity (Experiential)	Potential impact
Recreation (not fishing)	Medium	Local	Medium	Medium
Agriculture	High-Very High	Regional – Reef Wide	Low-Medium	High
Traditional use of marine resources	Medium	Local	Low	Low-Medium
Urban development	High	Local	Very High	High-Very High
Industrial development	High	Local	Very High	High-Very High
Scientific studies	Medium	Local	Medium	Medium
Defence	Low	Local	Low	Low
Aquaculture	Low-Medium	Local	Low	Low-Medium
Shark Control Program.	High-Very High	Regional – Reef Wide	Medium-Low	Medium-High

5.4 Looking at an example

Looking at the example of the impact of shipping, the table above indicates that many **environmental attributes** could be impacted by this activity. The sensitivity of each should therefore be assessed using the sensitivity statements in Table 5.3. Some environmental attributes this many require a detailed assessment such as that undertaken in the GBRMPA vulnerability assessments. A list of these vulnerability assessments against the list of environmental attributes is provided above (Table 5.1).

Each GBRMPA vulnerability assessment provides an assessment of:

- Exposure to the sources of the pressure
- Degree of exposure to the pressure – referred to as risk in the Outlook Report, with both combining likelihood and consequences
- Sensitivity to the source of the pressure – using the sensitivity statements summarised in Table 5.3 in the present report.
- Natural and management adaptive capacity.

For example, the environmental attribute 'seagrass meadows' is addressed in the Seagrass Vulnerability Assessment (GBRMPA 2012e:15). It considers that 'ports and shipping' is one of the four most important activities that can have a significant impact on seagrasses:

> *Port and shipping activities*
>
> *Port development, dredging, marinas, marine facility expansion and increased shipping traffic can cause loss of meadows through direct removal, and also indirectly through changes to hydrodynamics, generation of sediment plumes that limit light for plant growth, and potentially smothering and/or burial. Developments are usually closely managed and generally the area of seagrass lost is small. However the resources boom in Queensland has resulted in significant expansion of ports and shipping. Proposals are underway for at least seven ports, or significant port expansions, along the Great Barrier Reef coast. Most involve direct and permanent loss of seagrasses and the cumulative losses in particular are of concern.* (GBRMPA 2012e:15)

The associated table from this assessment report (below) identifies the exposure, risk and sensitivity of this environmental attribute to this activity, but does not distinguish between the

development and management of a port separately from ship movements outside a port. The comprehensive strategic assessment separates these two components. The sensitivity statements applied below to define 'sensitivity to the source of the pressure' are those summarised in Table 5.3.

Table 5.22: Extract from the Seagrass Vulnerability Assessment (GBRMPA 2012e:14)

Vulnerability assessment matrix summary for seagrass

		Exposed to source of pressure	Degree of exposure to source of pressure	Sensitivity to source of pressure	Adaptive capacity – natural	Adaptive capacity – management	Residual vulnerability	Level of confidence in supporting evidence
	Commercial tourism	Yes; locally	Low	Low	Good	Good	Low	Good
	Defence activities	Yes; locally	Low	Low	Good	Good	Low	Good
	Commercial fishing	Yes; locally	Low	Low	Good	Good	Low	Good
	Recreational fishing	Yes; locally urban coast	Low	Low	Good	Good	Low	Good
	Ports and shipping	Yes; locally (with potential for regional significance)	High within port limits	Very high e.g. for complete meadow removal	Poor e.g. for complete meadow removal	Good. Spatial confinement. Conditional approvals.	High for greenfield proposals and expanding sites	Good – effects of pollutants
			Low outside port limits	Low e.g. distanced from activity	Moderate e.g. for medium density sediment plumes	Moderate. Some concern re removal and cumulative impact.	Low for areas outside port limits and influence of generated plumes	Poor – cumulative effects

In using the above table to consider the impact on aesthetic values for a particular activity and location, it is important to also use Tables 4.19 and 4.20 which together which describes the qualities that enhance the aesthetic values of each potentially impacted environmental and experiential attribute respectively. These provide a refinement or an additional layer of understanding on the purely environmental considerations in the GBRMPA vulnerability assessment.

Below is an extract from Table 4.19 as an example.

Attribute	Qualities that enhance aesthetic value	Image
Seagrass meadows	• Extent (WL, BW) • Diversity (BW) • Association with dugong (BW) • Visibility at water level (WL) • Clarity of water (WL, BW)	

For **experiential attributes**, the sensitivity statements are provided in Table 5.4.

Two experiential attributes – beauty and naturalness – are identified as being impacted by all of the components of shipping, whereas tranquillity, remoteness and solitude are impacted by three component activities.

Using the identification of experiential attributes likely to be impacted from the shipping activity analysis table (Table 5.7), combined with data from the Outlook Report and professional judgement, the sensitivity statements in Table 5.4 can be used to identify the minimum relative sensitivity of each activity in relation to each experiential attribute. However, because it is not possible to determine the amount of the activity, only a minimum and not a maximum can be s can be determined. This is documented in Table 5.19 (extract below).

Activity	Beauty	Naturalness	Tranquillity	Solitude	Remoteness	Discovery	Inspiration
Shipping	Medium	Medium	Medium	Low	Low	NA	Low

Then combining Risk and Sensitivity, using Table 5.2 as the guide, it is possible to determine the potential impact of the activity on the attributes of aesthetic value. Below is an extract from Table 5.21.

Completion of the vulnerability assessments for the environmental attributes will enable this aspect to be considered as well.

	Risk	Scale	Sensitivity Experiential)	Potential impact
Shipping	Medium	Local	Low-Medium	Medium

6 CASE STUDIES

6.1 Purpose

The case studies are intended to illustrate how to use the aesthetic values and sensitivity analysis method developed in this study. They are a test of the application of our approach – that is, the methodology and steps.

The case studies are not intended as a detailed or definitive analysis of each study area but a demonstration of how the process might work and therefore help resolve gaps or issues for future application.

6.2 Selection of the case studies

At the first GBRMPA workshop an exercise was undertaken whereby GBRMPA staff suggested areas or slices of the GBR that would make good case study areas in terms of examining aesthetic values and sensitivities.

Six areas were put forward showcasing a number of sites or features that were considered to have a range of aesthetic values and where a number of activities or pressures existed that could have future impact on those values.

The areas considered were:

- Captain Billy Landing and Raine Island
- Princess Charlotte Bay and Cape Melville
- Cairns to Townsville
- Whitsundays
- Keppel Islands out to Capricorn Bunker Group
- Curtis Island.

Two case study areas were selected from the recommended short list that would illustrate differing environmental and experiential attributes in two contrasting parts of the GBRWHA.

4. **Princess Charlotte Bay – Cape Melville,** which represents the remote far north and highlights pressures of commercial fishing and issues over Traditional Owner access.
5. **The Whitsundays,** which represent a popular tourism area with a wealth of aesthetic characteristics ranging from high continental islands to remote outer reefs and highlights pressures of coastal development, tourism and shipping.

Of these, Princess Charlotte Bay has been completed. The resources available were more than fully expended on this case study, and it was not possible to complete the second case study. The materials partially developed for the second case study have been lodged with DSEWPaC.

6.3 Steps

6.3.1 Identify environmental attributes

The first step in applying the method was to identify environmental attributes for each case study area. A number of sources have been used to help compile an initial understanding of the areas but it is not a definitive list and other sources and expertise should be called upon in future mapping work, including extensive GBRMPA data sets. Sources used in the case study exercise included:

- Report on the Great Barrier Reef Marine Park Zoning Plan 2003 – Section 7 Zone placement, examples and basis for zoning
- Great Barrier Reef Marine Park Zoning Plans – Map 3 Cape Melville and MPZ10 Whitsunday
- Identifying Special or Unique Sites in the Great Barrier Reef World Heritage Area for inclusion in the Great Barrier Reef Marine Park Zoning Plan 2003, compiled by Kirsten Dobbs in 2011
- Review of the Great Barrier Reef Marine Park Act 1975 (2006)
- Google satellite images
- Guidebooks.

Once identified the environmental attributes were drawn on a sketch plan based on data supplied by GBRMPA. The mapped attributes are not definitive and some attributes such as seagrass meadows are indicative only, based on the general location given in the GBR Marine Park Zoning Plan Report.

Using the OUV table (section 4.4.3), the values (that is the extended descriptions of OUV) were mapped indicatively based on the environmental attributes and their qualities. Whilst most values can be seen to be found throughout the GBR to a greater or lesser extent this indicative mapping shows areas where aesthetic values are most prevalent.

6.3.2 Identify experiential attributes

The next step was to identify the experiential attributes. The experiential attributes of the case study area are best understood through a more thorough investigation than is possible within the present project. Instead our aim was to demonstrate a process using the resources to hand, as listed above.

As can be understood from the earlier sections of this report, the experiential attributes that hold the aesthetic values of the GBR are associated with the opportunities to experience and engage with nature within a vast natural land and seascape, below, on and above the water. This conclusion is based on the many data sources examined.

Seven experiential attributes were then described, drawing on a number of sources (Section 2.2.3 and 3.2.2), refined through consideration of data on the research on the GBR (Section 4.20) and then used in relation to the extended descriptions of RSoOUV (Section 4.4.3).

In considering this case study area, it is suggested that all of the experiential attributes exist across the whole case study area, except where they have been reduced or removed by human activities, past and present. As is indicated in the sensitivity table for experiential attributes (Table 5.4), each is sensitive to a particular aspect of 'human activity'.

It is important to recognise that the aesthetic values of a place and its experiential attributes will be particular to that place. A number of places may share an experiential attribute – for example, remoteness. But not all places with aesthetic values will have the same set of experiential attributes.

Identifying where the experiential attributes occur with a case study area will be based on mapping what they are dependent on – or given the availability of particular types of data, mapping of the conditions do not allow for those experiential attributes to exist – in part or in full.

Considering the experiential attributes defined for the GBR and parts of it, the range of past and present human activities that may reduce or preclude the recognised experiential attributes include, for example:

- land uses and developments that reduce naturalness and remoteness

- activities that generate noise, light and other types of pollution
- activities that bring human-created structures into the viewscape.

6.3.3 Undertake the sensitivity analysis

This was undertaken as described in Section 5.2 and 5.3, using the tables contained in these sections.

6.4 Case Study: Princess Charlotte Bay-Cape Melville

6.4.1 Overview

The case study area, located in the Far Northern Management Area of the GBRWHA, is a broad sweep of reef from Princess Charlotte Bay in the west to the outer reef off Howick Island to the east. The area includes the high continental islands of the Flinders Group, remote cays, extensive coastal mangroves, a number of coastal headlands, a complex of coral cays and reef formations around the Howick Islands and a continuous chain of outer reefs.

The area is well used by prawn trawlers and is a significant area for Traditional Owners. Tourism is low-key.

6.4.2 Description

The main environmental attributes found in the case study area are listed and presented in map form below.

Significant places and characteristics include:

Princess Charlotte Bay

- The extensive inshore waters support high density seagrass meadows with high species diversity and Princess Charlotte Bay together with adjacent Bathurst Bay and Cape Melville have been identified as most important areas for dugong in the northern GBR
- Other large marine animals found in the bay include Irrawaddy Indo-Pacific humpback dolphins and turtles
- Muddy bay, surrounded by silica sand deposits with low nutrient levels
- Running Creek Station on Princess Charlotte Bay is an access point for Cape York Peninsula and provides for limited line fishing and access to the coastal foreshore of the Bay
- Four rivers drain into its basin the most dominant being the North Kennedy River, whose tributary, the Annie River, is a port for Marina Plains and was used extensively as a trawler servicing and unloading facility before mother ships and fuel barges operated in the area. Now a base for a charter boat and a few small fishing vessels
- The rivers drain an enormous, nationally significant wetland – the mouths of the rivers where they join the GBR are characterised by vast sand and mud banks around their mouths
- The whole stretch of the bay is fringed by mangroves.

Flinders Group

- Significant high continental islands with fringing reefs and clear waters
- The islands are well established with extensive vegetation and provide a habitat for a number of threatened bird species, including the Beach Stone-Curlew listed under the EPBC Act and listed as vulnerable under the Nature Conservation Act 1992 (Qld)

- The channels and bays of the Flinders group provide good anchorages for tourist craft and commercial trawlers
- The landscape of the Flinders Group is characterised by distinctive ridgelines and headlands such as the table-top outcrop of Pirie Head. These islands are mostly vegetated with mangroves in bays and fringing reefs.

Bathurst Bay

- Bathurst Bay, including Bathurst Head is one of a limited number of access points to the east coast of Cape York Peninsula and includes sheltered anchorages
- Extensive inshore seagrass habitat
- Bathurst Head is steep and covered in stunted trees.

Cape Melville to Ninian Bay to Lookout Point

- Significant coastal area
- Shallow water seagrass and one of the most important areas for dugong in the whole GBR
- Regular access to Ninian Bay by Traditional Owners of the area
- Access to the Weigall Reefs area by local Aboriginal community.

Clack Reefs and Island

- Known for its underwater topography and marine life of significant diversity
- Also extensive seagrass beds, reef flats and significant Hawksbill and Green Turtle foraging area leading to many sightings
- With neighbouring King Island and reef shares extensive reef flats and shoal terraces separated by diverse channels ranging from calm and sheltered to others with strong water flows
- Surrounded by inshore muddy lagoon areas with high carbonate sand forming a rich habitat for prawns.

Stapleton Island Reef and Coombe Reef

- Dense mid-shelf seagrass beds and generally muddy area surrounding the mid-shelf reef areas which are sheltered from the outer barrier reefs and often form lagoons within.

Howick Group

- The island group is a significant anchorage area for trawlers and tourist craft.
- The area provides an important foraging habitat for dugongs and hawksbill turtles.

Lakefield and Cape Melville National Parks

- Significant wetlands and mangroves.

6.4.3 Environmental attributes

Of the environmental attributes listed in Section 4.4.3, coral reefs, coral cays, mangroves and beaches have been fairly well mapped on the accompanying case study plans. Information is based on GBRMPA zoning plans and Google satellite images, and not on detailed mapping of attributes as this was beyond the scope of the present project. The diagrams are therefore indicative and designed to demonstrate an approach to identifying the extent of OUV.

Other attributes such as open water, mainland coast, bays are largely self evident, whilst the rest have not been accurately mapped at this stage and are indicative only, again to demonstrate the application of the methodology.

From our analysis the particular aesthetic values in this case study area are associated with the following environmental attributes:

Attributes that are extensive throughout the case study area include:

- Coral reefs (P,WL,BW)
- Open water (P,WL,BW)
- Marine animals (BW)
- Mangroves (WL)
- Seagrass meadow (WL)
- Mainland coast (WL)
- Bays (WL)

Attributes with good coverage throughout the case study area include:

- Coral cays (P,WL)
- Estuaries (WL)
- Lagoon Floors (WL,BW)

Attributes with limited coverage in the case study area include:

- Continental Islands (P,WL)
- Beaches (WL)
- Blue Holes (WL,BW)
- Shoals (BW)
- Cliffs and rocky shores (WL)
- Birds (WL).

Lenses

Below water, aesthetic values are found throughout the case study area but particularly where coral reefs are clustered and in the bays and around the islands where seagrass meadows are found and dugong and turtles may be encountered. However, there was little evidence of aesthetic values associated with seagrass meadows or dugong from our data analysis, although community sources and experts recognise aesthetic value of these attributes.

At water level the beaches, mangroves, fringing reefs and continental islands of the Flinders Group hold a number of values along with the bays, beaches, mangroves and to a lesser extent, cliffs and rocky shores that constitute the mainland coast.

Princess Charlotte Bay is not noted for its conventional scenic qualities, being largely flat and featureless, but its sweeping character and impressive scale, along with its important mangrove and wetland habitat induce an aesthetic response both from experts and local community.

No image evidence came to light to underpin the aesthetic value of mangroves, but again support from the community and experts.

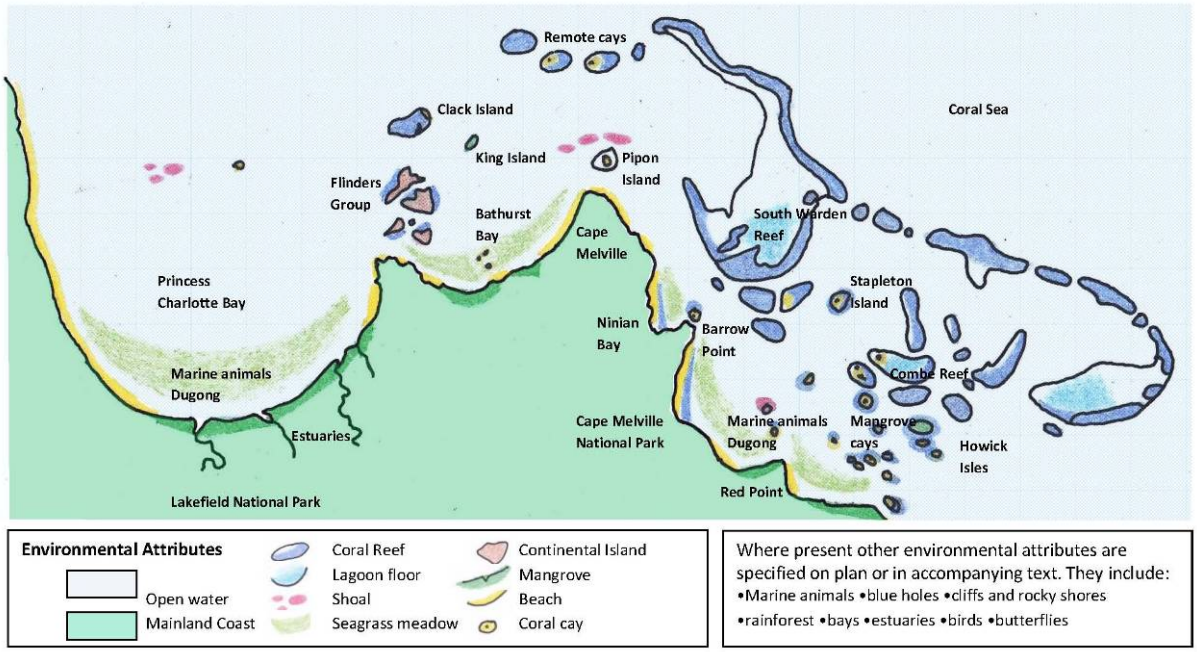
At the panoramic level the pattern of mid shelf and outer reefs form a strong aesthetic value particularly around the Howick Isles, where the mosaic pattern of the various reef formations are especially prevalent.

The mainland coast from Bathurst Head and the Flinders Island Group around Cape Melville to Red Point also holds aesthetic value.

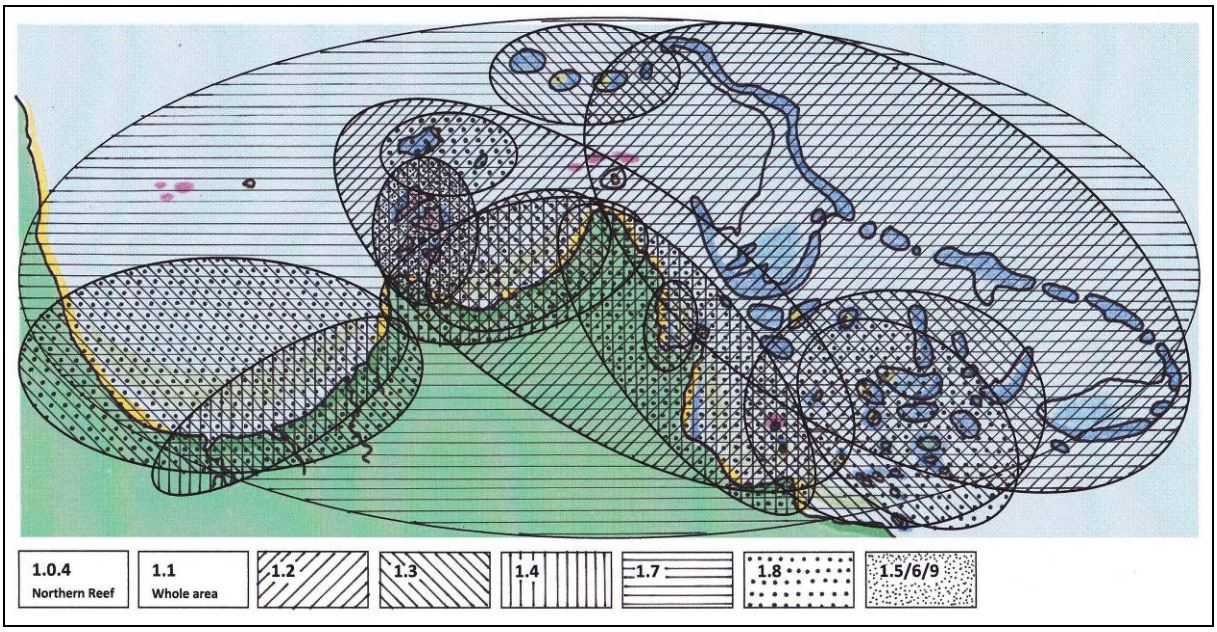
Mapping

The following diagrams map the environmental attributes and individual aesthetic values related to the extended descriptions of OUV 1.0 to 1.8 (see Section 4.4.3 *Integrated Presentation of Aesthetic Value* for full descriptions).

Case Study Area: Princess Charlotte Bay – Cape Melville

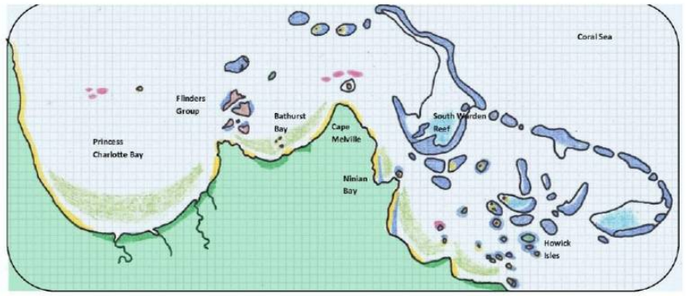


Composite Map of RSoOUV Aesthetic Values



Princess Charlotte Bay – Cape Melville

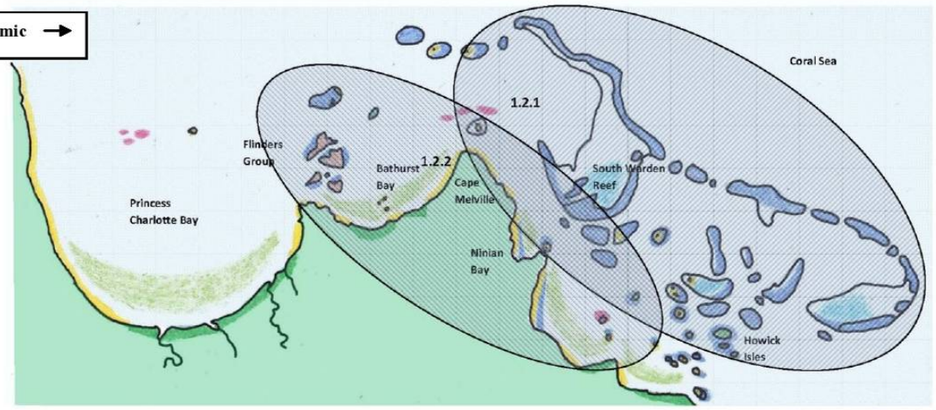
Mapping Individual Aesthetic Values



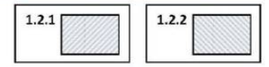
RSoOUV 1.0.4 & 1.1

For the extended description of OUV and the lens through which the values are viewed see section 4.4.3

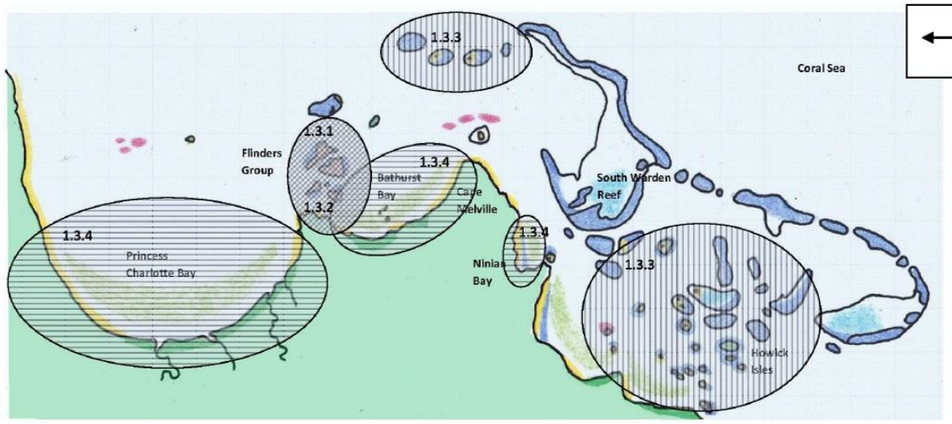
Panoramic



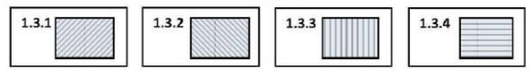
RSoOUV 1.2

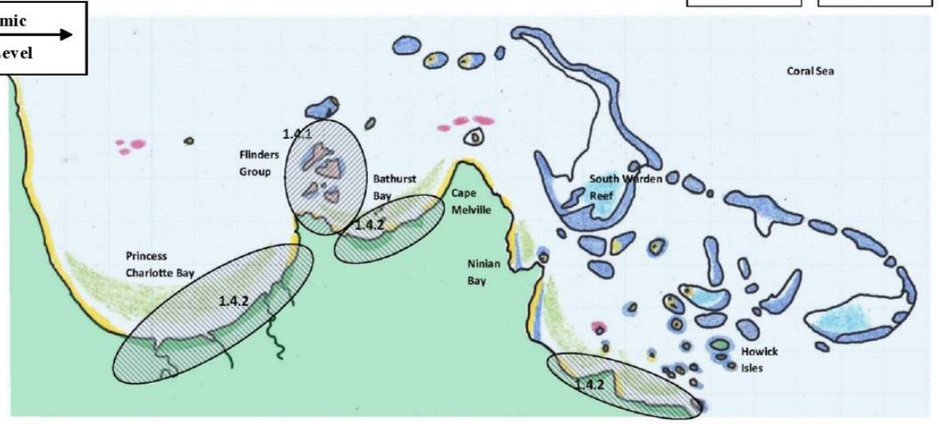


Panoramic
Water Level

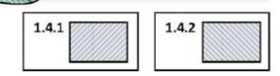


RSoOUV 1.3

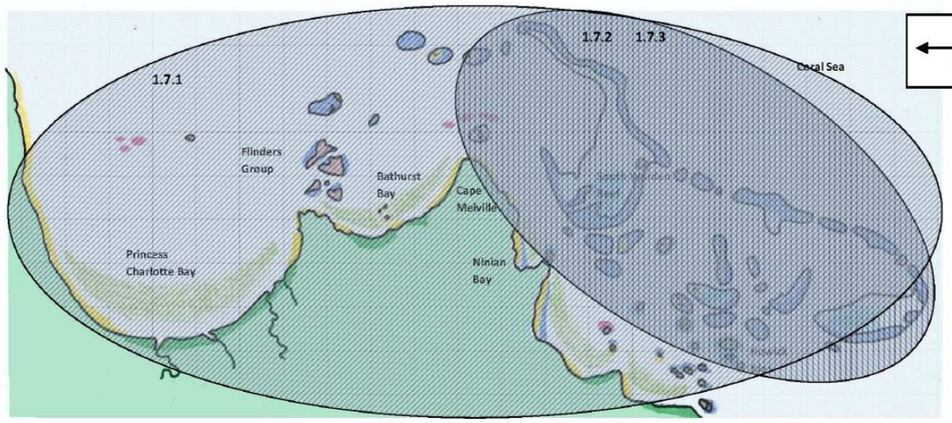




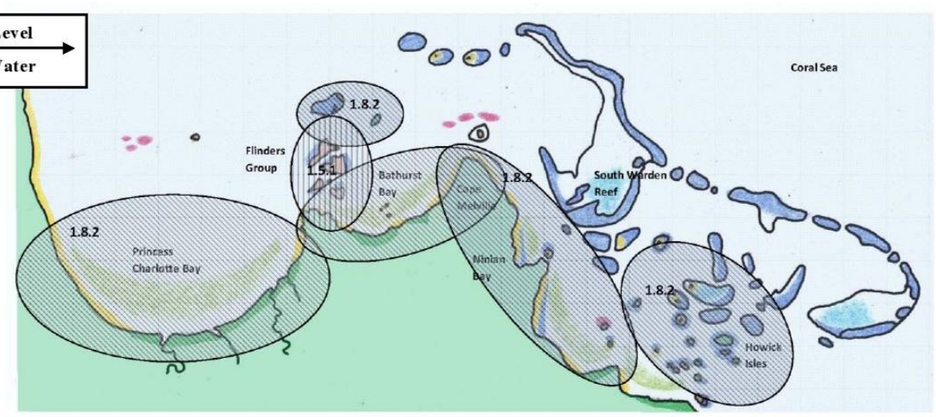
RSoOUV 1.4



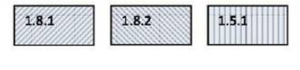
Water Level
Below Water



RSoOUV 1.7



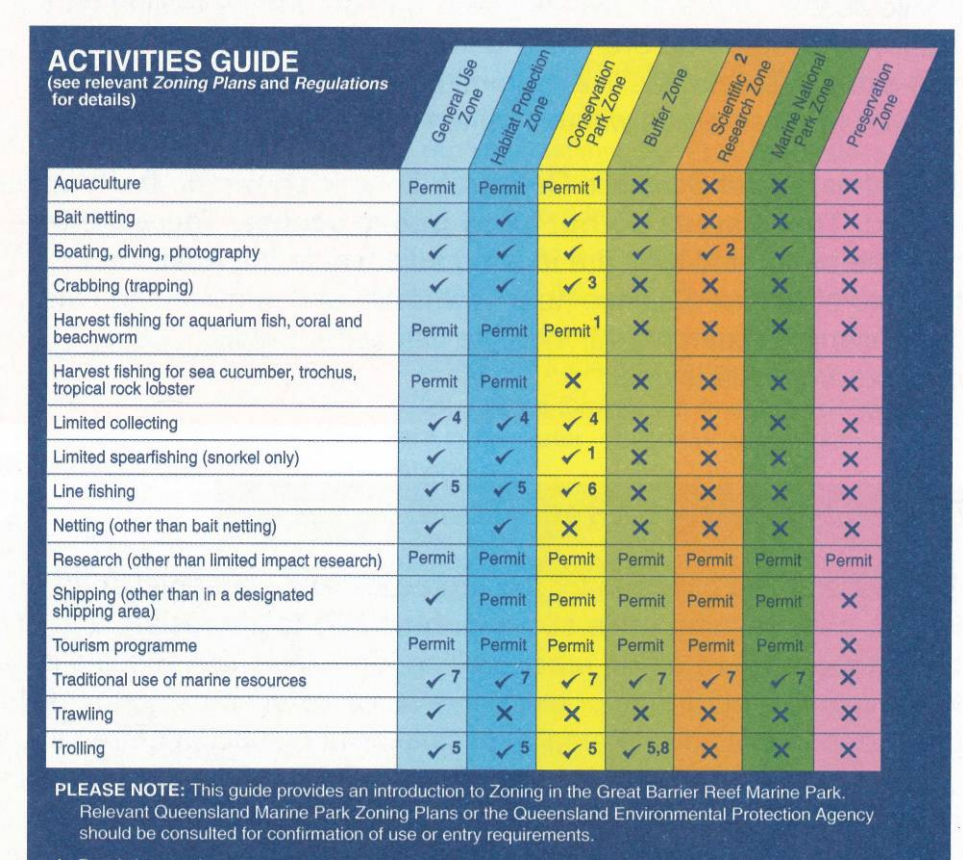
RSoOUV 1.8 & 1.5



6.4.4 Experiential attributes

For the Princess Charlotte Bay case study, the mapping of experiential attributes was based on the GBRMPA management zoning for the area, combined with the land tenure of the adjoining coast. Together these provide for specific activities, based primarily on ecological values.

Within the Princess Charlotte case study area there are 5 management zones. The activities allowed based on the zoning are summarised in the Activities Guide below which applies to the whole GBR.



ACTIVITIES GUIDE
(see relevant *Zoning Plans* and *Regulations* for details)

	General Use Zone	Habitat Protection Zone	Conservation Park Zone	Buffer Zone	Scientific Research Zone [2]	Marine National Park Zone	Preservation Zone
Aquaculture	Permit	Permit	Permit [1]	✗	✗	✗	✗
Bait netting	✓	✓	✓	✗	✗	✗	✗
Boating, diving, photography	✓	✓	✓	✓	✓ [2]	✓	✗
Crabbing (trapping)	✓	✓	✓ [3]	✗	✗	✗	✗
Harvest fishing for aquarium fish, coral and beachworm	Permit	Permit	Permit [1]	✗	✗	✗	✗
Harvest fishing for sea cucumber, trochus, tropical rock lobster	Permit	Permit	✗	✗	✗	✗	✗
Limited collecting	✓ [4]	✓ [4]	✓ [4]	✗	✗	✗	✗
Limited spearfishing (snorkel only)	✓	✓	✓ [1]	✗	✗	✗	✗
Line fishing	✓ [5]	✓ [5]	✓ [6]	✗	✗	✗	✗
Netting (other than bait netting)	✓	✓	✗	✗	✗	✗	✗
Research (other than limited impact research)	Permit	Permit	Permit	Permit	Permit	Permit	Permit
Shipping (other than in a designated shipping area)	✓	Permit	Permit	Permit	Permit	Permit	✗
Tourism programme	Permit	Permit	Permit	Permit	Permit	Permit	✗
Traditional use of marine resources	✓ [7]	✓ [7]	✓ [7]	✓ [7]	✓ [7]	✓ [7]	✗
Trawling	✓	✗	✗	✗	✗	✗	✗
Trolling	✓ [5]	✓ [5]	✓ [5]	✓ [5,8]	✗	✗	✗

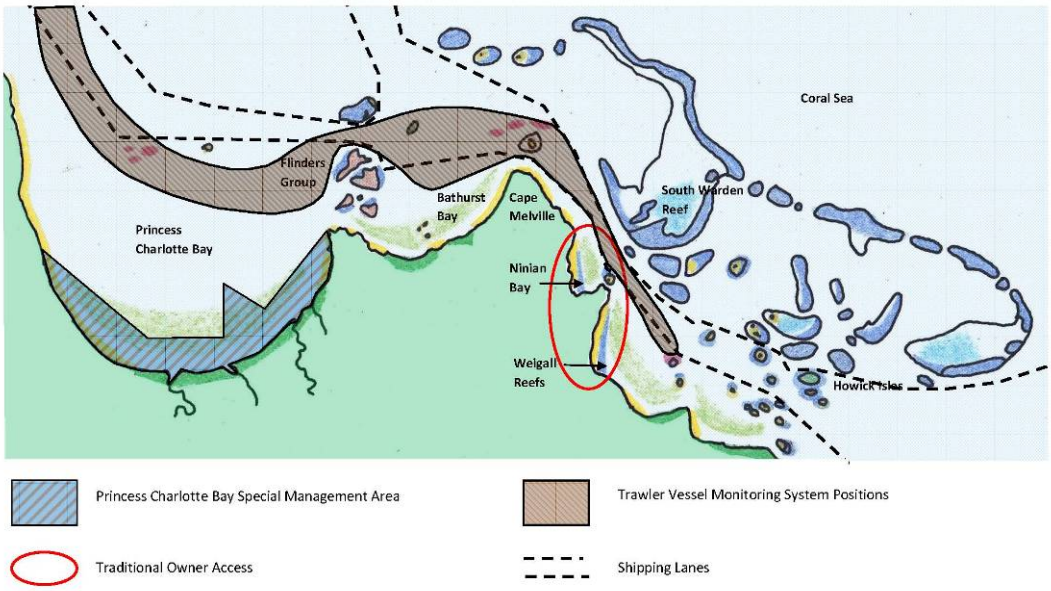
PLEASE NOTE: This guide provides an introduction to Zoning in the Great Barrier Reef Marine Park. Relevant Queensland Marine Park Zoning Plans or the Queensland Environmental Protection Agency should be consulted for confirmation of use or entry requirements.

In the Princess Charlotte Bay case study area, the following activities are known to occur:

- there is a shipping channel through the General Use Zone
- there is a trawling area within the General Use Zone
- Traditional Owners access the coast and marine resources at Ninian Bay and Weigell Reefs
- There is a Special Management Area within Princess Charlotte Bay designed to protect dugongs.

The general location of these activities is indicated on the plan below.

Activities



There may be other activities, but these are considered sufficient for testing the approach. The scale or intensity of particular activities may have a significance impact on the experiential attributes. Tourism, for example may occur within all of the zones except the Preservation (Pink) Zone, requiring a permit in all zones. The intensity of tourism activities may impact on a number of the experiential attributes, and the degree of impact may vary (see sensitivity Table 4.X).

For the purposes of testing the approach, we have defined the experiential attribute as either present or not present, based on whether the conditions under which this experiential attribute is most likely to exist are achieved by the zoning. Clearly this provides only a rough measure.

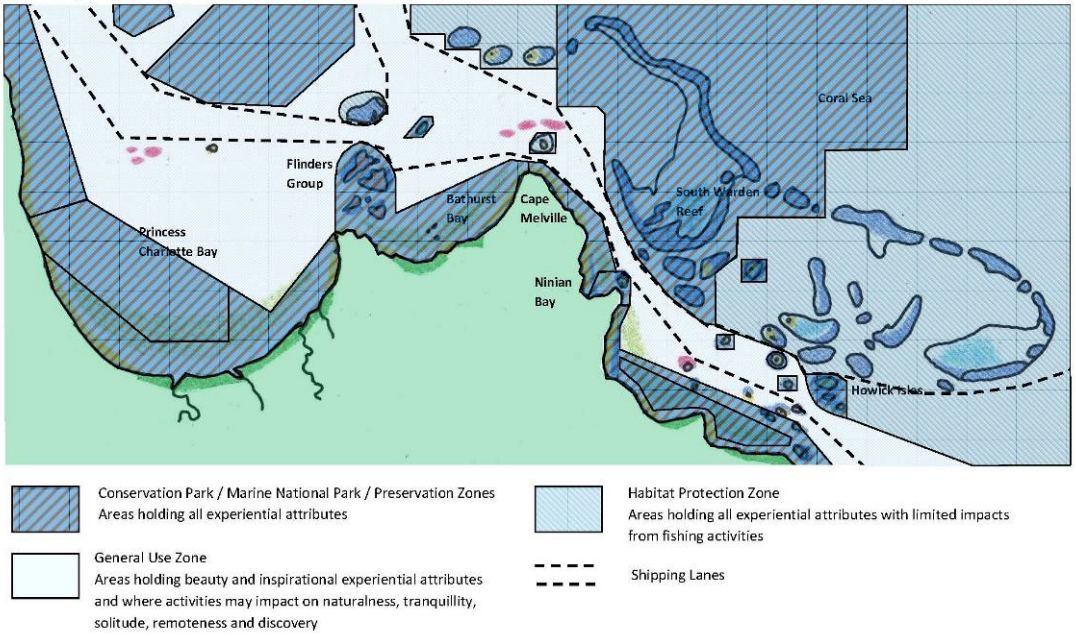
Table 6.1: Presence or absence of experiential attributes

Zone	Comment	Beauty	Naturalness	Tranquillity	Solitude	Remote	Discovery	Inspirational
Preservation (Pink) Zone	Inshore area	✓	✓	✓	✓	✓	✓	✓
Marine National Park (Green) Zone	Inshore Area	✓	✓	✓	✓	✓	✓	✓
	Offshore Area	✓	✓	✓	✓	✓	✓	✓
Conservation Park (Yellow) Zone		✓	✓	✓	✓	✓	✓	✓
Habitat Protection (Dark Blue) Zone	Allows for fishing activities which may impact on some experiential attributes: assumed to be small scale and transitory	✓	✓	✓	✓	✓	✓	✓

Zone	Comment	Beauty	Naturalness	Tranquillity	Solitude	Remote	Discovery	Inspirational
General Use (Light Blue) Zone	Impact of shipping and trawling. Assumed to be a transitory impact, with little impact on the beauty and inspirational attributes.	✓						✓

Based on this approach, the experiential attributes were mapped.

Experiential attributes based on GBRMPA Management Zoning Plan



6.4.5 Assessing sensitivity

To test out the approach to assessing sensitivity using the Princess Charlotte case study, the project team have proposed two hypothetical new activities:

- **A new port at Ninian Bay,** based on the existing shipping routes. It would serve several new mines and processing plants proposed to be developed near Musgrave and the Peninsula Development Road. The mines would be within the catchment of the rivers that flow into Princess Charlotte Bay.
- **An eco-tourism resort** on one of the Flinders group of islands – say Flinders Island - with access by helicopter. Tourists staying at the resort would be offered fishing, boating diving and snorkelling activities. The resort would be small (say less than 50 beds) and designed with no off-site waste disposal.

The process for assessing the sensitivity of the environmental and experiential attributes is described in Section 5.2 and 5.3.

Ninian Bay: New port

The activity comprises port development and an increased movement of ships into Ninian Bay and along the adjoining shipping route. These activities and their potential impacts are described in Tables 5.7 and 5.13.

In Table 6.2, the attributes that may be affected by shipping are in red, and those that may be impacted by port development are underlined. Other attributes present but not identified as associated with the extended description of OUV are in blue text (refer to section 4.4.3).

The lenses are:

- panoramic (P)
- water level (WL)
- below water (BW).

The specific types of impacts that can arising from these activities are detailed in Tables 5.7 and 5.13 and include impacts on species, habitat and biodiversity; impacts on physical features and processes, environmental contamination and direct impacts on human experience. In undertaking an actual assessment the nature and scale of the activity would be carefully defined along with the potential impacts, enabling an in-depth analysis. With this hypothetical example, the analysis is at a general level.

Table 6.2: Extended description of OUV and attributes

Extended description of OUV	Lens	Environmental attributes present	Experiential attributes present
1.2.2 The exceptional natural beauty of the property is associated with contrasting colours and forms of green islands, coastlines, sweeping white sands, fringing reefs and patterns of blue waters that are visible from above.	P	Bays Beaches Continental islands Coral cays Mangroves Marine animals Water Other attributes present but not associated with OUV: - seagrass meadows	Beauty Discovery Naturalness Remoteness Sense of inspiration Other attributes present but not associated with OUV: - tranquillity - solitude
1.3.4 The exceptional natural beauty of the property is associated with sweeping pristine and remote bays	P WL		
1.4.2 The exceptional natural beauty of the property is associated with the extensive mangroves, mudflats and channels of the coastal islands visible from above and from high points on the islands.	P WL		
1.8.2 The aesthetic importance of the property is associated with encountering iconic, large and rare marine species in their natural environment.	WL, BW		

Using our method, the next step is to look at the sensitivity of each of the attributes identified above. This process is described in Section 5.3.3.

Looking at experiential attributes present (shaded), the extract below from Table 5.19 indicates the potential sensitivities of the experiential attribute to the Activities.

Activity	Beauty	Naturalness	Tranquillity	Solitude	Remoteness	Discovery	Inspiration
Shipping	Medium	Medium	Medium	Low	Low	NA	Low
Industrial development (incl Ports)	Very High	Very High	High	Very High	Very High	Very High	Very High

The sensitivity of some sample environmental attributes are considered in Table 4.20, and extract of which is provided below.

Activity	Species	Habitats
	In-shore species	Seagrass
Shipping	Ports & Shipping – Medium (locally); Low (reef-wide)	Low
Industrial development (incl Ports)	High Ports & Shipping – Medium (locally); Low (reef-wide)	Very High

Note: the inshore species is based on the Indo-Pacific (in-shore) Bottlenose Dolphin but the assessment is considered relevant to other in-shore marine animals.

	Risk	Scale	Sensitivity (Experiential)	Potential impact
Shipping	Medium	Local	Low-Medium	Medium
Industrial development	High	Local	Very High	High-Very High

Based on this simple analysis, it is apparent that these activities are likely to have a significant impact on experiential attributes associated with OUV in the case study area.

Flinders Island: eco-tourism resort

The same steps were followed for the proposed eco-tourism resort. The relevant Activity is Marine Tourism, with the helicopter access adding an uncommon dimension that would need consideration. This Activity and its potential impacts are described in Table 5.6.

The attributes that may be affected by Marine Tourism are in red, and those that may be impacted by helicopter flights in and out of the island underlined. Other attributes present but not identified as associated with the extended description of OUV are in blue text (refer to section 4.4.3).

Table 6.3: Extended description of OUV and attributes

Extended description of OUV	Lens	Environmental attributes present	Experiential attributes present
1.2.2 The exceptional natural beauty of the property is associated with contrasting colours and forms of green islands, coastlines, sweeping	P	Bays Beaches Birds	Beauty Discovery Naturalness

Extended description of OUV	Lens	Environmental attributes present	Experiential attributes present
white sands, fringing reefs and patterns of blue waters that are visible from above.		Butterflies. Cliffs and rocky shores Continental islands Coral cays Fringing reefs Mangroves Marine animals Water	Remoteness Sense of inspiration Tranquillity Other attributes present but not associated with OUV: - solitude
1.3.1 The Whitsunday Islands exemplify the exceptional natural beauty associated with the diverse and distinctive combinations of landforms, textures and colours created by the islands, island groups and the sea that are visible from water level throughout the property.	WL		
1.3.2 The exceptional natural beauty of the property is associated with spectacular scenery within the continental island groups visible from above, and at water level and characterised by rugged mountains with dense and diverse vegetation, sweeping beaches and adjacent pristine fringing reefs and the absence of human presence	P,WL		
1.4.2 The exceptional natural beauty of the property is associated with the extensive mangroves, mudflats and channels of the coastal islands visible from above and from high points on the islands.	P,WL		
1.5.1 The aesthetic importance of the property is associated with the witnessing of superlative natural phenomena including breeding colonies of turtles, aggregations of overwintering butterflies, migrating whales, annual coral spawning and spawning aggregations of fish species.	WL, BW		

The next step is to look at the sensitivity of each of the attributes identified above. This process is described in Section 5.3.3.

Looking at experiential attributes present (shaded), the extract below from Table 5.19 indicates the potential sensitivities of the experiential attribute to the Activities.

Activity	Beauty	Naturalness	Tranquillity	Solitude	Remoteness	Discovery	Inspiration
Marine tourism	Medium -High	Medium -High	Medium	Medium	Medium	Low	Medium

None of the environmental attributes sampled in Table 4.20 are relevant to this area of the case study.

The sensitivity of some sample environmental attributes are considered in Table 4.20, and extract of which is provided below.

The potential impact of Marine Tourism is, according to table 5.21, Medium-High. An extract of this table is presented below.

	Risk	**Scale**	**Sensitivity (Experiential)**	**Potential impact**
Marine tourism	Medium-High	Local	Medium	Medium-High

Based on this simple analysis, it is apparent that this activity is likely to have an impact on experiential attributes associated with OUV in the case study area.

7 ENGAGING COMMUNITIES IN DEFINING AESTHETIC VALUES

7.1 Introduction

The scope of this project has been the aesthetic values, and their attributes, identified as being of outstanding universal value under Criterion vii in the RSoOUV for the GBR. The aim has been to expand the understanding of the relatively brief statements of values to provide detailed information on the attributes of those values – environmental and experiential - and to map their extent, providing an evidential basis for assessment and management of aesthetic values across the property.

The limited time and budget for the project did not permit any new research however review and analysis of existing data sources has indicated that those aesthetic values identified in the RSoOUV, and their environmental attributes, are recognised across a range of communities – local, national and international. It has not been possible within the current project to identify aesthetic values not considered of OUV, in particular those held by the local and regional communities associated with the GBR. Although local community values may not be considered in protection of the World Heritage values of the GBR they nonetheless need consideration in the overall management of the property (cf. Greer et al 2000).

7.2 Changing practice in the World Heritage system

At the time of the nomination and inscription of the GBR, the OUV of the property was established through expert scientific knowledge. In line with the established practice of the time, the values listed under Criterion vii primarily described the visual beauty of environmental attributes holding the scientific values listed under Criteria viii, ix and x on which the property was also nominated and inscribed. Subsequent discussion of the use of Criterion vii, in particular that of Lucas et al (1997 - see Section 2 and below), acknowledged that a purely descriptive and visual approach to assessing aesthetics values in the GBR does not acknowledge the full depth and range of the aesthetic experience.

> *Aesthetic values are . . . expansive and contain an array of meanings and attachments that people associate with particular places* (Lucas et al 1997:49).

Aesthetic response to a place reflects the influences of perception, culture, experience and interaction with that place and is therefore likely to vary within and between various communities. Scientists may be considered as a particular kind of community but only one of many that may contribute to an understanding of the values of a place. The physical elements of a land or seascape may be the same, the ways in which they are perceived – the values attached to them - may differ, in much the same way as a taxonomic system of assigning similarity and difference to plants or animals is culturally specific.

Our literature review and analysis of existing data demonstrated that aesthetic response is linked to the characteristics or attributes of an environment and culturally or personally derived preferences. Our analysis has also shown that how people characterize or articulate the physical land or seascape is also culturally or personally determined, in other words the aesthetic experience is integrally connected to personal perception. The language or description of the environment and understanding of the relationships between physical or tangible elements within an environment cannot be generalized for example through descriptive or explanatory scientific frameworks such as ecosystems. To assess aesthetic values beyond those considered of OUV and to adequately manage aesthetic values, individual and community perceptions and the consequent values need to be documented.

Since the inscription of the GBR on the World Heritage list in 1981 the *Operational Guidelines to the World Heritage Convention* have changed significantly in relation to community involvement and engagement in the WH process. In 1981 the *Operational Guidelines* (UNESCO 1980) did not specifically refer to community. Only expert knowledge was

considered in providing evidence in justification of the values of the property. Little detail was provided in relation to the requirement for management of the property only that measures for conservation, including any management plans, be included with the nomination dossier (1980 Paragraph 33(iv)). The current *Operational Guidelines* (UNESCO 2012a) make a number of references to the role of communities, especially local communities and traditional societies. Although the primary concern of the World Heritage Committee, environmental NGOs and the international community will continue to be the OUV of the property, the Operational Guidelines now stress the involvement and engagement of local communities in all aspects of the World Heritage process including ongoing protection and management. This provides a mandate for community engagement in the general assessment of aesthetic values of the GBR and the management of aesthetic values not of outstanding universal value to be better recognised in the GBR. The relevant paragraphs are listed in Table 7.1.

Table 7.1: Relevant references to communities and traditional societies in the Operational Guidelines to the World Heritage Convention (UNESCO 2012a)

Section/Paragraph	Text (our emphasis)
Section I.C The States Parties to the World Heritage Convention : Paragraph 12	States Parties . . . are encouraged to ensure the participation of a wide variety of stakeholders, including site managers, local and regional governments, local communities, non-governmental organizations (NGOs) . . . in the identification, nomination and protection of World Heritage properties.
Section I.E The World Heritage Committee : Paragraph 26 (Strategic Objectives)	5. Enhance the role of Communities in the implementation of the World Heritage Convention
I.I Partners in the protection of World Heritage : Paragraph 40	Partners in the protection and conservation of World Heritage can be those individuals and other stakeholders, especially local communities, governmental, non-governmental and private organizations and owners who have an interest and involvement in the conservation and management of a World Heritage property.
II.E Integrity and/or authenticity : Paragraph 83. (Discussion of authenticity – cultural properties)	Attributes such as spirit and feeling do not lend themselves easily to practical applications of the conditions of authenticity, but nevertheless are important indicators of character and sense of place, for example, in communities maintaining tradition and cultural continuity.
II.E Integrity and/or authenticity : Paragraph 90. Integrity	For all properties nominated under criteria (vii) - (x) . . . it is recognized that no area is totally pristine . . . Human activities, including those of traditional societies and local communities, often occur in natural areas. These activities may be consistent with the Outstanding Universal Value of the area where they are ecologically sustainable.
Section II.F Protection and management : Paragraph 119. Sustainable use	World Heritage properties may support a variety of ongoing and proposed uses that are ecologically and culturally sustainable and which may contribute to the quality of life of communities concerned
Section III.A Preparation of Nominations : Paragraph 123	Participation of local people in the nomination process is essential to enable them to have a shared responsibility with the State Party in the maintenance of the property. States Parties are encouraged to prepare nominations with the participation of a wide variety of stakeholders, including site

Section/Paragraph	Text (our emphasis)
	managers, local and regional governments, local communities, NGOs and other interested parties

7.3 Understanding the diversity of community-held values

Values held in communities may vary and therefore identification of values involves consideration of aggregate community perceptions of the value of a land or seascape and the identification of values that are shared within and between communities (cf. Planisphere et al 2007:5). Identifying and understanding aesthetic values must therefore necessarily directly involve communities and stakeholders. For local communities the experience of the GBR will be closely tied to layers of personal and shared identity and personalised and shared understandings of community history. Communities will have associations or attachments to the GBR that may originate from a variety of experiences or influences including cultural, uses or activities, visitation or access.

Communities may be defined in many different ways – scientific communities, locally-based communities, cultural groups, communities of users, communities of artists, tourists etc. These communities may be formally defined or loosely constituted. Our image research and our analysis of the research undertaken by others suggests – although this needs further investigation - that the regularity and mode of access to the GBR and the associated uses or activities may influence or at least frame the aesthetic experience of the GBR especially where people choose to return to particular places outside their everyday realm of engagement with the GBR, for example to journey to the northern remote part of the GBR. Wynveen et al (2010) specifically identified people with extensive associations with the GBR through recreational uses to research place meaning; all were also residents or former residents of the GBR region. As Greer et al (2000:73) noted, most research or consultation with non-indigenous stakeholder groups associated with the GBR was, at that time, generally couched 'in terms of tourism and other recreational user studies, or socio-economic impact assessments for commercial operators'. With the exception of consultation with the GBR communities recently undertaken, and the larger scale study of values now underway by Natalie Stoeckl at James Cook University (in preparation), our investigations found that the available data on community-held values was associated with understanding the needs, expectations and satisfiers for visitors.

Community assessment of aesthetic values needs to be framed by initial discussion and consultation to identify the range of communities and cultural groups who may have a particular kind of attachment to or association with the GBR. Individuals may belong to more than one of these 'communities' or cultural groups. Of particular relevance here is our finding that both environmental and experiential the attributes underpin aesthetic values and their management. Communities with particular associations with the GBR may identify distinctive environmental and experiential attributes associated with their own connections and experiences of the GBR; these need to be documented.

More recently, in 2012, GBRMPA held a series of workshops designed to understand stakeholder perceptions and views about values, threats and pressures in relation to different elements of the Great Barrier Reef (GBRMPA 2012b:2). Stakeholders invited to attend the workshops included existing GBRMPA's community-based advisory groups (including the Local Marine Advisory Committees – see below) together with three stakeholder workshops at different locations, and two workshops specifically for Traditional Owners and Indigenous communities.

Participants were asked to reflect on the natural elements of the reef that are important to them and the potential impacts to those elements. The responses of participants were then summarized as different general sets of values. Those listed under aesthetic values confirm a

number of findings from our research as to the aesthetic values of OUV and their environmental attributes. These were:

- reefs and islands can be seen from space; place of natural wonder; spectacular pristine beauty; awesome; spiritual; majestic and calming; looked upon with pride; unique habitats associated with environmental attributes of islands, beaches and coastlines; estuaries, deep water, bays, inlets and coral reefs
- 'wow' factor associated with fish, crocodiles, birds, whales, dugong, sharks, rays, sea snakes, turtles
- water clarity; colour of water associated with water quality (GBRMPA 2012b:5).

Participants were also invited to complete a follow-up survey to provide GBRMPA with a more detailed understanding of the workshop responses. Again the focus was on natural elements, future management and threats. Only 10 of the 135 survey respondents identified themselves as being from a Traditional Owner group (see section below).

The results of the workshops and follow-up survey, while limited in number of participants, were noted by GBRMPA as being of value for identifying and describing values and threats and pressures to the values of the reef in their strategic assessment process. In relation to aesthetic values, the results are useful in confirming those values already well known and documented through the RSoOUV and elaborated in our research – at least as far as their environmental attributes are concerned. Their experiential attributes were not investigated. Of note in the summary of outcomes of the project was the importance of the GBR to several participants (number not reported) in generating optimism that the world might persist; for its contribution to well-being; and for its spiritual value, suggesting experiential values that could be explored in future consultations.

In much the same way as our analysis confirmed aesthetic values that are broad-based and shared, so too a community assessment is likely in the first instance to draw out these well known values, especially if questions are guided by scientific approaches to documenting the environments and values of the GBR. Differences or other values reflecting personal and/or community aesthetic responses require time and engagement in consultation processes and the framing of questions that enable participants to move from commonly articulated values to more personal or deeper responses. There is no 'one size fits all' in community engagement and in the assessment of cultural heritage values. In social and community research, surveys, workshops, focus groups or interviews, or a mixture of all of these, are commonly used. Shifting the initial focus of community engagement to experiential attributes may provide a pathway for broadening community responses in the identification and assessment of aesthetic values.

The Local Marine Advisory Committees (LMACs), the voluntary community-based committees who advise GBRMPA on management issues, provide an already established pathway for identifying various communities who have an interest in the GBR and could contribute their experience and knowledge to detailed assessment of aesthetic values and attributes held within and across specific communities. Given the role of the LMACs in facilitating communication between user groups in the local community, they may be best placed to identify the very diverse communities and individuals that should be considered in future assessments and the most appropriate methods by which they can participate in the process.

As discussed in *Section 3 Shaping a method*, at the first GBRMPA workshop it was suggested by GBRMPA representatives that a set of principles could be used to guide recognition of aesthetically significant, unique and special areas of the GBR. A preliminary set of principles for consideration of aesthetic values was drafted that included

> *Principle 3 Recognise that human aesthetic values and aesthetic perceptions have changed and will continue to change, and that different generations may hold distinctly different values.*

Our analysis supports this contention to some extent, and we agree that the aesthetic values differ between communities and cultural groups. Further, our analysis reveals that the modes or ways of experiencing the GBR have changed, and that contemporary ethical positions appear to have strongly influenced how people interact with other species and act towards the environment of the GBR, while seeking to enjoy similar types of experiential attributes – for example, the colour, visual richness and aliveness of reef communities and the opportunities to engage with large and iconic marine animals. These changes demonstrate that generational differences are likely to exist now and into the future. Periodic review of the aesthetic values held by communities is therefore needed.

7.4 GBR Traditional Owners & Indigenous communities

Associated with the increasing recognition of the fundamental role of communities in the World Heritage process are calls for the involvement and informed consent of Indigenous communities in the nomination and management of their customary lands (UNESCO 2012b). Participants at a recent meeting of the International Expert Workshop on the World Heritage Convention and Indigenous Peoples, organised by the International Work Group for Indigenous Affairs (IWGIA) have called for Indigenous peoples to be:

- fully consulted and directly involved in the identification, decision-making and management of World Heritage sites within or affecting their lands, territories and resources, through representatives chosen by themselves in accordance with their own procedures and institutions, and
- for the implementation of the World Heritage Convention to be consistent with the United Nations Declaration on the Rights of Indigenous Peoples (http://whc.unesco.org/uploads/events/documents/event-906-1.pdf).

In relation to the current project, the GRMPA web site states:

> *Aboriginal and Torres Strait Islander people are the Traditional Owners of the Great Barrier Reef Region and evidence of their sea country connections goes back over 60,000 years. Today there are approximately 70 Traditional Owner clan groups whose sea country includes the Great Barrier Reef Marine Park.*
>
> *The Great Barrier Reef Marine Park Authority (GBRMPA) works with Aboriginal and Torres Strait Islander Traditional Owners and acknowledges their continuing social, cultural, economic and spiritual connections to the Great Barrier Reef region.*

As discussed above, a set of draft principles to guide recognition of aesthetically significant, unique and special areas of the GBR was developed at the first GBRMPA workshop. The first principle is:

> *1. Recognise Indigenous and traditional owner perspectives on aesthetic values*

The Retrospective Statement of Outstanding Universal Value for the GBRWHA acknowledges under Criterion ix the strong and continuing links of Aboriginal and Torres Strait Islander peoples with their sea-country and their interaction with the environment, evident in 'numerous shell deposits (middens) and fish traps, plus the application of story places and marine totems'. Although no further detail is provided, the inclusion of this statement in the RSoOUV recognises the special relationship that Indigenous peoples have with the GBR.

Indigenous values are not referred to under Criterion vii in the RSoOUV and full comparative assessment would be needed to identify whether aesthetic values specific to Indigenous communities can be considered of outstanding universal value. As noted in Section 2 of this report, we are unaware of any such study having been undertaken in relation to the use of World Heritage Criterion vii. Also as previously discussed, IUCN has noted the generally visual and Eurocentric approach to the application of Criterion vii even though aesthetic appreciation or values are considered 'a personal and emotionally based response . . . rooted in

a community/culture'. The IUCN principles and guidelines concerning Indigenous rights include:

> *Principle 1. Indigenous and other traditional peoples have long associations with nature and a deep understanding of it … Moreover, they should be recognised as rightful, equal partners in the development and implementation of conservation strategies that affect their lands, territories, waters, coastal seas, and other resources, and in particular in the establishment and management of protected areas.*
>
> and
>
> *Principle 4. Indigenous and other traditional peoples should be able to share fully and equitably in the benefits associated with protected areas, with due recognition to the rights of other legitimate stakeholders.*

Currently research into Indigenous perspectives on aesthetic values of the GBR is lacking and it was beyond the scope of this project to address this lack. Such perspectives will need to be considered in future studies and undertaken in consultation with Traditional Owners. The objective of consultation in the assessment of Indigenous (aesthetic) values of the GBR should be for Traditional Owners to:

- contribute to culturally appropriate information gathering and the research methodology
- provide information that will enable the cultural significance of places to be determined and
- have input into the development of any cultural heritage management options

recognizing some information may be sensitive or have restricted public access (see DECCW 2010).

There are a number of sources of information and existing organisational structures that may be useful frameworks or starting points for documenting Indigenous values in the GBR.

A brief search of the *Story Place* reference database of information and knowledge about Traditional Owners and their relationship with land and sea country in the Great Barrier Reef Region suggests a rich documentary source of existing studies and projects that offer a valuable repository of Indigenous knowledge of the GBR and in particular Indigenous experience of and associations with places within the GBR. For example the CRC study of Traditional Owner aspirations towards co-operative management of the Great Barrier Reef World Heritage Area (Ross et al 2004) used community case studies, and those from Traditional Owner groups documented connections to particular locations, management issues and observations of environmental change over time and were conducted entirely by the traditional Owner individuals and organisations concerned. In the Gooreng Gooreng Sea Country case study Mervyn Jukarn Johnson, a Gooreng Gooreng Elder states 'Our traditional art forms, dance, song and rock art, all depict and tell stories to translate the importance of river and sea life in their various forms' (Ross et al 2004:15).

The outcomes of this 2004 study demonstrate both the richness of cultural information held in Indigenous communities – and in the *Story Place* archive - and the value of providing communities with the opportunity to research, document and tell their stories in their own voices and through processes and mediums of their choice. In line with the recommendations of the IUCN (2006:9) future assessment of Indigenous perspectives on aesthetic values of the GBR could include local appreciation of aesthetics manifest in a variety of cultural expressions such as storytelling, mythology, spirituality, literature, music/art, symbols of power, wealth.

GBRMPA already has established processes for consultation with Indigenous communities and Traditional Owner groups, for example through Indigenous representation on the GBRMPA Board; working with Traditional Owners in the development and implementation of Traditional Use of Marine Resources Agreements (TUMRA); and through the Indigenous Reef Advisory Committee (IRAC). IRAC advises the Authority on matters, programs and strategies that impact Indigenous communities in the Great Barrier Reef World Heritage Area including the Great Barrier Reef Outlook Report and the Caring for Our Country Reef Rescue Program.

The terms of reference for IRAC include advising the Authority on ways to facilitate partnerships and engage with Traditional Owners to manage biological and cultural marine resources in the Great Barrier Reef World Heritage Area and to advise the Authority on

> *innovative and best practice communications approaches that facilitate information exchange between Indigenous people, managers and Reef stakeholders, and build a better understanding of the rights and interests of Traditional Owners in the Great Barrier Reef World Heritage Area.*

Given this, IRAC would seem to be the appropriate body through which GRMPA should initially consult with and seek the advice of Traditional Owners and Indigenous communities in relation to any future assessment of Indigenous value aesthetic values.

8 FINDINGS, CONCLUSIONS & RECOMMENDATIONS

8.1 Introduction

The purpose of the project was to:

- Identify, define and assess the aesthetic values of the Great Barrier Reef World Heritage Area (GBR) described in the Retrospective Statement of Outstanding Universal Value (RSoOUV) in relation to the aesthetic component of Criterion vii:

  containing superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance

- Define, and where possible map the attributes that embody these values
- Consider the potential impacts of a set of defined actions on the attributes associated with the defined aesthetic values (sensitivity analysis)

This required the development, refinement and application of a methodology to enable the aesthetic values given in the RSoOUV to be interrogated, their attributes to be identified and mapped and their sensitivity to be assessed against a range of impacts, providing a basis for management of those values.

From the outset of the project it was recognised that models for assessment of aesthetic values within the World Heritage system are lacking and the development of an appropriate methodology and its application in the project would break new ground and require evaluation and refinement as the project progressed. The methodology also needed to take account of the limited scope and timeframe for the project as these did not allow for any primary research or for new data to be generated. All data used in the project was available through published sources, primarily online or provided by GBRMPA.

Section 8.2 elaborates the findings from the present project in relation to the methods developed and processes used:

- Literature review (8.2.1)
- Developing the methodology (8.2.2)
- Applying the methodology (8.2.3).

Then Section 8.3 looks at our conclusions about the aesthetic values, first covering our conclusions on the aesthetic values of the GBR, and then our observations about the nature of aesthetic value as applied in the World Heritage system.

Section 8.4 then presents recommendations arising specifically from the present project.

8.2 Findings on methods and processes

8.2.1 Literature review

The identification and development of an appropriate methodology for the project was framed by review of the use of Criterion vii in arguing for the Outstanding Universal Value of World Heritage properties (Section 2.1) and current models of aesthetic values assessment (Section 2.2).

With regard to OUV and Criterion vii discussed in Section 2.1, we concluded that:

- It is the scientific values and their environmental attributes under Criteria viii, ix or x that that lead arguments for the OUV of properties also inscribed under Criterion vii.

- The attributes of the values against Criterion vii – superlative natural phenomena or natural beauty and aesthetic importance - are not distinct from or substantially different to the attributes of the other values of the property recognised through the Criteria viii, ix or x t
- The aesthetic values under Criterion vii 'describe' the visual aesthetics of attributes of the scientific values of the property making the argument for their OUV through the rhetorical power of description
- The aesthetic values considered of OUV are generally visual, 'scenic beauty', rather than other sensory experiences
- Threats and impacts to aesthetic values of OUV are rarely explicit.

The literature review confirmed that there is currently a lack of systematic methodologies for, or approaches to, the assessment of aesthetic values for World Heritage properties and little recognition of specific threats to or management of aesthetic values within the World Heritage system.

IUCN recommends that a rigorous approach is applied in establishing OUV in relation to aesthetic values but does not recommend any approaches, nor are any evident in the post-2005 inscriptions under Criterion vii. Systematic or comparative studies are needed to demonstrate and evaluate the threshold for OUV in relation to Criterion vii, and having documented approaches would facilitate this being done. At the time of writing, IUCN has not yet proposed or adopted any specific approaches.

Our review of literature associated with practice in the fields of landscape and heritage assessment (Section 2.2) suggested that the methodology developed for the present project should:

- Define aesthetics to include perceptual and experiential relationship to place or environment and not be limited to 'visual' or 'scenic qualities' (see Section 3.2.1 for a definition)
- Seek out multiple data sets and use a range of analytical methods to encompass the broadest understanding of aesthetic values
- Adopt a phenomenological approach that includes consideration of multiple community values.

These elements were subsequently adopted into the methodology for the present project.

8.2.2 Developing the methodology

On the basis of the literature review and through consultation and discussions with GBRMRPA at two workshops (Section 3.1) a method was proposed to elaborate the aesthetic values of the GBR framed by the RSoOUV.

From the literature review and workshops, we determined that:

- aesthetic values should be recognised as having both environmental and experiential attributes
- aesthetic values derive from human response to the characteristics and qualities of the environment (or place) and to the desired experiential conditions.

As is illustrated in Table 4.19, environmental attributes (elements, features or relationships between physical elements within the environment or landscape) may have a quality or qualities that enhance aesthetic appeal (e.g. water + blue + clear). The conditions under which the environment is experienced will also influence a person's perceptions of that environment. These desired conditions – experiential attributes - relate strongly to the nature of the place and its values. For example, the GBR is sought out for experiential attributes such as 'naturalness'.

The language around aesthetic values and World Heritage is complex and to assist in the definition of the methodology, a series of terms were carefully defined in Section 3.2.1.

Further definitions proved necessary in relation to sensitivity analysis, and we note in Section 3.3 and Table 3.7 that there is considerable potential for confusion between the definitions adopted by GBRMPA, the comprehensive strategic assessment of the GBR, the present project and impact assessment generally. We have tried to be clear in our use of terminology but recognise that more work is needed. In particular, expanding the GBRMPA's current suite of methods and approaches to encompass aesthetic values will require some sorting out of terminology.

8.2.3 Applying the methodology

As the elements of the methodology were developed, they were progressively reviewed through two workshops held at GBRMPA and a workshop with DSEWPaC staff in Canberra, as well as through feedback from project team members and client representatives. The methodology thus was refined prior to being applied.

The scope of this project was focused on OUV and Criterion vii. This meant that the RSoOUV was the foundation for our work. In considering potential data sources that could throw light on these values, we decided to adopt a broad approach and to look at a range of data. In particular we looked well outside the 'scientific' data sets that would be used to build a case for OUV under the other natural Criteria. As we have noted previously, aesthetic aspects of OUV have generally been established 'through the rhetorical power of description' rather than by the gathering and analysis of evidence.

The methodology we have developed is responsive to the particular brief for the GBR, but in principle we consider that our approach could be used in the assessment of aesthetic values:

- as part developing nominations for or assessing OUV for a place under consideration for the WHL
- to better define the aesthetic values of a place on the World Heritage List where aesthetic values have not been subject to a direct investigation
- to assess aesthetic values outside of the World Heritage framework.

We think it would be valuable to apply the methodology in another context to further refine and prove its value.

Data sets

The data used in our analysis was all pre-existing. The challenge was to locate and analyse material which offered the best opportunity of illuminating aesthetic values. Neither time nor budget allowed for any new research.

There is a massive wealth of data on the GBR, and it is held in many different places: the primary sources were those published on-line, sourced from the GBRMPA library, or obtained from GBRMPA staff and academic researchers.

Essentially there were four types of data:

- direct expressions of aesthetic values revealed through images and videos taken, selected and posted on-line by individuals (including professional photographs and videos)
- reported research on perceptions, expectations and satisfiers, mostly focused on visitors to the GBR, plus limited data from 'experts' and reef communities
- mediated expressions of aesthetic values in tourist posters, promotional materials and websites, with images sampled covering a period of nearly one hundred years
- consultation data from a recent series of workshops held by GBRMPA that explored why communities along the GBR coast value the GBR.

To enable analysis and integration of these diverse sources, a framework was developed and a series of summary tables prepared (Tables 4.15, 4.16, 4.17, 4.18 in Appendix 5).

Each of the data sources presented its own opportunities and challenges. Images as direct expressions of aesthetic values proved to be a valuable source. Vast quantities of such images are available from a range of websites, and sampling was needed to deal with the volume of this data. Inevitably, the images dataset is dominated by images taken at the most popular and accessible places, which in turn reflect the management plans and zonings of GBRMPA.

It is argued that the aesthetic values and associated attributes that are valued in one part of the GBR will be equally valued if experienced in another part of the GBR, whether currently visited or not. So the images taken provide a window into values and associated attributes across the property. Other factors may influence the images that are taken: for example, published images including those used to attract people to visit the GBR may influence some people to create their own version of that image, for example reef mosaic patterns taken from the air. Conversely, others may seek to create 'unique' images. It is not possible to control for these influences when using pre-existing images, but future research could be designed around this potential source of 'bias'.

Another challenge is to maintain a consistent approach in the content analysis of images. In the present project this was achieved by assigning the analysis of contemporary images to one team member and the analysis of historical imagery and changes over time to another team member. Then together they integrated their work into a single table related to the RSoOUV (Table 4.15).

Whereas many of the 'general public' images are not labelled with their location, the expert data was typically highly specific in terms of values, locations and attributes. The term 'experts' referred to people with a substantial knowledge of the GBR, generally derived from scientific or management-based roles. The data on 'expert' perceptions was gathered opportunistically, and a more comprehensive approach could be developed in future.

There has been a wealth of research into visitor perceptions, and although much of it was designed to assist in the development or refinement of tourism products, it still offered valuable perspectives. The majority of visitors go to a relatively small number of locations within the GBR, and again their perceptions can be regarded as a window into values and attributes that exist beyond these highly visited locations.

The most significant gap was data related to the communities and cultural groups that live along the GBR coast, with the main source of data coming from GBRMPA workshops and a survey that were held during the present project. It may be that there are other relevant data sets that we did not discover during the present project. Some new research currently underway through James Cook University will help fill this gap. There is also an important need to better understand the perspectives of Traditional Owners and Indigenous communities.

Extended descriptions of OUV

Linking the evidence to the RSoOUV was a key requirement in the present project, and the approach taken was to define a series of 'extended descriptions of OUV' against each aspect of Criterion vii in the RSoOUV, and to define environmental and experiential attributes for each 'extended description'. Section 4.4.3 demonstrates this.

This process revealed that some aspects of OUV were well represented within the RSoOUV. However, other aspects in the RSoOUV appeared to be limited to exemplar places, whereas our finding was that these aspects were far more extensively represented across the property.

Deriving the attributes

The derivation of the environmental and experiential attributes is described in Section 3.2.2 (Tables 3.1 and 3.2). Following consideration of the data on aesthetic values, the qualities that enhance the aesthetic value of the attributes of the GBR were defined (see Section 4.4.2 and Tables 4.19 and 4.20). This step gave further precision to the method.

Conceptual mapping

To illustrate where these extended descriptions of OUV are found within the property, the idea of conceptual mapping was adopted and a series of conceptual maps developed. These form part of Section 4.4.3.

Recognising the potential of conceptual mapping was an important moment in the development of the methodology. Using multiple GIS data layers was initially proposed as a way to map the attributes of OUV. However, on further examination a number of difficulties were recognised, including the time involved in assembling new GIS layers, the need to use 'surrogate' data, and the overall project time and resource limitations. Further, GBRMPA expressed concern that the use of GIS mapping may suggest that aesthetic aspects of OUV can be precisely and geographically defined, and that this may be misleading, especially at this early stage in the development and application of a new methodology. Both the project team and client representatives agreed with these concerns, and saw value in the use of conceptual maps.

Through a case study approach (described further below) we were able to demonstrate how the extended descriptions of OUV, the environment and experiential attributes, and the conceptual mapping could form the basis for geographical mapping.

Assessing sensitivity and impacts

In developing an approach to assessing sensitivity and impacts, the project team sought to build on existing approaches used by GBRMPA in the Outlook Report (GBRMPA 2009) and in the vulnerability assessments underway as part of implementing the GBRMPA's Biodiversity Strategy. The main difficulties were to align - so far as possible - other existing approaches with work underway as part of the comprehensive strategic assessment of the GBR including definitions of activities and the associated 'threats' or 'impacts', to attach an assessment of risk and scale and then to define which attributes could be impacted. Essentially this was based on the available information combined with professional judgement. Further development of these activity analysis tables (Section 5.3.2) is warranted, as is integration of aesthetic values into the biodiversity-based methods developed and used by GBRMPA (for example, the vulnerability assessments).

Because of the scope and resources available to the present project, it was agreed that our work should focus on the sensitivity assessment for experiential attributes. GBRMPA vulnerability assessments will progressively provide the sensitivity assessments for key species and groups of species as well as a series of defined habitats. Even when this work has been completed, it appears that there will still be gaps in terms of morphological, non-biological attributes, for example sandy beaches, bays and shoals.

Case study approach

Case studies were initially conceived of as a way to 'ground truth' the sensitivity analysis, and formed part of the project team's proposal. As the project progressed, and given the scale of the GBR, the value of case studies to test the overall methodology – that is both values and sensitivity – was recognised, and strongly supported by GBRMPA and DSEWPaC. GBRMPA staff, in a workshop with the project team, proposed 6 case studies; these are described in Section 6.2. Further, the comprehensive strategic assessment intends to focus on specific locations where there are emerging planning, land use and development issues, and the Strategic Assessment team supported the alignment of the 'aesthetic values and sensitivity' case studies with their proposed locations.

Ultimately, only one case study was able to be explored. This was selected from the initial GBRMPA list. It was important that the selected case study offer the opportunity to examine the aesthetic values and sensitivity method, had data available and represented a range of the physical, biological and human settings present in the GBR.

The case study enabled both a testing of the methodology and its 'deepening'. For example, in applying the aesthetic values methodology, we were able to move from conceptual mapping of the types of environmental and experiential attributes holding each of the extended description

of OUV (as provided in Section 4.4.3) to indicative geographic mapping of values and attributes. In our view this demonstrated the potential for:

- the methodology to be used to demonstrate the location and layering (or clustering) of the extended descriptions of OUV at a local scale
- geographic mapping of attributes and aesthetic values.

In the case study, the experiential attributes proved more difficult to define than the environmental attributes, with the available data. Although experiential attributes will be present throughout the property they will vary in nature and importance and may be severely impacted in some areas by human interventions. This is a significant finding. The sensitivity table (Table 5.4) developed for the experiential attributes illustrates this point.

Use of the management zones as a surrogate demonstrated the potential value of this approach for approach to be applied broadly across the GBR, but our view is that these zonings are probably not sufficiently refined for use at the local level.

In conclusion, the case study approach proved to be a worthwhile part of the project:

- It provided a way of testing and confirming that the methodology was robust and could be applied at GBR-wide and local scales.
- Applying the methodology in the case study enabling further refinement.
- The case study that was completed demonstrated that the method offered a considered approach to assessing impacts on the experiential and environmental attributes associated with aesthetic values under Criterion vii.
- Conceptual mapping proved to be a valuable way to communicate the potential location of OUV as well as taking the next step towards geographic mapping. It could provide a useful tool for proponents.

8.3 Findings on aesthetic values

8.3.1 Aesthetic values of the Great Barrier Reek World Heritage Area

Based on our research and analysis we make the following observations about the aesthetic values of the GBR:

- Aesthetic values can be investigated and documented, through the use of existing research methodologies and data. Equally, aesthetic values cannot be assumed and need to be investigated. The primacy of underwater and encounter experiences for example, may have been anticipated but qualities such as 'blueness' were not.
- Our analysis, and the evidence we examined confirms and supports all of the 'aesthetic values' described in the RSoOUV. These values all have attributes that are both environmental and experiential (see Section 4.4.3).
- The evidence is very limited in relation to the 'superlative natural phenomena' components of RSoOUV except for element 1.1; we expect this may reflect the more limited visitor access to highly sensitive locations such as turtle breeding colonies or fish spawning sites and therefore limited opportunities to experience these phenomena. It may also be the case that natural phenomena may require specialist knowledge and precise timing to witness and appreciate these phenomena. It may also be that the other aesthetic qualities of the GBR outshine these superlative natural phenomena.
- Based on the evidence examined, there is a noticeable primacy of underwater and encounter experiences.

- Our research has provided an extended understanding of the aesthetic values given in the RSoOUV through elaboration of their environmental and experiential attributes (see Section 4.4.3).
- RSoOUV is focused strongly on the visual aspect of aesthetics. The data reveals that this is a limited and limiting perspective. The aesthetic values revealed in the evidence examined in the present project reflect a far broader appreciation than just the visual. This confirms the importance of adopting a broader definition of aesthetic value for the GBR and the World Heritage system in general, an observation aligned with emerging heritage practice in Australia and the potential for its inclusion in new approaches being developed by IUCN.
- The values are evident at different scales and through different lenses – panoramic, water level and below the water - and these are relevant in the assessment of sensitivity and potential impacts.
- Environmental attributes are spread throughout the property but their qualities and the experience of these attributes (experiential attributes) differs in different contexts or locations (and presumably for different people or communities).
- Environmental attributes of aesthetic values occur in different individual strengths (the extent of their qualities) and combinations. These two factors may suggest some places are of higher aesthetic value however but this is not necessarily the case especially when the experiential attributes are considered. An environmental attribute may be associated with different experiential attributes in different locations.
- Some of the experiential attributes not captured in RSoOUV include concepts of solitude, remoteness, and discovery. There are also some qualities that enhance the aesthetic value of environmental attributes that are not well represented in RSoOUV, for example 'blueness' (see Table 4.19).
- The experiential attributes differ across the GBR. Some areas (particularly the northern section of the GBR) can be described as 'remote, natural' and can be contrasted to areas that are 'well-known, well-experienced'. This is primarily attributable to accessibility, population centres and tourism 'hot spots'. A further contrast exists between areas in the GBR where there are substantial impacts on experiential and environmental attributes through a range of other uses and activities. This suggests that there may be areas of the GBR in which aesthetic values are more strongly expressed although this will depend on the interrelationships of the experiential and environmental attributes.
- The enormous scale and interconnectivity of environmental attributes underpins many of the aesthetic values of the GBR, especially through the panoramic lens as has been emphasised by Lucas et al (1997). On the other hand most visitors experience the GBR at the close-up and intimate scale of the underwater lens, seeing particular 'jewels'. This may run counter to appreciating interconnectivity of the environment.
- The RSoOUV highlights the aesthetic values of specific locations such as the Whitsunday Islands and Hinchinbrook Island. Although these locations may be exemplars of specific aspects of OUV, they are not the only parts of the GBR where this value exists. Through the 'extended description of OUV' we have sought to address this observation. Our work demonstrates that the aesthetic values associated with the exemplar places mentioned in the RSoOUV are in fact far more widespread across the property.

8.3.2 Findings on aesthetic values as applied in the World Heritage system

Defining aesthetic value

In Section 8.2.1 above we have noted a number of findings from the literature review in relation to the definition of aesthetic value in the World Heritage system. These include:

- The complexity of Criterion vii, with its two distinct and apparently unrelated parts, each requiring a different approach in assessment (this is explored further below).
- The difference between the Operating Guidelines which suggests a broad, experiential approach to aesthetic values and practice as evidenced through post-2005 inscriptions which focus on the visual aspects of aesthetic values.
- The way that in practice, assessment of aesthetic values and identification of attributes is reliant Criteria viii, ix and x.

Differences in the scientific and aesthetic discourses

Scientific values such as those referred to under Criteria viii, ix and x of the RSoOUV describe and analyse the relationships between elements of the physical world and use terminology that is specific to a particular way of understanding the physical world, for example as an ecosystem. A specific scientific discourse frames how the component parts of the land or seascape and how they are seen to be interrelated. This discourse is culturally specific, and not all cultures accept western scientific discourses as the only valid discourse.

Articulating aesthetic values and their environmental attributes similarly requires description of the physical world but through a language or terminology that is specific to aesthetic appreciation of the land or seascape, and that is culturally determined. Moreover, it describes relationships between elements of the physical world together with the experience of these elements and relationships.

Scientific and aesthetic appreciations of the physical world begin with describing tangible elements of the environment - organic and inorganic. In understanding aesthetic appreciations, the **perception** of the environment, its component parts and inter-relationships arises from the knowledge or perception of the individual, their relationship to the place and the framing provided by their social and cultural setting. Aesthetic appreciations are contextual.

By contrast, a scientific classificatory system or typology of the environment or landscape - of which there are many – relies on defining observable and measurable physical differences.

To the extent that a scientific conceptual framework is used in relation to aesthetic values in the World Heritage system and in evaluating Criterion vii by IUCN, the present study suggests that this requires reconsideration.

The identification of the environmental attributes of aesthetic values needs to start with understanding the diverse ways in which an environment or place is perceived or conceptualised by different communities and from different cultural perspectives. Further work is needed within the World Heritage system to investigate the diversity of approaches to conceptualising the environment and attributes of aesthetic values, the extent to which this is culturally determined and in light of this, thresholds for establishing OUV. In relation to the GBR, it will particularly important to consider the culturally-specific perceptions of Traditional Owners and Indigenous communities.

Defining the attributes of aesthetic values

In the RSoOUV, the environmental attributes of aesthetic values under Criterion vii are described as elements of the environment in a similar (scientific) manner to those under the Criteria viii, ix and x with the addition of a rhetorical qualitative description of the attribute that makes the argument for its aesthetic qualities. A similar process or pattern in the description of values under Criterion vii in other World Heritage properties was identified in the literature review in Section 2. This was discussed as potentially problematic if the assessment of aesthetic values of OUV is limited to this approach and does not recognise the potential OUV of aesthetic values for which the attributes differ from those of values identified under other criteria. It has not been possible within the scope of this project to explore this further in relation to the GBR through existing or new research. A full assessment of the aesthetic values of the GBR – local, national and international - remains to be done.

Environmental attributes and the aesthetic perceptions of those attributes

This project identified a range of environmental attributes of aesthetic values similar to those indicated in the RSoOUV, however it is in the **perception** of the attributes that differences were noted between the data analysed in the project and the description of environmental attributes given in the RSoOUV. For example, the scientific values may relate to reef biodiversity but the environmental attributes of aesthetic values may be diversity in form, colour and patterns of animals, plants and water plus the experiential attributes. We addressed this by considering the qualities of the environmental attributes that enhance aesthetic values (Table 4.19).

In management terms, this may mean that maintaining the biodiversity of the reef for example may not necessarily equate to maintaining its aesthetic values, although arguably loss of biodiversity would impact on aesthetic values.

Recognising and managing experiential attributes

The RSoOUV for the GBR focuses exclusively on the environmental attributes of aesthetic values and does not recognise experiential attributes. As the findings of our research suggest, experiential attributes are integral to the integrity of aesthetic values and therefore OUV under Criterion vii being the conditions in which aesthetic values are experienced. Beauty as perceived through vision also has experiential attributes or conditions such as quiet or lack of human presence that are not held in the tangible attributes but are essential to experiencing aesthetic value. Appropriate management strategies for the aesthetic values of the GBR will need to recognise their experiential attributes.

8.3.3 Engaging communities in defining aesthetic values

Section 7 Engaging communities in defining aesthetic values briefly explores some of the issues and opportunities associated with bringing an understanding of community-held aesthetic values into an assessment of OUV under Criterion vii.

The key points below reflect observations from previous work and the present project, and form part of our findings:

- Aesthetic values are shaped through culture and experience and can be expected to vary across time and generations and across cultures.
- All values are influenced by, and more probably founded upon, contemporary societal ethics and morals. These may exist broadly across a society and across otherwise distinctive cultural groups. This is evident in the continuity of expressions of particular aesthetic values of the GBR over a period during which there are been significant changes in the opportunities to engage with the GBR environment and other species (primarily through technology).
- The aesthetic values of individuals, communities and cultural groups can be examined directly and indirectly. Examples of both modes were used in the present project. Direct examination included the questions posed in the GBRMPA workshops and subsequent survey (GBRMPA 2012b), and in much of the visitor research. Indirect modes include examining images produced and posted to the internet. Both modes have value and multiple data sources can be used to enable a richer and more nuanced understandings to emerge. On the other hand, a proportion of the data examined was created for other research purposes, such as understanding visitor motivations and satisfiers, and more focused investigation of community-held aesthetic values is warranted.
- There may be significant differences in the aesthetic appreciation of GBR resident communities and visitors, and some of the research examined noted differences between first-time and repeat visitors. Equally, there may be significant common ground and shared appreciations. Examination of these differences is a topic worthy of future research, and would help build a stronger evidence-base around the aesthetic values of people with different types of connections with the GBR.

- Aesthetic values are connected to both environmental and experiential attributes, and therefore the nature of people's association with the GBR – or more precisely the nature of their opportunities to experience the GBR – needs further examination. A focus on the experience of place – what it feels like to be there – may help broadened and deepen an understanding of aesthetic values.
- In examining expressed aesthetic values, the initial articulation by an individual, community or cultural group may first rest on well-known or widely shared values, with more deeply felt and personal expressions being harder to articulate, requiring more reflection and 'a safe space' in which these feelings and aesthetic responses can be expressed. Such processes are not common in community-based values research, usually because of constraints of time and budget, and specific opportunities may need to be sought to undertake this type of work.
- Aesthetic values can be seen as linked to other notions such as 'social capital' and the 'cultural services' provided by ecosystems. Aesthetic values are also linked to a sense of well-being and, at times and by some people, to spiritual values. These understandings are worth further exploration and may deliver opportunities for GBRMPA to more firmly integrate aesthetic values into their assessment and monitoring methodologies.
- The aesthetic values held by Traditional Owner and Indigenous communities have been relatively little explored in Australia. Assumptions are often made about differences between Indigenous and non-indigenous peoples however there appears to have been little research done. The limited framing of aesthetic values as predominantly visual in the World Heritage system, as was evident in our examination of recent nominations, would not appear to align well with Indigenous perspectives on country that are more holistic and encompassing. In some Australian jurisdictions, aesthetic values have been aligned with western concepts of art and beauty, an even more remote framing if Indigenous values are to be considered. Even the distinction between aesthetic and other values may be inappropriate within an Indigenous worldview.
- Engaging with Indigenous peoples and bringing their values into management is now a requirement of the World Heritage system; this is discussed in Section 7.2 and 7.4. Enabling Indigenous peoples across the GBR to shape their own expressions of aesthetic value would be a worthwhile undertaking. It would bring important perspectives and assist with the management of aesthetic values across the GBR. It may reveal additional aspects that should be added to the 'extended descriptions' of OUV presented in this report in relation to Criterion vii, and add to an understanding of other values and attributes of the RSoOUV.

8.4 Specific recommendations

This section draws out some specific recommendations from the above discussion of the findings made in the present project.

Recommendation 1: Workshop with GBRMPA to develop an action plan

Many ideas have been explored in the present project, and the project team has made a number of observation and findings that are worthy of discussion and action.

It is recommended that the first step could be to bring together key officers from GBRMPA and DSEWPaC and the project team to review the methodology used, the results obtained and the future directions indicated in our findings. Through discussion, an action plan could be formulated so that the results and findings can be implemented.

In making this proposal, it is noted that the recommendations of the Lucas et al report (1997) on the aesthetic values have not been implemented, and it is clear that action by GBRMPA will be needed to enable action to now be taken. Further, it is clear that GBRMPA staff have a keen interest in tackling aesthetic values and integrating them into their work. Given the

comprehensive strategic assessment process and the scoping of a long term sustainability plan for the GBR now underway, it appears to be the right time to take this initiative.

Recommendation 2: Broad community engagement on aesthetic values

Based on the analysis undertaken in the present project, it is recommended that a program of research be developed by GBRMPA, in partnership with relevant research institutions, to better document all aesthetic values associated with the GBR so as to assist with assessing impacts and managing these values.

Recommendation 3: Indigenous engagement on aesthetic values

Indigenous understandings of aesthetic value should be investigated, preferably through processes that enable Traditional Owner and Indigenous communities to explore, document and share their perspectives on aesthetic values and attributes. The GBRMPA's Indigenous Reef Advisory Committee (IRAC) would be the right initiating body for this work.

Recommendation 4: IUCN thematic study on aesthetic values and Criterion vii

Thematic studies are global and regional studies of sites types, themes and values that assist in the selection of potential sites for World Heritage nomination, and in their evaluation by providing guidance on determining OUV in relation to the themes explored: for example IUCN's Global Overview of Forest Protected Areas on the World Heritage List (1997).

Given the finding of the present project that aesthetic values within the World Heritage system have not, in the past, been the subject of rigorous assessment, it is recommended that IUCN commission a thematic study to enable assessment, evaluation, comparative analysis and thresholds to be developed for aesthetic values that recognise both environmental and experiential attributes. At the time of writing IUCN is undertaking a study of issues in the use of Criterion vii in the World Heritage system and this study may address these topics.

A thematic study in relation to Criterion vii should examine both parts of Criterion vii to discern the relationship between 'natural phenomena' and 'natural beauty and aesthetic importance'. In the present project we have noted that the first concept is usually expressed comparatively and within a scientific framework, and the links between the two parts of the criterion are therefore significantly disjunct.

Recommendation 5: Experiential attributes and management planning

Although the environmental attributes under Criterion vii of the RSoOUV are well integrated into the management of the GBR, experiential attributes have to date received little consideration. The findings of the project indicate that impacts to experiential attributes (like impacts to environmental attributes) will impact on aesthetic values and therefore greater consideration in protection of the aesthetic values and in relation to management planning and zoning is needed. As well, the activity analysis tables presented in Section 5.3.2 require further work by GBRMPA to enable the full impact assessment process to be completed for the full range of environmental attributes used in the present study.

Recommendation 6: Making use of this report

This report brings together a very rich and detailed corpus of information that will contribute to the protection and management of aesthetic values in the Great Barrier Reef and may assist in the assessment and management of aesthetic values in World Heritage sites and other protected environments.

Our literature review has indicated that despite recognition of the need for investigation of aesthetic values within the GBR and more generally their assessment within the World Heritage system, this is the first study to specifically address these issues in a World Heritage property and to recognise both the environmental and experiential attributes of aesthetic values.

Although framed by the scope of the project, the report presents extensive research in a number of sections that individually address particular issues in the assessment and/or management of

aesthetic values and provides a methodology that is explored through the detailed examination of the GBR.

As such it provides a valuable resource that can be drawn on in various ways including:

- Providing the basis on which a 'how to' manual for the assessment of aesthetic values in the World Heritage system and more generally (e.g. in the assessment of National Heritage nominations) could be developed through refining the methodology, including assessment of values, conceptual mapping and assessment of sensitivity and impacts.
- A publication communicating the outcomes of the project that would distil this very detailed and data-rich report so that the research and findings could be made more widely accessible.
- Provide the basis for a response to the IUCN study currently underway.
- Seeking to apply the methodology developed in the present project in another context. This could include to another World Heritage property inscribed under Criterion vii, in the development of a nomination to the World Heritage List, or in the assessment of a place for a national or state heritage listing.
- Seeking to provide a full assessment of aesthetic values for the GBR.

REFERENCES

Reports and published material

AGB McNair Pty. Ltd. 1994, Report of scoping study on community attitudes towards wilderness-based recreation on the Great Barrier Reef, 2 volumes. Report to the Great Barrier Reef Marine Park Authority, Townsville.

AGB McNair Pty. Ltd. 1995, Recreation use and management issues for the Great Barrier Reef Marine Park: National Survey of Community Attitudes. Report to the Great Barrier Reef Marine Park Authority, Townsville.

AHC and ACIUCN 2002, *Australian Natural Heritage Charter.* Second edition.

Australia ICOMOS 1988, *Guidelines to the Burra Charter: Cultural significance*. Australia ICOMOS.

Australian Heritage Commission 1993, A Preliminary Proposal for Assessment of Aesthetic Values for Regional Assessment. Unpublished Working Paper, Australian Heritage Commission. Canberra.

Badman, T., Bomhard, B., Fincke, A., Langley, J., Rosabal, P. and Sheppard, D. 2008, *Outstanding universal value: Standards for natural world heritage*. Gland, Switzerland: IUCN.

Beltrán, J. (Ed.) 2000. *Indigenous and Traditional Peoples and Protected Areas: Principles, Guidelines and Case Studies*. Gland, Switzerland and Cambridge UK: IUCN and International, Gland, Switzerland: WWF.

Bennett, I. 1971, *The Great Barrier Reef.* Melbourne: Lansdowne Bowen, J. and M. Bowen, J. and M. Bowen 2002 *The Great Barrier Reef. History, Science, Heritage*. Cambridge: Cambridge University Press.

Bowen, J. & M. Bowen 2002, *The Great Barrier Reef : history, science, heritage*. Cambridge; Port Melbourne, Vic.: Cambridge University Press.

Bureau of Tourism Research (BTR) 1992, Australian tourism trends, BTR, Canberra.

Catherine Brouwer Landscape Architects & Chenoweth & Associates Pty Ltd 1994, *Coastal Visual Landscape Evaluation Procedure,* A Report for the Department of Environment and Heritage Coastal Management Branch, Catherine Brouwer Landscape Architects & Chenoweth & Associates Pty Ltd, Brisbane.

Clark, R. N. & Stankey, G. H. 1979, *Recreation Opportunity Spectrum: A framework for planning, monitoring and research*, General Technical Report PNW-98, USDA Forest Service.

Colfelt, D. 2010, *100 Magic Miles of the Great Barrier Reef the Whitsunday Islands*. Woodhill Mountain, Via Berry: Windward Publications Pty, Limited, 9th Edn.

Context Pty Ltd 2003, Inspirational Landscapes: Stage 1. Report prepared for the Australian Heritage Commission. Four volumes.

Context Pty Ltd 2006, Desktop review: landscape aesthetics of four National Heritage List nominations. Department of the Environment and Heritage.

Context Pty Ltd 2012, Presentations to the Australian Heritage Council's Aestehtic Methodology Workshop, 22 March 2012, Canberra. Talk 1 History and context of the assessment of aesthetic values; Talk 2 Existing aesthetic assessment methodology.

Coghlan, A. and Prideaux, B. 2009, Reef Tourism: An analysis of the competitiveness of the Great Barrier Reef tourism destination and a comparison with other reef tourism destinations. Report to the Marine and Tropical Sciences Research Facility. Reef and Rainforest Research Centre Limited, Cairns.

CRC Reef Research Centre 2003, *Marine Tourism on the Great Barrier Reef. Current State of Knowledge June 2003*. Brochure.

Department of Environment, Climate Change and Water NSW (DECCW) 2010, *Aboriginal cultural heritage consultation requirements for proponents 2010*. Sydney: Department of Environment, Climate Change and Water NSW.

Department of Sustainability, Environment., Water, Population and Communities 2011, *Draft referral guidelines for potential National Heritage listing of the west Kimberley.* DSEWPaC.

Doubilet, David. 'Coral Eden' in *National Geographic* (January 1999), 2-29.

Dunstan, A. and J. Fruend 2008, *The Great Barrier Reef Australia : undersea experience*. Thornbury, [Vic.]: Grollo Ruzzene Foundation.

EC3 Global (n.d.) *The Great Barrier Reef: Experiences Audit*, report prepared for Tourism Queensland and Department of Resources, Energy and Tourism.

EDAW 1996, *A View of the Coast An Overview of the Scenic Resources of the Queensland Coast* (Draft final copy for review), Prepared for: Queensland Department of Environment Coastal Management Branch, EDAW, Brisbane.

EDAW 1996, *A view of the coast: an overview of the scenic resources of the Queensland coast.* Department of Environment and Heritage, Queensland.

Fenton, M. D., Young, M. & Johnson, V. Y. 1998, Re-presenting the Great Barrier Reef to tourists: Implications for tourist experience and evaluation of coral reef environments, *Leisure Sciences: An Interdisciplinary Journal*, 20:3, 177-192.

GBRMPA 2012a, *Great Barrier Reef Strategic Assessment Terms of Reference Submissions Report*, GBRMPA, Australian Government, Townsville.

GBRMPA 2012b, 'Great Barrier Reef Strategic Assessment Stakeholder Workshop: General Workshop Report', GBRMPA, Australian Government, Townsville (Confidential draft).

GBRMPA 2012c, *Informing the Outlook for the Great Barrier Reef coastal ecosystems,* GBRMPA, Australian Government, Townsville.

GBRMPA 2012d, *Great Barrier Reef Biodiversity Conservation Strategy 2012: Draft for public consultation,* GBRMPA, Australian Government, Townsville.

GBRMPA 2012e, *Seagrass Vulnerability Assessment*, accessed via website < http://www.gbrmpa.gov.au/__data/assets/pdf_file/0017/21743/VA-Seagrass-31-7-12.pdf>.

Gillett, K. 1984, *Australia's Great Barrier Reef in colour*. Frenchs Forest, N.S.W. : Reed.

Government of Australia. 1980, Nomination of the Great Barrier Reef for inclusion in the UNESCO World Heritage List. Canberra: Government of Australia.

Green, David, Gianna Moscardo, Tanya Greenwood, Philip Pearce, Matt Arthur, Amanda Clark & Barbara Woods, 1999, Understanding public perceptions of the Great Barrier Reef and its management, CRC Reef Research Centre, Technical Report No. 29, Townsville.

Greer, S., J. Harrington, M. Gibbs, M. Fuary and D. Roe. 2000, Cultural Heritage Values in the Great Barrier Reef Marine Park and World Heritage Area: Recommendations for Research and Management. Draft Report to the Great Barrier Reef Marine Park Authority.

Harding, C., Jarman, A., Eddy, R. & Nolan, M. 1987, 'An aesthetic evaluation of Stage 2 of Kakadu National Park: a comparison with the Top End and the North Western Woodlands biogeographic provinces', in CCNT (ed.), *A Preliminary Assessment with Particular Reference to Operational Guidelines for the Implementation of the World Heritage Convention,* Technical Report Number 37, Conservation Commission of Northern Territory, Darwin, pp. 153-166.

Harrington, Jane 2004, 'Being here: heritage belonging place making study community identity formation at Avebury (England) Magnetic Island (Australia) Ayutthaya (Thailand). PhD thesis, James Cook University.

HCOANZ 2009, *Protecting Local Heritage Places: a national guide for local government and communities.* Revised edition.

Heenan, D. 1990, *The Great Barrier Reef : a guide to the reef, its islands and resorts*. Wilberforce, N.S.W: Glenmede.

Huf, S. & Douglas, A. 1995, Community attitudes toward wilderness-based recreation on the Great Barrier Reef. Unpublished report to the Great Barrier Reef Marine Park Authority. Quoted in Shafer et al 1998.

Itami, R. 1993, 'Characteristics of landscape aesthetic value and implications for assessment methodology', in *More than meets the eye: Identifying and assessing aesthetic value.* Report of the Aesthetic Value Workshop held at the University of Melbourne on 27 October 1993. AHC Technical Workshop Series No. 7.

IUCN 2006, *Enhancing the IUCN Evaluation Process of World Heritage Nominations. A contribution to achieving a credible and balanced World Heritage List.* Proceedings of the IUCN-WCPA World Heritage Workshop at the International Academy for Nature Conservation Isle of Vilm, Germany, November 24th – 28th, 2005.

IUCN 2007, Evaluations of Nominations of natural and mixed properties to the World Heritage List. UNESCO doc. WHC-07/31.COM/INF.8B2

IUCN 2008, Evaluations of Nominations of natural and mixed properties to the World Heritage List. UNESCO doc. WHC-08/32.COM/INF.8B2

Lamb, R. 1993, 'Advancing arguments for the conservation of valued landscapes' *More than meets the eye: Identifying and assessing aesthetic value.* Report of the Aesthetic Value Workshop held at the University of Melbourne on 27 October 1993. AHC Technical Workshop Series No. 7.

Larson, Silva 2009, *Communicating stakeholder priorities in the Great Barrier Reef region.* Society & Natural Resources, 22 (7). pp. 650-664. ISSN 1521-0723

Lucas, P. T. Webb, P. Valentine and H. Marsh 1997, *The Outstanding Universal Value of the Great Barrier Reef World Heritage Area*. Great Barrier Reef Marine Park Authority and James Cook University of North Queensland.

McGregor, C. 1974, *The Great Barrier Reef.* Amsterdam: Time-Life Books.

McIntyre-Tamwoy, Susan 2004, *My Barrier Reef: exploring the Bowen community's attachment to the Great Barrier Reef.* Historic Environment, 17 (3). pp. 19-28. ISSN 0726-6715.

McNamara, K. & Prideaux, B. 2009, *Tourist Exit Survey Second Annual Report: January – December 2008. Annual and Quarterly Patterns of Reef and Rainforest Tourism in North Queensland from Exit Surveys Conducted at Cairns Domestic Airport*. Report to the Marine and Tropical Sciences Research Facility. Reef and Rainforest Research Centre Limited and James Cook University, Cairns.

Moscardo, G, Woods, B. & Greenwood, T. 2001, *Understanding visitor perspectives on wildlife tourism*, CRC Sustainable Tourism Technical Report, Gold Coast, CRC Sustainable Tourism..

Moscardo, G. and Ormsby, J. 2004, *A Social Indicators Monitoring System for Tourist and Recreational Use of the Great Barrier Reef*. GBRMPA Research Publication No. 80.

The following were reported in Coglan & Prideaux, 2009:

Moscardo, G. and Pearce, P. 2002, The Great Barrier Reef Media Monitoring Project, Report 5: May – August 2001. Supplementary Report on Internet Users. CRC Reef Research Project B2.1.2 Data Summary Report. Townsville: CRC Reef Research Centre.

Moscardo, G. 2001, The Great Barrier Reef Media Monitoring Project, Report 4: January –April 2001. Exploring Reef Science summary. Townsville: CRC Reef Research Centre.

Moscardo, G. 2000a, The Great Barrier Reef Media Monitoring Project, Report 1: January –April 2000. Exploring Reef Science summary. Townsville: CRC Reef Research Centre.

Moscardo, G. 2000b, The Great Barrier Reef Media Monitoring Project, Report 2: May – August 2000. Exploring Reef Science summary. Townsville: CRC Reef Research Centre.

Moscardo, G. 2000c, The Great Barrier Reef Media Monitoring Project, Report 3:September – December 2000. Exploring Reef Science summary. Townsville: CRC Reef Research Centre.

Northern Development Taskforce, n.d. 'Visual Landscape Study: Inventory and analysis with implications'. Report for the Departments of Industry and Resources, and Environment and Conservation. Unpublished report.

O'Brien, M. & Ramsay, J. 1991, *Assessing aesthetic values of landscapes for the Register of the National Estate: A discussion paper.* Prepared for the Australian Heritage Commission.

Ormsby, J A 2004, *Review of the Social, Motivational and Experiential Characteristics of Recreational Anglers from Queensland and the Great Barrier Reef Region*. GBRMPA Research Publication No. 78.

Ormsby, J., Moscardo, G., Pearce, P. and Foxlee. J. 2004, *A Review of Research into Tourist and Recreational Uses of Protected Natural Areas.* GBRMPA Research Publication No. 79.

Ormsby, J. and Shafer, S. 2000, *Visitor Experiences, Values and Images of Whitehaven Bay: An Assessment of Perceived Conditions* GBRMPA Research Publication No. 62.

Planisphere, Context & Collaborations 2007, *Wind Farms and Landscape Values: National Assessment Framework*. Report prepared for Auswind and the Australian Council of national trusts.

Pocock, C. 2002, Sense Matters: aesthetic values of the Great Barrier Reef. *International Journal of Heritage Studies* 8(4):365-381.

Prineas, T. & Allen, P.J. 1992, 'Queensland's Wet Tropics World Heritage Area: mapping the scenic quality', *Landscape Australia, vol. 3.* pp.241-246.

Queensland Government 2009, *Central Queensland Tourism Opportunities Plan 2009-2019.*

Queensland Heritage Council 2006, *Using the criteria: a methodology*. Cultural Heritage Branch, Queensland Environmental Protection Agency.

Queensland Parks and Wildlife Service, *2077 Whitsunday and Mackay Islands Visitor Management Strategy*, QPWS.

Roughley, T. C. 1927, *The wonders of the Great Barrier Reef*. Sydney: Angus & Robertson.

R.W. Butler, R. W. & Waldbrook, L. A. 2003, 'A New Planning Tool: The Tourism Opportunity Spectrum', *The Journal of Tourism Studies,* Vol. 14, No. 1 May 2003, 21-32.

Resource Assessment Commission 1993, *Values and attitudes concerning the Coastal Zone*, Coastal Zone Inquiry Information Paper No. 4, Australian Government Publishing Service, Canberra.

Resource Assessment Commission 1993, *Values and Attitudes Concerning the Coastal Zone, Coastal Zone Inquiry Information Paper No.4,* Australian Government Publishing Service, Canberra.

Rolfe, J., Gregg, D., & Tucker, G. 2011, *Valuing local recreation in the Great Barrier Reef, Australia.* Research Report No. 102. Environmental Economics Research Hub.

Ross H, Innes J, George M, Gorman K. (eds) 2004, Traditional Owner aspirations towards co-operative management of the Great Barrier Reef World Heritage Area: community case studies. Townsville: CRC Reef Research Centre Technical Report No 56. CRC Reef Research Centre.

Shafer, S.C., Inglis, G.J., Johnson, V.Y., & Marshall, N.A. 1998, *Visitor experiences and perceived conditions on day trips to the Great Barrier Reef,* Technical Report No. 21, CRC Reef Research Centre, Townsville.

Sherl, L.M. Valentine, P.S. and Millard M 1997, *Recreation and Tourism Experience in the Great Barrier Reef Marine Park and Implications for Management*. GBRMPA Research Publication No. 65.

Stoeckl, N., Birtles, A., Valentine, P., Farr, M., Curnock, M., Mangott, A. & Sobtzick, S. 2010, *Understanding the social and economic values of key marine species in the Great Barrier Reef*. Project 4.8.6 (a) Final Report. Marine and Tropical Sciences Research Facility, James Cook University.

Stoeckl, N., Hicks, C. C., Mills, M., Fabricius, K., Esparon, M., Kroon, F., Kaur, K., & Costanza. R. 2011, The economic value of ecosystem services in the Great Barrier Reef: our state of knowledge in *Ecological Economics Reviews*. Robert Costanza, Karin Limburg & Ida Kubiszewski, Eds. *Ann. N.Y. Acad. Sci*. 1219: 113–133.

Swanwick, C. & Land Use Consultants, 2002, *Landscape Character Assessment Guidance for England and Scotland.* Prepared by Carys Swanwick and Land Use Consultants for The Countryside Agency & Scottish Natural Heritage.

The Research Box, Land Use Consultants & Minter, R. 2009, *Experiencing Landscapes: capturing the cultural services and experiential qualities of landscape*, Natural England Commissioned Report NECR024 prepared by The Research Box, Land Use Consultants & Rick Minter for Natural England, Cheltenham (UK).

Thorsell, J. 2012, Scenic natural beauty: how can it be judged? in *World Heritage Review* 63:8-14.

Tourism Australia (n.d.), *National Landscapes Great Barrier Reef Positioning workshop outcome*'. Report prepared by LEAP.

Tourism Queensland (n.d.), National Landscapes Program: Submission for the Great Barrier Reef GBRMPA (unpublished – provided by Chris Briggs 14/8/2012).

USDA Forest Service, (n.d.), Recreation Opportunity Spectrum Primer and Field Guide, <http://www.fs.fed.us/cdt/carrying_capacity/rosfieldguide/ros_primer_and_field_guide.htm> accessed 30 October 2012.

U.S. Department of the Interior, 2009, *Water and Land Recreation Opportunity Spectrum (WALROS): Users' Handbook.* Prepared by Aukermann, Haas and Associates, Second Edition, Denver (Co).

UNESCO 1977, *Guidelines for the World Heritage Committee*, June 1977. Paris: UNESCO World Heritage Centre.

UNESCO 1994, Operational Guidelines for the Implementation of the World Heritage Convention, February 1994. Paris: UNESCO World Heritage Centre.

UNESCO 2005, Operational Guidelines for the Implementation of the World Heritage Convention, February 2005. Paris: UNESCO World Heritage Centre.

UNESCO 2011, Operational Guidelines for the Implementation of the World Heritage Convention, November 2011. Paris: UNESCO World Heritage Centre.

UNESCO 2011b, *Preparing World Heritage Nominations* (Second edition, 2011). Paris: UNESCO.

UNESCO 2012a, *Operational Guidelines for the Implementation of the World Heritage Convention*. Paris: UNESCO World Heritage Centre.

UNESCO 2012b, *World Heritage and Indigenous Peoples. World Heritage Review.* Vol 62. Paris: UNESCO World Heritage Centre.

Vanclay, F M 1988, *Tourist perceptions of the Great Barrier Reef 1998*. GBRMPA Research Publication No. 38.

Woodford, J. 2010, *The Great Barrier Reef.* Sydney: Pan Macmillan.

Wynveen, Christopher J., Kyle, Gerard T., and Sutton, Stephen G. 2010, *Place meanings ascribed to marine settings: the case of the Great Barrier Reef Marine Park.* Leisure Sciences, 32 (3). pp. 270-287. ISSN 1521-0588.

Young, J. & Temperton, J. 2007, *Measuring community attitudes and awareness towards the Great Barrier Reef 2007*. GBRMPA Research Publication No. 90.

Image sources

National Archives of Australia, www.naa.gov.au [including the photographic collections of the Department of Information Central Office (1949); Australian News and Information Bureau (1951); Australian Information Service (1980s)]

National Library of Australia, including collections of photographs by CM Yonge 1928 and Frank Hurley

State Library of Victoria, www.slv.vic.gov.au

Queensland State Archives, http://www.archives.qld.gov.au

GBRMPA Library online, www.gbrmpa.gov.au/resources-and-publications/library-services

National Geographic Magazine, May 2011, http://ngm.nationalgeographic.com/2011/05/great-barrier-reef/wallpaper

Allposters, www.alposters.com.au

Vintage Venus, http://www.vintagevenus.com.au

Yonge, C. M. 1928/9, Album of views of Queensland, Great Barrier Reef, New South Wales and Canberra, 1928-1929 http://www.nla.gov.au/apps/cdview/?pi=nla.pic-vn3997786&referercode=cat

Online sources (from Sections 4.3 and 4.4)

AUSCAPE Photo Library, www.auscape.com.au, accessed 12 October 2012.

Australian Government tourism website, www.australia.com

Cairns and the Great Barrier Reef website, www.cairnsgreatbarrierreef.gov.org.au

Flickr, www.flickr.com, accessed 5 October 2012.

Great Barrier Reef Marine Park Authority (GBRMPA) website and the Department of Sustainability, Environment, Water, Population and Communities website, www.environment.gov.au/coasts/gbr/index.html

National Geographic photography, www.photography.nationalgeographic.com, accessed 15 October.

Peter Lik, www.lik.com, accessed 12 October 2012.

Photobucket, www.photobucket.com, accessed 5 October 2012.

Queensland Government website, www.queenslandholidays.com.au

Roger Steen, www.rogersteen.com, accessed 12 October 2012.

Steve Parish Publishing, www.steveparish.com.au, accessed 12 October 2012.

The Conversation, www.theconversation.edu.au, accessed October 2012.

APPENDIX 1: GREAT BARRIER REEF STRATEGIC ASSESSMENT FACT SHEET

Australian Government
Department of Sustainability, Environment, Water, Population and Communities

September 2012

GREAT BARRIER REEF STRATEGIC ASSESSMENT FACT SHEET

The Great Barrier Reef is the largest coral reef ecosystem on earth and one of Australia's most beloved natural icons. It is also facing increased pressures from population and economic growth and climate change.

The Australian and Queensland governments share responsibility for managing the Reef. Together we are actively addressing these pressures to maintain the Great Barrier Reef World Heritage Area's reputation as one of the best managed marine protected areas in the world.

But we have also recognised the need to become more strategic in our joint planning to future proof the Reef against potential impacts from activities ranging from increased shipping to urban development.

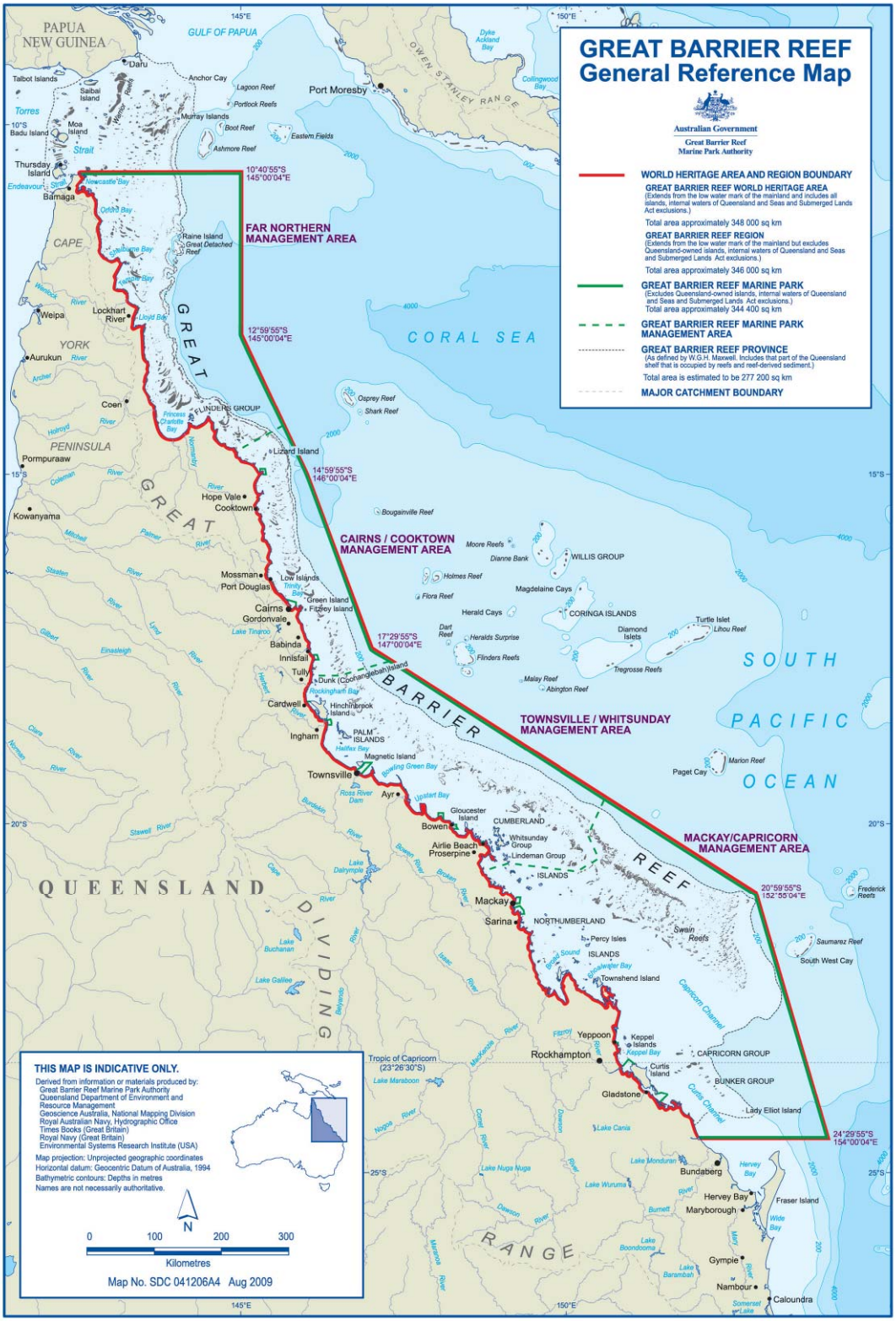
As a result, we have embarked on by far the largest, most wide-ranging and most complex strategic assessment ever undertaken in Australia. It will cover not only the Great Barrier Reef World Heritage Area but also the adjacent coastal zone where a range of activities occur that can impact on its environmental and heritage values.

Strategic assessments enable a `big-picture' approach to environment and heritage protection that provide certainty in the long term, by determining where sustainable development can occur, the type of development that will be allowed and the conditions under which development may proceed.

They go beyond normal project by project assessments to look at landscape-scale cumulative impacts, as well as all relevant direct and indirect impacts.

The comprehensive strategic assessment of the Great Barrier Reef will forge stronger links between planning for the land and marine environments, in recognition of how much one affects the other.

It will also provide an opportunity for more focussed studies of how planning approaches are applied in some of the highest growth coastal areas along the Reef's edge.


GREAT BARRIER REEF
General Reference Map
Australian Government
Great Barrier Reef Marine Park Authority
WORLD HERITAGE AREA AND REGION BOUNDARY
GREAT BARRIER REEF WORLD HERITAGE AREA
(Extends from the low water mark of the mainland and includes all islands, internal waters of Queensland and Seas and Submerged Lands Act exclusions.)
Total area approximately 348 000 sq km
GREAT BARRIER REEF REGION
(Extends from the low water mark of the mainland but excludes Queensland-owned islands, internal waters of Queensland and Seas and Submerged Lands Act exclusions.)
Total area approximately 346 000 sq km
GREAT BARRIER REEF MARINE PARK
(Excludes Queensland-owned islands, internal waters of Queensland and Seas and Submerged Lands Act exclusions.)
Total area approximately 344 400 sq km
GREAT BARRIER REEF MARINE PARK MANAGEMENT AREA
GREAT BARRIER REEF PROVINCE
(As defined by W.G.H. Maxwell. Includes that part of the Queensland shelf that is occupied by reefs and reef-derived sediment.)
Total area is estimated to be 277 200 sq km
MAJOR CATCHMENT BOUNDARY
FAR NORTHERN MANAGEMENT AREA
CAIRNS / COOKTOWN MANAGEMENT AREA
TOWNSVILLE / WHITSUNDAY MANAGEMENT AREA
MACKAY/CAPRICORN MANAGEMENT AREA
PAPUA NEW GUINEA
GULF OF PAPUA
CORAL SEA
SOUTH PACIFIC OCEAN
QUEENSLAND
GREAT BARRIER REEF
GREAT DIVIDING RANGE
CAPE YORK PENINSULA
Port Moresby
Thursday Island
Bamaga
Weipa
Lockhart River
Aurukun
Coen
Pormpuraaw
Kowanyama
Hope Vale
Cooktown
Mossman
Port Douglas
Cairns
Gordonvale
Babinda
Innisfail
Tully
Cardwell
Ingham
Townsville
Ayr
Bowen
Airlie Beach
Proserpine
Mackay
Sarina
Yeppoon
Rockhampton
Gladstone
Bundaberg
Hervey Bay
Maryborough
Gympie
Nambour
Caloundra
Lizard Island
Osprey Reef
Shark Reef
Bougainville Reef
Moore Reefs
Dianne Bank
WILLIS GROUP
Holmes Reef
Flora Reef
Magdelaine Cays
Herald Cays
CORINGA ISLANDS
Diamond Islets
Turtle Islet
Lihou Reef
Dart Reef
Heralds Surprise
Flinders Reefs
Tregrosse Reefs
Malay Reef
Abington Reef
Marion Reef
Paget Cay
Frederick Reefs
Saumarez Reef
South West Cay
Swain Reefs
Percy Isles
Townshend Island
Keppel Islands
CAPRICORN GROUP
BUNKER GROUP
Curtis Island
Lady Elliot Island
Fraser Island
Hinchinbrook Island
PALM ISLANDS
Magnetic Island
Gloucester Island
CUMBERLAND ISLANDS
Whitsunday Group
Lindeman Group
NORTHUMBERLAND ISLANDS
Green Island
Fitzroy Island
Low Isles
FLINDERS GROUP
Raine Island
Great Detached Reef
Murray Islands
Boot Reef
Eastern Fields
Ashmore Reef
Lagoon Reef
Portlock Reefs
Anchor Cay
Dau
Talbot Islands
Saibai Island
Moa Island
Badu Island
Torres Strait
Endeavour Strait
Newcastle Bay
Orford Bay
Temple Bay
Lloyd Bay
Princess Charlotte Bay
Trinity Bay
Halifax Bay
Rowling Green Bay
Upstart Bay
Edgecumbe Bay
Shoalwater Bay
Keppel Bay
Port Curtis
Hervey Bay
Wide Bay
Tropic of Capricorn (23°26'30"S)
10°40'55"S 145°00'04"E
12°59'55"S 145°00'04"E
14°59'55"S 146°00'04"E
17°29'55"S 147°00'04"E
20°59'55"S 152°55'04"E
24°29'55"S 154°00'04"E
THIS MAP IS INDICATIVE ONLY.
Derived from information or materials produced by:
Great Barrier Reef Marine Park Authority
Queensland Department of Environment and Resource Management
Geoscience Australia, National Mapping Division
Royal Australian Navy, Hydrographic Office
Times Books (Great Britain)
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Environmental Systems Research Institute (USA)
Map projection: Unprojected geographic coordinates
Horizontal datum: Geocentric Datum of Australia, 1994
Bathymetric contours: Depths in metres
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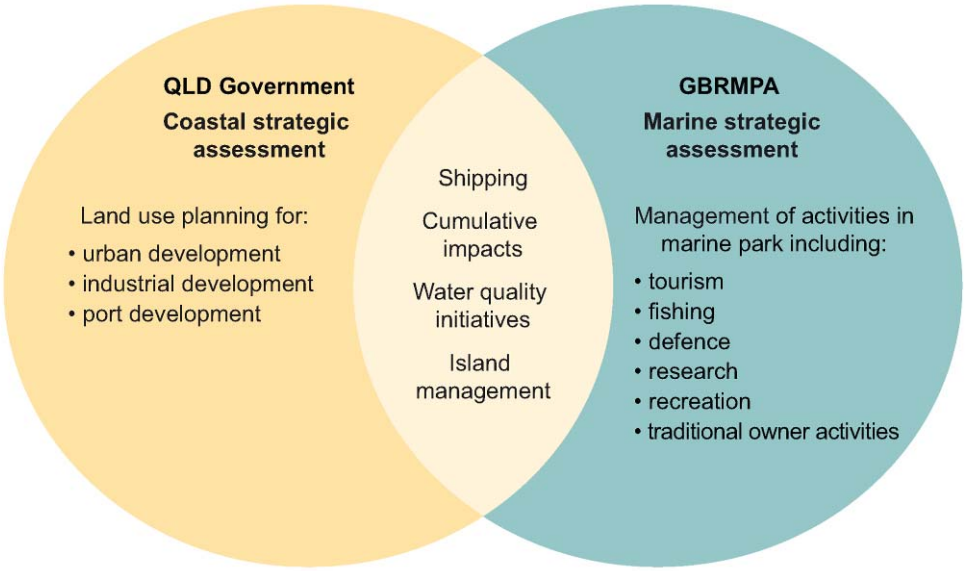


Once a strategic assessment is complete, new development projects or activities can be planned on a more sustainable basis and under more streamlined government processes that aim to cut red tape and reduce approval timeframes, benefitting the environment, local communities and business.

It will ensure the protection of the highest value environmental assets while guiding sustainable development in the Great Barrier Reef coastal area.

The Australian Government has signed two agreements to ensure the comprehensive strategic assessment strengthens protection for matters of national environmental significance, including the Great Barrier Reef Marine Park and relevant world heritage properties, wetlands of international importance, threatened species and ecological communities and migratory species.

The first agreement is with the Great Barrier Reef Marine Park Authority which manages the 344,400 square kilometre marine park for many uses, including conservation, recreation, tourism, fishing and shipping.

The second agreement is with the Queensland Government which manages the 2,300 km long coastal zone and the islands of the marine park.

These agreements establish the basis for the two strategic assessments that will together comprise a comprehensive strategic assessment of the Great Barrier Reef World Heritage Area and adjacent coastal zone.

The Australian and Queensland governments have been discussing ways of managing the Reef in a more strategic way for some time. This approach has been accelerated in response to the decision of the World Heritage Committee to investigate the state of conservation of the Great Barrier Reef World Heritage Area. The comprehensive strategic assessment is a key element of Australia's response to the concerns raised by the World Heritage Committee.

The comprehensive strategic assessment will investigate the adequacy of existing management arrangements to protect the Great Barrier Reef World Heritage Area as well as the Queensland Government's coastal management, planning and development framework.

The strategic assessment will assess all matters of national environmental significance in the coastal area including world heritage values.

It will be developed over a 12-16 month period, allowing time for public input into its development.

Subject to conditions, under an endorsed strategic assessment, the federal environment minister can approve certain classes of actions, avoiding the need for proponents to submit individual proposals for further environmental assessment under national environment law.

But the federal environment minister still retains the right to consider individual proposals that are large or complex and have not been approved under the strategic assessment, and to place appropriate conditions to ensure strict environmental standards apply.

In the meantime, the Australian Government will continue to ensure that individual proposals for development in this area meet a high standard of assessment, including consideration of cumulative and other relevant impacts such as from shipping and associated infrastructure. It will also ensure these individual project assessments are aligned with the strategic assessment as it develops.

The World Heritage Committee's 2012 monitoring mission to the Great Barrier Reef highlighted the value of the strategic assessment now underway as a means of improving protection of this natural wonder.

Once complete, the strategic assessment will strengthen our protection of the Great Barrier Reef and guide its management for different uses for many years to come, building in enough flexibility to adapt to changing climatic and other circumstances.

APPENDIX 2: GREAT BARRIER REEF RSoOUV – CRITERION vii

Ref #	Statement of Outstanding Universal Value	Attributes
(vii) *Contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance*		
1	The GBR is of superlative natural beauty above and below the water, and provides some of the most spectacular scenery on earth.	See 1.2, 1.3, 1.4, and 1.7
1.1	It is one of a few living structures visible from space, appearing as a complex string of reefal structures along Australia's northeast coast.	Coral reefs (whole of system)
1.2	From the air, the cast mosaic patterns of reefs, islands and coral cays produce and unparallelled aerial panorama of seascapes comprising diverse shapes and sizes.	Aerial scenery
1.3	The Whitsunday Islands provide a magnificent vista of green vegetated islands and white sandy beaches spread over azure waters.	Whitsunday Islands scenery
1.4	This contrasts with the vast mangrove forests in Hinchinbrook Channel, or the rugged vegetated mountains and lush rainforest gullies periodically cloud-covered on Hinchinbrook Island.	Hinchinbrook channel mangroves
		Hinchinbrook Island morphology
		Hinchinbrook Island vegetation
1.5	On many of the cays there are spectacular and globally important breeding colonies of seabirds and marine turtles and Raine Island is the world's largest green turtle breeding area.	Seabird breeding colonies
		Turtle breeding colonies
		Raine Island green turtle breeding area
1.6	On some continental islands, large aggregations of over-wintering butterflies periodically occur.	Overwintering butterfly aggregations
1.7	Beneath the ocean surface, there is an abundance and diversity of shapes, sizes and colours: for example spectacular coral assemblages of hard and soft corals, and thousands of species of reef fish provide a myriad of brilliant colours, shapes and sizes.	Reef fish diversity
		Coral diversity, health and structure
		Water clarity
		Overall marine species diversity and abundance
1.8	The internationally renowned Cod Hole is one of many significant tourist attractions.	Potato cod (site specific)
		Cod Hole dive site
1.9	Other superlative natural phenomena include the annual coral spawning, migratng whales, nesting turtles, and significant spawning aggregations of many fish species.	Whales
		Coral spawning
		Turtle rookeries
		Fish aggregations

APPENDIX 3: DETAILS OF WORLD HERITAGE PROPERTIES INSCRIBED ON CRITERION vii FROM 2003 – 2012.

Marine properties are highlighted.

Property	County	Criteria	Description of values under Criterion vii
Purnululu National Park	Australia	vii, viii,	Although PNP has been widely known in Australia only during the past 20 years and it remains relatively inaccessible, it has become recognised internationally for its **exceptional natural beauty**. The prime scenic attraction is the extraordinary array of banded, beehive-shaped cone towers comprising the Bungle Bungle Range. These have become **emblematic of the park and are internationally renowned** among Australia's natural attractions. The **dramatically sculptured structures, unrivalled in their scale, extent, grandeur and diversity of forms anywhere in the world**, undergo remarkable seasonal variation in appearance, including striking colour transition following rain. The intricate maze of towers is accentuated by sinuous, narrow, sheer-sided gorges lined with majestic Livistona fan palms. These and the soaring cliffs up to 250 m high are cut by seasonal waterfalls and pools, creating the major tourist attractions in the park, with evocative names such as Echidna Chasm, and Frog Hole, Piccaninny and Cathedral Gorges. The diversity of landforms and ecosystems elsewhere in the park are representative of the larger region, and lack a unique aesthetic quality, but provide a sympathetic visual buffer for the massif. The **powerful aesthetic experience of the Bungle Bungles** has aroused huge interest among the public, and the ranges figure prominently in national and international advertising of Australia's tourist attractions, matching the prominence of the Uluru-Kata Tjuta National Park. Photographers and travel writers include the Bungle Bungles among the world's natural wonders, some describing them as Australia's equivalent of the Grand Canyon.
Three Parallel Rivers of Yunnan Protected Areas	China	vii, viii, ix, x	The deep, parallel gorges of the Jinsha, Lancang and Nu Jiang are the **outstanding natural feature of the property**; **while large sections of the three rivers lie just outside the property boundaries, the river gorges are nevertheless the dominant scenic element in the area**. High mountains are everywhere, with the glaciated peaks of the Meili, Baima and Haba Snow Mountains providing a **spectacular scenic skyline**. The **Mingyongqia Glacier is a notable natural phenomenon**, descending to 2700 m altitude from Mt Kawagebo (6740 m), and is claimed to be the glacier descending to the lowest altitude for such a low latitude (28° N) in the northern hemisphere. Other **outstanding scenic landforms** are the alpine karst (especially the 'stone moon' in the Moon Mountain Scenic Area above the Nu Jiang Gorge) and the 'tortoise shell' weathering of the alpine Danxia.
Ilulissat Icefjord	Denmark	vii, viii	The combination of a huge ice sheet and a fast moving glacial ice-stream calving into a fjord covered by icebergs is **a phenomenon** only seen in Greenland and Antarctica. Ilulissat offers both scientists and visitors easy access for close view of the calving glacier front as it cascades down from the ice sheet and into the ice-choked fjord. The wild and highly scenic combination of rock, ice and sea, along with the dramatic sounds produced by the moving ice, combine to present a **memorable natural spectacle.**
Pitons Management Area	Saint Lucia	vii, viii	The Pitons Management Area **derives its primary visual impact and aesthetic qualities from the Pitons,** two adjacent forest-clad volcanic lava domes rising abruptly from the sea to heights greater than 700m. The Pitons predominate over the St Lucian landscape, being visible from virtually every part of the island and providing a distinctive landmark for seafarers.The combination of the Pitons against the backdrop of green tropical vegetation and a varying topography combined with a marine

Property	County	Criteria	Description of values under Criterion vii
			foreground gives the area its **superlative beauty.**
Tropical Rainforest Heritage of Sumatra	Indonesia	vii, ix	The parks that comprise the Tropical Rainforest Heritage of Sumatra are all located on the prominent main spine of the Bukit Barisan Mountains, known as the 'Andes of Sumatra'. **Outstanding scenic landscapes abound** at all scales. The mountains of each site present prominent mountainous backdrops to the settled and developed lowlands of Sumatra. The combination of the **spectacularly beautiful** Lake Gunung Tujuh (the highest lake in southeast Asia), the magnificence of the giant Mount Kerinci volcano, numerous small volcanic, coastal and glacial lakes in natural forested settings, fumaroles belching smoke from forested mountains and numerous waterfalls and cave systems in lush rainforest settings, emphazise the **outstanding beauty** of the Tropical Rainforest Heritage of Sumatra.
Islands and Protected Areas of the Gulf of California	Mexico	vii, ix, x	The serial property is of **striking natural beauty** and provides a dramatic setting due to the rugged forms of the islands, with high cliffs and sandy beaches contrasting with the brilliant reflection from the desert and the surrounding turquoise waters. The **diversity of forms and colours** is complemented by a wealth of birds and marine life. The diversity and abundance of marine life associated to **spectacular submarine forms and high water transparency** makes the property a diver's paradise.
West Norwegian Fjords – Geirangerfjord and Nærøyfjord	Norway	vii, viii	The Nærøyfjord and Geirangerfjord areas are considered to be **among the most scenically outstanding fjord areas** on the planet. Their **outstanding natural beauty** is derived from their narrow and steep-sided crystalline rock walls that rise up to 1400 m direct from the Norwegian Sea and extend 500 m below sea level. Along the sheer walls of the fjords are numerous waterfalls while free-flowing rivers rise up through deciduous and coniferous forest to glacial lakes, glaciers and rugged mountains. There is **a great range of supporting natural phenomena,** both terrestrial and marine such as submarine moraines and marine mammals. Remnants of old and now mostly abandoned transhumant farms add a cultural aspect to the dramatic natural landscape that complements and adds human interest to the area.
Malpelo Fauna and Flora Sanctuary	CO	vii, ix	The marine environment of the Malpelo FFS, characterized by steep walls, caves, and large aggregations of large predators and pelagic species, is indeed a **phenomenon of outstanding natural beauty and aesthetic importance**. It is one of the few areas in the world where large predators and pelagic species can be observed in large numbers in an undisturbed environment where they maintain behavioral patterns relatively free from human influence. The **superlative nature of this area** is well recognized by the major diving magazines of the world, which rank it as a top dive destination.
Jeju Volcanic Island and Lava Tubes	Korea	vii, viii	The Geomunoreum lava tube system, which is regarded as the finest such cave system in the world, has an **outstanding visual impact** even for those experienced with such phenomena. It displays the **unique spectacle** of multi-coloured carbonate decorations adorning the roofs and floors, and dark-coloured lava walls, partially covered by a mural of carbonate deposits. The fortress-like Seongsan Ilchulbong tuff cone, with its walls rising out of the ocean, is a **dramatic landscape** feature, and Mount Halla, with its array of textures and colours through the changing seasons, waterfalls, display of multi-shaped rock formations and columnar-jointed cliffs, and the towering summit with its lake-filled crater, further adds to the **scenic and aesthetic appeal**.

Property	County	Criteria	Description of values under Criterion vii
South China Karst	China	vii, viii	South China Karst represents **one of the world's most spectacular examples** of humid tropical to subtropical karst landscapes. T**he stone forests of Shilin are considered superlative natural phenomena** and the world reference site for this type of feature. The cluster includes the Naigu stone forest occurring on dolomitic limestone and the Suyishan stone forest arising from a lake. Shilin contains a wider range of pinnacle shapes than other karst landscapes with pinnacles, and a higher diversity of shapes and colours that change with different weather and light conditions. The cone and tower karsts of Libo, also considered the world reference site for these types of karsts, form **a distinctive and beautiful landscape**. Wulong includes giant collapse depressions, called Tiankeng, and **exceptionally high natural bridges** between which are long stretches of very deep unroofed caves. These **spectacular** karst features are of world class quality.
Teide National Park	Spain	vii, viii	Mount Teide is a **striking** volcanic landscape dominated by the jagged Las Cañadas escarpment and a central volcano that makes Tenerife the third tallest volcanic structure in the world. Within this landscape is a **superlative suite of landforms** that reveal different phases of construction and remodeling of the volcanic complex and highlight its unique geodiversity. The **visual impact** is emphasized by atmospheric conditions that create constantly changing textures and tones in the landscape and a 'sea of clouds' that forms a visually impressive backdrop to the mountain.
Lagoons of New Caledonia: Reef Diversity and Associated Ecosystems	France	vii, ix, x	The tropical lagoons and coral reefs of New Caledonia are considered to be some of the **most beautiful reef systems** in the world due to their wide variety of shapes and forms within a comparatively small area. This ranges from extensive double barrier systems, offshore reefs and coral islands, to the near-shore reticulate reef formations in the west coast zone. The **richness and diversity of landscapes and coastal backdrops** gives a distinctive aesthetic appeal of exceptional quality. This **beauty continues below the surface** with dramatic displays of coral diversity, massive coral structures, together with arches, caves and major fissures in the reefs.
Monarch Butterfly Biosphere Reserve	Mexico	vii [nom: vii, x]	The overwintering concentration of the monarch butterfly in the property is the most **dramatic manifestation of the phenomenon of insect migration**. Up to a billion monarch butterflies return annually, from breeding areas as far away as Canada, to land in close-packed clusters within 14 overwintering colonies in the oyamel fir forests of central Mexico. The property protects 8 of these colonies and an estimated 70% of the total overwintering population of the monarch butterfly's eastern population.
Mount Sanqingshan National Park	China	vii [nom: vii, viii, ix]	Mount Sanqingshan's remarkable granite rock formations combine with diverse forest, near and distant vistas, and striking meteorological effects to create a landscape of **exceptional scenic quality**. The most notable aspect is the concentration of fantastically shaped pillars and peaks. The **natural beauty of Mount Sanqingshan** also derives from the juxtaposition of its granite features with the mountain's vegetation enhanced by meteorological conditions which create an ever-changing and arresting landscape. The access afforded by suspended walking trails in the park permits visitors to appreciate the park's stunning scenery and enjoy its serene atmosphere.

Property	County	Criteria	Description of values under Criterion vii
The Dolomites	Italy	vii, viii	The Dolomites are widely regarded as being among the most attractive mountain landscapes in the world. Their **intrinsic beauty derives from a variety of spectacular vertical forms such as pinnacles, spires and towers, with contrasting horizontal surfaces** including ledges, crags and plateaux, all of which rise abruptly above extensive talus deposits and more gentle foothills. A g**reat diversity of colours** is provided by the contrasts between the bare pale-coloured rock surfaces and the forests and meadows below. The mountains rise as peaks with intervening ravines, in some places standing isolated but in others **forming sweeping panoramas**. Some of the rock cliffs here rise more than 1,500 m and are among the highest limestone walls found anywhere in the world. The distinctive scenery of the Dolomites has become the archetype of a "dolomitic landscape". Geologist pioneers were the first to be captured by the beauty of the mountains, and their writing and subsequent painting and photography further underline the aesthetic appeal of the property.
China Danxia	China	vii, viii	China Danxia is an impressive and **unique landscape of great natural beauty**. The reddish conglomerate and sandstone that form this landscape of exceptional natural beauty have been shaped into spectacular peaks, pillars, cliffs and imposing gorges. Together with the contrasting forests, winding rivers and majestic waterfalls, China Danxia presents a significant natural phenomenon.
Phoenix Islands Protected Area	Kiribati	vii, ix	Phoenix Islands Protected Area, an oceanic wilderness, is sufficiently remote and inhospitable to human colonisation as to be **exceptional in terms of the minimal evidence of the impacts of human activities both on the atolls and in the adjacent seas**. The Phoenix Islands Protected Area is a very large protected area, a **vast wilderness domain where nature prevails and man is but an occasional visitor**. The property is distinguished by containing a large suite of seamounts complete with a broad expanse of contextual abyssal plain with a **natural phenomenon of global significance**. The essentially pristine environment, outstanding underwater clarity, the spectacle of large groups of charismatic aquatic animals (e.g. bumphead parrotfish, Napolean wrasse, surgeonfishes, parrotfishes, groupers, maori wrasse, sharks, turtles, dolphins, manta rays, giant clams) in quantities rarely found elsewhere in the world, aesthetically outstanding coral reef features (e.g. giant clams, large coral heads) together with the spectacle of huge concentrations of seabirds on remote atolls, makes of this property a truly **kaleidoscopic natural "oceanscape" exhibiting exceptional natural beauty** of global significance
Pitons, cirques and remparts of Reunion Island	France	vii, x	The combination of volcanism, tectonic landslide events, heavy rainfall and stream erosion have formed a **rugged and dramatic landscape of striking beauty**, dominated by two towering volcanoes, the dormant Piton de Neiges and the highly active Piton de la Fournaise. Other major landscape features include "Remparts" - steep rock walls of varying geological age and character, and so-called "cirques", which can be described as massive natural amphitheatres with an imposing height and verticality. There are deep, partly forested gorges and escarpments, with subtropical rainforests, cloud forests and heaths creating a **remarkable and visually appealing mosaic of ecosystems and landscape features**
Putorana Plateau	Russia	vii, ix	**A vast and diverse landscape of striking natural beauty**, the Putorana Plateau is pristine and not affected by human infrastructure. Its superlative natural features include an extensive area of layered basalt traps that has been dissected by dozens of deep canyons; countless cold water rivers and creeks with thousands of waterfalls; more than 25,000 lakes characterized by a fjord-like formation that is associated with a large variation in the relief. The immense arctic and boreal landscapes remain intact with carpets of lichens and forest that are unusual at such northern latitudes.

Property	County	Criteria	Description of values under Criterion vii
Kenya Lake System in the Great Rift Valley	Kenya	vii,ix,x	The Kenya Lake System presents an **exceptional range of geological and biological processes of exceptional natural beauty,** including falls, geysers, hot springs, open waters and marshes, forests and open grasslands concentrated in a relatively small area and set among the landscape backdrop of the Great Rift Valley. The massed congregations of birds on the shores of the lakes including up to 4 million **Lesser Flamingos which move between the three lakes is an outstanding wildlife spectacle**. The natural setting of all three lakes surrounded by the steep escarpment of the Rift Valley and associated volcanic features provides an **exceptional experience of nature.**
Ningaloo Coast	Australia	vii,x	The landscapes and seascapes of the property are comprised of mostly intact and large-scale marine, coastal and terrestrial environments. The **lush and colourful underwater scenery provides a stark and spectacular contrast with the arid and rugged land**. The property supports **rare and large aggregations of whale sharks (Rhincodon typus)** along with important aggregations of other fish species and marine mammals. The aggregations in Ningaloo following the mass coral spawning and seasonal nutrient upwelling cause a peak in productivity that leads approximately 300-500 whale sharks to gather, making this the largest documented aggregation in the world.
Wadi Rum Protected Area	Jordan	iii, v,vii [Nom iii, v, vii, viii]	Wadi Rum is recognised globally as an **iconic desert landscape**, renowned for its spectacular series of sandstone mountains and valleys, natural arches, and the range of narrow gorges, towering cliffs, massive landslides, and dramatic cavernous weathering forms displayed. **Key attributes of the aesthetic values of the property include the diversity and sheer size of its landforms, together with the mosaic of colours, vistas into both narrow canyons and very large wadis, and the scale of the cliffs within the property**. The property displays, in a protected setting, an **exceptional combination of landforms** resulting from drainage incision, severe weathering by salt, biological, and other processes, and the undermining of steep sandstone cliffs by these weathering processes, together with the world's most **spectacular networks of honeycomb weathering features**.
Lakes of Ounianga	Chad	vii [nom: vii, viii]	The property represents an **exceptional example of permanent lakes in a desert setting, a remarkable natural phenomenon** which results from an aquifer and associated complex hydrological system which is still to be fully understood. The **aesthetic beauty of the site results from a landscape mosaic** which includes the varied coloured lakes with their blue, green and /or reddish waters, in reflection of their chemical composition, surrounded by palms, dunes and spectacular sandstone landforms, all of it in the heart of a desert that stretches over thousands of kilometers. In addition, about one third of the surface of the Ounianga Serir Lakes is covered with floating reed carpets whose intense green color contrasts with the blue open waters. Rock exposures which dominate the site offer a breathtaking view on all the lakes, of which the colours contrast with the brown sand dunes separated by bare rock structures. The shape and distribution of the lakes, combined with the effect of the wind moving the floating vegetation in the lakes, gives the impression of "waves of water flowing in the desert".

APPENDIX 4: LIST OF 'SPECIAL PLACES'

The evidence presented in the Special Places table is derived from a number of sources representing both expert opinion and the views of local stakeholders. Expert opinion is made up of several data sets including:

- A workshop where GBRMPA staff were asked to map special places based on their own personal aesthetic experiences of the GBR.
- Location and types of images selected by the GBR Steering Group/ Committee for the National Landscapes Submission.
- Sites on the Australian Heritage Database within the GBRWHA where reference is made to aesthetic values.
- A study undertaken by Lucas et al (1997) to expand and clarify the values and attributes of outstanding universal value.
- Places or areas along the Queensland coast designated as having high or very high scenic value as identified in the Queensland Coastal Management Plan (2002) and based on two earlier landscape assessments by EDAW (1996) for whole Queensland Coast and by Catherine Brouwer et al (1994) for the Whitsundays.

The Queensland community list is based on 3 GBRMPA workshops and 2 community consultation reports.

By combining all data sets the table presents a long list of locations with aesthetic qualities but also distinct clustering of certain places and areas. All experts agree on the special aesthetic attributes of the Far Northern section of the GBR including Raine Island, Lizard Island and the Flinders Group, as well as Hinchinbrook and the popular Whitsunday Islands. GBRMPA staff in their exercise, which was undertaken on an individual basis allowing places to be multi-listed, revealed a number of other locations where aesthetic experiences are concentrated including the Ribbon Reefs off the northern section of the coast, the area between Cairns and Port Douglas 'where the rainforest meets the reef', the Capricorn Bunker Group of Islands and the Keppel Islands. Smaller groupings included; Dunk Island, Palm Islands, Magnetic Island, and Swains Reef. The landscape studies offered the same locations for their high or very high scenic quality and a few extra places such as Curtis Island but the Australian Heritage Database list has few of the main iconic places suggested by the all the other expert data sets.

The community stakeholder groups, not surprisingly, suggest a much wider range of places reflecting their local knowledge and intimate experiences of their patch of the Great Barrier Reef. At the same time they also include the well known islands, beaches and reefs listed by the experts as outlined above.

Sources:

Note 1: GBR National Landscapes Steering Group/Committee Submission

Note 2: Landscape studies: Queensland Coastal Management Plan (2002); Catherine Brouwer et al (1994): Places of very high or high scenic quality

Note 3: AHD includes places where aesthetic values are included in the citation

	EXPERTS					QUEENSLAND COMMUNITY	
PLACE	**GBRMPA Staff Workshop (Aug 12)**	**GBR National Landscapes (Note 1)**	**Australian Heritage Database: (Note 3)**	**Lucas et al (1997)**	**Landscape Studies (Note 2)**	**Young & Temperton (2007) ; Rolfe et al (2011)**	**GBRMPA Stakeholder Workshops**
Encompass entire study area							
Great Barrier Reef			✓ WHL NHL RNE				
Far Northern							
Cape Melville					Rugged mountainous landscape near Cape Melville and the Flinders Islands		
Cape York beach/coastline			✓ RNE (North East Cape York)		Extensive water areas that define, divide and dominate the area		✓
Flinders Group / Princess Charlotte Bay	Indigenous Art, Rugged, Taboo Indigenous Island, Traditional Owner's men only island						
Flinders Group of Islands	• Cultural, cave paintings • Powerful indigenous sea island connections						✓
Milman Islet	Largest hawksbill nesting site on the GBR (also site of PhD research)						
Princess Charlotte Bay	Fine white sand landscape						✓ (2)
Raine Island	• Birds, turtles, coral, fish • At turtle nesting time (30,000 turtles in a night • Wilderness (to Princess Charlotte Bay)						✓ (2)
Raine Island to Low Islands	The iconic barrier reef. Islands and island groups, sharks, birds, monsoon storms, wilderness, clear water, remoteness, diversity of fish						

	EXPERTS					QUEENSLAND COMMUNITY	
PLACE	**GBRMPA Staff Workshop (Aug 12)**	**GBR National Landscapes (Note 1)**	**Australian Heritage Database: (Note 3)**	**Lucas et al (1997)**	**Landscape Studies (Note 2)**	**Young & Temperton (2007) ; Rolfe et al (2011)**	**GBRMPA Stakeholder Workshops**
	and coral, shelf diving with sheer drops to 1000m - breathtaking						
Shelburne Bay					Significant degree of sandy dunal landscapes		
Torres Strait							✓
Torres Strait to Lizard Island	Remote, peaceful, quiet, calming, relatively untouched			Vast unpopulated northern section; occurrences of spectacular wildlife including immense whale-sharks (Lucas et al 1997:52)			
Wet Tropical Forests of North Queensland/ Wet Topics of Queensland			✓ RNE WHL NHL				
Cairns / Cooktown							
Cairns area	High tourist area, seeing people enjoy the Reef is aesthetically enjoyable which is possibly something that is undervalued						
Cairns Tidal Wetlands Redefined Area #2			✓ RNE				
Cairns to Port Douglas	• Where the rainforest meets the reef • Highway scenic drive • Rainforest, reef, great drives and views						

	EXPERTS					QUEENSLAND COMMUNITY	
PLACE	**GBRMPA Staff Workshop (Aug 12)**	**GBR National Landscapes (Note 1)**	**Australian Heritage Database: (Note 3)**	**Lucas et al (1997)**	**Landscape Studies (Note 2)**	**Young & Temperton (2007) ; Rolfe et al (2011)**	**GBRMPA Stakeholder Workshops**
	• Cook Highway, rainforest, reef						
Cape Flattery					Vast area of considerable visual diversity		
Cape Tribulation	Where the rainforest meets the reef						
Cooktown	Windy, historic significance				cultural and natural landscape of extensive wetlands and rain forest		
Coral Sea National Nature Reserves, Cairns (Ext)			✓ NHL				
Cowley Beach National Park (1978 boundary)			✓ (RNE)				
Fitzroy Island	Palm trees, clear water, isolation, sleeping under the stars, snorkelling straight off the beach, warm tropical nights, views from lookouts of land and sea						
Franklin Islands	Mouth of the Mulgrave river, wooded islands, can walk across the reef flat from one island to the next						
Green Island	Where everyone goes … the most popular … the first place where people went as reef tourists					Frequently visited	✓ (2)
Lizard Island	• Coral diversity, fish diversity, deep sea drop-off, shark population			Megafauna including Potato Cod (Lucas et al 1997:52)			✓ (2)

	EXPERTS					QUEENSLAND COMMUNITY	
PLACE	**GBRMPA Staff Workshop (Aug 12)**	**GBR National Landscapes (Note 1)**	**Australian Heritage Database: (Note 3)**	**Lucas et al (1997)**	**Landscape Studies (Note 2)**	**Young & Temperton (2007) ; Rolfe et al (2011)**	**GBRMPA Stakeholder Workshops**
	• Dwarf minke whales • Turquoise water, white sand, island paradise • Blue lagoon is spectacular • Crystal clear water, Cook's lookout, 360 degree views						
Low Island / Low Isles	• Amazing fish diversity, mangrove, tranquillity, lighthouse, beautiful island • Spectacular OUV – childhood experience					My parents grew up there … good times	✓ (2)
Malbon Thompson River					Highly natural landscape with Frankland Islands a significant feature		
Michaelmas Cay (off Green Island)	Lots of seabirds nesting, watching lively courtings and baby chicks						
Mossman / Port Douglas					Rich rural and semi natural landscape contains considerable scenic diversity		
Mourilyan Harbour							✓
Ribbon Reef	• Long and spectacular • Diversity of coral and fish (between Cooktown and Low Islands) • Spectacular diving, geomorphology of this area is extraordinary, biodiversity, diversity in the reef structure (between Flinders and Cooktown)						✓
Russel Island	Sailing, fishing, diving, snorkelling, walking						

	EXPERTS					QUEENSLAND COMMUNITY	
PLACE	**GBRMPA Staff Workshop (Aug 12)**	**GBR National Landscapes (Note 1)**	**Australian Heritage Database: (Note 3)**	**Lucas et al (1997)**	**Landscape Studies (Note 2)**	**Young & Temperton (2007) ; Rolfe et al (2011)**	**GBRMPA Stakeholder Workshops**
Townsville / Whitsunday							
Abbot Point wetland							✓
Airlie Beach						Romantic	
Blue Pearl Bay							✓
Bowen Reef [assuming it's near Bowen - can't locate otherwise]							✓
Bowling Green Bay							✓
Caley Valley wetlands							✓
Cape Upstart							✓
Cape Upstart Lowlands			✓ RNE		□		□
Cape Upstart National Park			✓ RNE		□		□
Cleveland Bay							✓
Conway Beach							✓
Dunk Island	• Historical sense of living on the GBR (Banfield) • Awesome boating, cruising, landscape, fishing						
Hamilton Island		✓ (land based shots)					
Hardy Reef							✓
Hayman Island		✓ (land based shots)					✓
Heart Reef		✓ (aerial shots)					
Hill Inlet		✓					

	EXPERTS					QUEENSLAND COMMUNITY	
PLACE	GBRMPA Staff Workshop (Aug 12)	GBR National Landscapes (Note 1)	Australian Heritage Database: (Note 3)	Lucas et al (1997)	Landscape Studies (Note 2)	Young & Temperton (2007) ; Rolfe et al (2011)	GBRMPA Stakeholder Workshops
(Tongue Point overlooking Hill Inlet)							
Hinchinbrook Island	• Scenic beauty • Vistas, sunsets, isolation • Trekking, remoteness, wilderness experience • Scenery • Saw my first dugong here • Spectacular mountains overlooking mangrove channels • Visually spectacular, two WHA's side by side, diverse mangrove forests, untouched beaches, wilderness hiking and camping • Awesome boating, cruising, landscape, fishing • Beautiful channel	✓ (from Nina Peak)		• Towering forested continental islands of immense size and exceptional beauty (such as Hinchinbrook Island rising steeply from sand beaches to 1000 metre peaks) • Exceptional natural beauty including the outstanding mangrove channels of Hinchinbrook Island (Lucas et al 1997:52)	Wide range of landscape types and experiences including the rugged mountain ranges, sweeping and intimate beaches, wetlands, creeks and channels. This diversity is highly unique for the coastline of Queensland	Pretty amazing	✓ (3)
Hook Island							✓ (2)
Horseshoe Bay							✓
Hydeaway Bay							✓
Langford Spit		✓					
Langford-Bird Reef							✓
Lindeman Island							✓
Luncheon Bay							✓
Magnetic Island	• Dugongs, whales • View to Magnetic Island • Crystal clear bays surrounded by boulders • Relaxation • Sense of 'home' close to					Frequently visited	✓ (2)

	EXPERTS					QUEENSLAND COMMUNITY	
PLACE	GBRMPA Staff Workshop (Aug 12)	GBR National Landscapes (Note 1)	Australian Heritage Database: (Note 3)	Lucas et al (1997)	Landscape Studies (Note 2)	Young & Temperton (2007) ; Rolfe et al (2011)	GBRMPA Stakeholder Workshops
	mainland • Awesome boating, cruising, landscape, fishing						
Mantaray Bay							✓
Middle Island Reef							✓
Mission Beach / Dunk Island					Close to the foreshore with the plains and undulating lowlands containing a fairly rich landscape		
Missionary Bay							✓
Myrmidon Reef							✓
Palm Island and area off Port Douglas						✓	✓
Palm Islands	• Cultural experiences, social experiences • Cultural • Awesome boating, cruising, landscape, fishing				Fairly rugged landform in a mostly natural state		✓ (2)
The Strand							✓
Townsville	• Beaches below: reflection, family, connection, vistas of Cape Cleveland and Cape Bowling Green • I live here						
Townsville Town Common and Environs			✓ RNE				
Whitsunday Island Group					Specific locations of high or very high scenic value include; Cid Harbour;	Frequently visited Hamilton Island & Whitsunday Islands	

	EXPERTS					QUEENSLAND COMMUNITY	
PLACE	**GBRMPA Staff Workshop (Aug 12)**	**GBR National Landscapes (Note 1)**	**Australian Heritage Database: (Note 3)**	**Lucas et al (1997)**	**Landscape Studies (Note 2)**	**Young & Temperton (2007) ; Rolfe et al (2011)**	**GBRMPA Stakeholder Workshops**
					Whitehaven; Hamilton East; Hayman Island; Lindeman Island		
Whitsunday area coastline					Specific locations of high or very high scenic value include; Cape Gloucester; George Point; Dingo Beach; Mt Dryander; Olden Island; Earlando; Clark's Cove; Charley's Creek; Mandalay; Funnel Bay; Molle Channel; Shute Harbour; Grants Bank; Long Island Sound; Conway Range; Cape Conway; Repulse Bay		
Whitsunday Molle Island Group					Specific locations of high or very high scenic value include; South Molle East; North Molle West; North Molle East; South Molle; Long Island East	Frequently visited Daydream Island	
Whitsundays	• Scenery • White beaches, green mountains, clear water • Sailing mecca in an amazing archipelago, 74 islands in this group, whales • Everything stereotypically beautiful about the GBRWHA • Whitehaven – Hill Inlet, magnificent beaches / vistas • Landscape of 'untouched' islands – drowned landscape of submerged mountains, whales, sand dunes, clear water, sunsets, hoop pines,	Whitehaven beach and Hill Inlet		Rich variety in landscapes and seascapes within a small area including sweeping beaches and rugged mountains with dense and diverse vegetation and adjacent pristine fringing reefs (Lucas et al 1997:52)	A mountainous densely vegetated landform extending from the mainland into the islands and creating a variety of water spaces and landscape character areas	Amazing sand Whitehaven beach	✓ (4)

	EXPERTS					QUEENSLAND COMMUNITY	
PLACE	**GBRMPA Staff Workshop (Aug 12)**	**GBR National Landscapes (Note 1)**	**Australian Heritage Database: (Note 3)**	**Lucas et al (1997)**	**Landscape Studies (Note 2)**	**Young & Temperton (2007) ; Rolfe et al (2011)**	**GBRMPA Stakeholder Workshops**
	vine forests on islands • Walks, beaches, sailing, boating, snorkelling, sunny • Diverse area, helicopter ride over the islands, bays, beaches and reefs						
Zoe Bay							✓
Mackay / Capricorn							
Bait Reef							✓
Balaclava Island							✓
Barney Point							✓
Boyne River							✓
Boyne Tannum Beach and foreshore							✓
Broadsound							✓ (2)
Bustard Bay							✓ (2)
Bustard Heads							✓
Byfield							✓
Cape Hillsborough and Wedge Island National Park			✓ RNE				
Capricorn Bunker Group	• Manta rays, Pisonia Forests, turtles, birds, beaches • Solitude, serenity, peace and tranquillity – wilderness camping – seabirds, muttonbirds, manta rays, whales, dolphins, sharks, reef					Environmentally pristine … important for the kids education (Heron Island)	✓ Lady Elliot Island (3) Lady Musgrave Island (2) Heron Island (3) Capricorn

	EXPERTS					QUEENSLAND COMMUNITY	
PLACE	**GBRMPA Staff Workshop (Aug 12)**	**GBR National Landscapes (Note 1)**	**Australian Heritage Database: (Note 3)**	**Lucas et al (1997)**	**Landscape Studies (Note 2)**	**Young & Temperton (2007) ; Rolfe et al (2011)**	**GBRMPA Stakeholder Workshops**
	flats, clear lagoons, coral cays and patch reefs, visual mosaic from air – gritty sand, clear water, smell of guano, bird calls, Pisonia forest, casurina beaches • Research, evolution of reefs, bird nesting populations, turtle, fish and invertebrate diversity, isolated and clear water • Historical epicentre of marine turtle research •Bird diversity, reef health, turtle, whale migration, surf (Lady Elliot Island)						Bunker Group (3)
Colosseum Inlet, Gladstone							✓
Cooks Landing Place			✓ RNE				
Corio Bay							✓
Curtis Island					Inter-tidal areas and integrity of the myriad of waterways and channels		✓ (2)
Dudgeon Point wetlands							✓
Endeavour Reef (the reef of Seventeen Seventy)						Where Captian Cook ran aground	
Eurimbula National Park beach/coastline							✓
Facing Island							✓

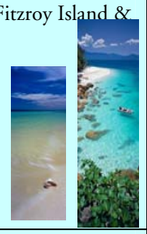
	EXPERTS					QUEENSLAND COMMUNITY	
PLACE	GBRMPA Staff Workshop (Aug 12)	GBR National Landscapes (Note 1)	Australian Heritage Database: (Note 3)	Lucas et al (1997)	Landscape Studies (Note 2)	Young & Temperton (2007) ; Rolfe et al (2011)	GBRMPA Stakeholder Workshops
Fitzroy River delta and estuary							✓ (2)
Gladstone Harbour							✓ (2)
Hummock Hill Island							✓ (2)
Keppel Islands	• Sea snakes, 28 islands, crystal clear waters, laid back, pure white sand beaches • Visual appeal from the mainland, diverse reefs, sea snakes, casurinas on island, views from North Keppel (top of island)	✓ (aerial shots)			High degree of naturalness, local relief and ruggedness	So close and local Frequently visited Great Keppel Island	✓ (3)
Mount Hector Conservation Park			✓ RNE				
Nine Mile Beach							✓
North West Island							✓
Peak Island							✓
Point Clinton, Gladstone							✓
Pumpkin Island							✓
Reefs throughout Southern Great Barrier Reef of significant shapes (aerial		✓					

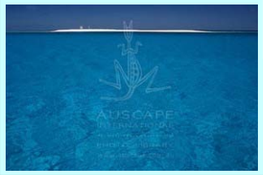
	EXPERTS					QUEENSLAND COMMUNITY	
PLACE	GBRMPA Staff Workshop (Aug 12)	GBR National Landscapes (Note 1)	Australian Heritage Database: (Note 3)	Lucas et al (1997)	Landscape Studies (Note 2)	Young & Temperton (2007) ; Rolfe et al (2011)	GBRMPA Stakeholder Workshops
shots)							
Rosslyn Bay							✓
Seventeen Seventy beach/coastline							✓ (2)
Shoalwater Bay	• Remote islands, isolation • Scenery, dugong, turtle		✓ RNE		High diversity from mountain ranges down to inter-tidal mangroves and saltpan		✓ (3)
Swains Reef	• A chain of coral cays, fishing, wilderness • Stunning vista from the air, deep black holes, honeycomb reefs						✓
The Narrows, Gladstone							✓ (3)
West Hill National Park (1978 boundary)			✓ RNE				
Wild Cattle Island							✓ (2)
Wilson Island		✓ (aerial shots)					

APPENDIX 5: ANALYSIS TABLES (RELEVANT TO SECTION 4.4.1)

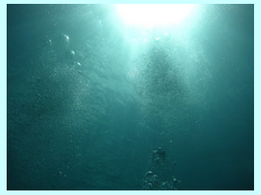
Table 4.15: Analysis of historical and contemporary images

Ref #	NP or A	1. Statement of Values (RSoOUV)	2. Evidence of values from our research	3. Evidence (Image or Data Set)	(image)	(image)	4. Lens	5. Exemplar Places	6. Environmental Attributes	7. Experiential Attributes
1	A	The GBR is of superlative natural beauty above and below the water, and provides some of the most spectacular scenery on earth.	Historical images: the superlative beauty and spectacular scenery of the the GBR is depicted through a) aerial photographs depicting patterns of reefs and usually isolated cays or small islands that appear from the 1950s and beome increasingly abstracted over time and b) underwater images of the colour and diversity of reef life that appear from the 1970s	HIA (historical image analysis)	Aerial view of the reef 1955 		P and BW		reef formations, cays, small islands, clear blue water; reef, coral, schools of fish, individual fish or other animals and the water	sense of beauty, sense of remoteness
			Contemporary images: from above depict the mosaic patterns of reefs beneath clear turqouise waters, contasting with the white cays and deep blue seas beyond	Tourism: Slashers Reef 	Professional: Wistari Reef 	Snapshot: Flight from Airlie Beach 	P		reef formations, cays, small islands, clear blue water	sense of beauty, sense of remoteness
			Contemporary images: from below depict a diverse and multi-coloured underwater landscape of coral reefs in blue clear waters	Tourism: Stevens Reef 	Professional: Coral Forms 	Snapshot: Outer barrier reef 	BW		reef formations, schools of fish, clarity of water	sense of beauty, sense of naturalness, sense of discovery
			Contemporary images: depict spectacular scenery of vegetated continental island groups set within azure blue seas	Tourism: 	Professional: Lindeman Island 	Snapshot: Whitsundays 	P		continental islands, bays, clear blue waters, fringing reefs	sense of beauty, sense of naturalness, sense of remoteness
1.1	NP	It is one of a few living structures visible from space, appearing as a complex string of reefal structures along Australia's northeast coast.	"…from space the east coast of Australia appears to be in the embrace of a giant opal…"	Exploring Oceans: Great Barrier Reef by National Geographic (4 minute video 2009)	AUSCAPE		P		reef formations	sense of beauty, sense of remoteness
1.2	A	From the air, the vast mosaic patterns of reefs, islands and coral cays produce and unparallelled aerial panorama of seascapes comprising diverse shapes and sizes.	Historical images:images depicting patterns of reefs and usually isolated cays or small islands that appear from the 1950s (the mosaic pattern is also seen in aerial survey photographs from early 20th century)	HIA (historical image analysis)	Great Barrier Reef 1973 		P		reef formations, cays, small islands, clear blue water	sense of beauty, sense of naturalness, sense of remoteness

Ref #	NP or A	1. Statement of Values (RSoOUV)	2. Evidence of values from our research	3. Evidence (Image or Data Set)	(image)	(image)	4. Lens	5. Exemplar Places	6. Environmental Attributes	7. Experiential Attributes
			Contemporary images: from the air depict the mosaic patterns of coral reefs set in a vast blue seascape, often forming pleasing abstract compositions	Tourism: Ribbon Reef 	Professional: Hardy's Lagoon 	Snapshot: Heart Reef 	P	Hardy's Reef, Whitsundays	reef formations, cays, small islands, clear blue water	sense of beauty, sense of remoteness
			Contemporary images: depicting panoramas of varied coastlines contrasting green islands with sweeping white sands and swirling patterns of various shades of blue water	Tourism: Hill Inlet, Whitehaven 	Professional: Whitsundays 	Snapshot: Lizard Island 	P	Lizard Island and Whitsundays	continental islands, bays, clear blue waters, fringing reefs	sense of beauty, sense of naturalness, sense of remoteness
1.3	A	The Whitsunday Islands provide a magnificent vista of green vegetated islands and white sandy beaches spread over azure waters.	Historical images: Images for the tourist market focus on the Whitsundays from the 1940s (images from boats) and 1950s - 1970s (images from air or high points of islands) The empahsise the interface of island and the sea, from the 1960s with contrasting colours and textures of green vegetation, usually white sand beaches and blue sea. Earlier images include settlements (camps and resorts). More recent images are 'natural' environment, that is, increasingly devoid of human and built elements	HIA (historical image analysis)	Whitehaven Beach 1977 	Hayman Islands 1960s 	P	Whitehaven Beach	green vegetation, usually white sand beaches and blue sea, absence of people and evidence of human intervention	sense of beauty, sense of solitude,
			Contemporary images: show many island beaches throughout the GBR area, mostly deserted and occasionally framed by coastal vegetation	Tourism: Horseshoe Bay 	Professional: Fitzroy Island & Sandy Cay 	Snapshot: Lizard Island 	WL	Whitsunday, Lizard and Fitzroy Islands	white sandy beaches, clear blue sea, coastal vegetation	sense of beauty, sense of naturalness, sense of tranquility, sense of solitude
			Contemporary images: depict inviting clear blue waters and ready access to the coral reef formations and its diverse life forms below	Tourism: snorkeling 	Professional: Hardy Reef 	Snapshot: snorkeling over reefs 	WL	Hardy's Reef, Whitsundays	clear blue water, shallow reef formations	sense of beauty, sense of naturalness, sense of discovery

Ref #	NP or A	1. Statement of Values (RSoOUV)	2. Evidence of values from our research	3. Evidence (Image or Data Set)	(image)	(image)	4. Lens	5. Exemplar Places	6. Environmental Attributes	7. Experiential Attributes
			Contemporary images: show relatively calm waters, varied island scenery and big skies promoting tranquility and a sense of discovery	Tourism: Hook Island 	Professional: sailing Whitsundays 	Snapshot: Whitsundays 	WL	Whitsundays	clear blue water	sense of beauty, sense of tranquility, sense of discovery
			Contemporary images: depict vast expanses of blue water merging into blue skies and glimpsed far horizons. Pure natural elements with no apparent human presence		Professional: a coral cay 	Snapshot: Keppel Islands 	WL	Capricorn Bunker Group	coral cays, clear blue water	sense of remoteness, sense of solitude
1.4	A	This contrasts with the vast mangrove forests in Hinchinbrook Channel, or the rugged vegetated mountains and lush rainforest gullies periodically cloud-covered on Hinchinbrook Island.	Contemporary images: depict the natural beauty of the mountains, forested islands and mangrove mudflats and channels of continental islands such as Hinchinbrook	Tourism: Hinchinbrook 	Professional: Low Isles 	Snapshot: Hinchinbrook 	P and WL	Hinchinbrook Island	forested high continental islands, water channels and mudflats, mangrove communities	sense of beauty, sense of naturalness, sense of solitude, sense of tranquility
			Contemporary images: display a range of coastlines where the rainforest or drier rocky shores meet the Great Barrier Reef	Tourism: Magnetic Island coastline 	Prof: Cape Tribulation 	Snapshot: Cape Tribulation 	WL	Cape Tribulation	rocky coastline, coastal vegetation, sandy beaches	sense of beauty, sense of naturalness
1.5	NP	On many of the cays there are spectacular and globally important breeding colonies of seabirds.	Contemporary images: are few and specific to certain localities. Professional photographers have a better opportunity to capture seabirds and other fauna in their natural habitat		Prof: Heron Island 	Snapshot: Michaelmas Cay 	WL	Heron Island	large breeding colonies of birds	sense of naturalness, sense of discovery
1.5	NP	On many of the cays there are spectacular and globally important breeding colonies of marine turtles and Raine Island is the world's largest green turtle breeding area.	Historical images: images from the 1920s - 1950s depict people encountering and enjoying turtles on the beaches of the islands including observing nesting, riding turtles	HIA (historical image analysis)	The Whitsunday Islands 1940s 		WL			sense of discovery

Ref #	NP or A	1. Statement of Values (RSoOUV)	2. Evidence of values from our research	3. Evidence (Image or Data Set)	(image)	(image)	4. Lens	5. Exemplar Places	6. Environmental Attributes	7. Experiential Attributes
			Contemporary images: are few and specific to certain localities where access is controlled		Professional: Raine Island 	Snapshot: Raine Island 	WL	Raine Island	white sandy beaches	sense of discovery
1.6	NP	On some continental islands, large aggregations of over-wintering butterflies periodically occur.								
1.7	A	Beneath the ocean surface, there is an abundance and diversity of shapes, sizes and colours: for example spectacular coral assemblages of hard and soft corals, and thousands of species of reef fish provide a myriad of brilliant colours, shapes and sizes.	Historical images: Underwater images depicting the diversity and abundance of life on the reef appear in the late 20th century when developments in camera technology and emphasise the colour and diverity of life under the water. Earlier images show an appreciation of the aesthetic value of the formas and diversity of corals, shell and fish in collected specimens	HIA (historical image analysis)	Looking at coral 1954 	Hook Island observatory 1969 	BW		diversity of form in coral, shell and fish and more recently colour and become increasingly 'intimate'	sense of beauty, sense of discovery
			Contemporary images: depict expansive, diverse and colourful underwater reefscapes. Clarity of water and light penetration illuminates the reef	Tourism: GBR 	Professional: GBR 	Snapshot: reef off Cairns 	BW		reef formations, clear blue water	sense of beauty, sense of naturalness
			Contemporary images: record the spectacle of encountering iconic marine species in their natural environment	Tourism: Maori Wrasse 	Professional: Lady Elliot Island 	Snapshot: GBR 	BW		megafauna	sense of naturalness, sense of discovery
			Contemporary images: capture the vivid colours and textures of the natural world often presented as abstract patterns	Tourism: Clownfish 	Professional: Parrot fish 	Snapshot: GBR 	BW		reef formations, marine fauna, clear blue waters	sense of beauty, sense of discovery

Ref #	NP or A	1. Statement of Values (RSoOUV)	2. Evidence of values from our research	3. Evidence (Image or Data Set)	(image)	(image)	4. Lens	5. Exemplar Places	6. Environmental Attributes	7. Experiential Attributes
			Contemporary images: depict the blueness of the ocean and the effects of light creating shimmering patterns within the water or on the seabed		Professional: Aqua mosaic 	Snapshot: Green Island 	BW		clear blue waters, lagoon floor	sense of solitude, sense of remoteness
			Contemporary images: depict the scale and diversity of the reef formations providing an underwater landscape of exploration	Tourism: GBR 	Professional: coral garden 	Snapshot: Agincourt Reef 	BW		reef formations, marine fauna, clear blue waters	sense of beauty, sense of discovery
1.8	A	The internationally renowned Cod Hole is one of many significant tourist attractions.	Contemporary images: record few visits to Cod Hole, but where taken, the images depict the deep blue of the water and the excitement and specialness of encountering an iconic species		Professional: Cod Hole 	Snapshot: Cod Hole 	BW and WL	Cod Hole, Lizard Island	reef formations, marine fauna, clear blue waters	sense of discovery
1.9	NP	Other superlative natural phenomena include the annual coral spawning, migrating whales, and significant spawning aggregations of many fish species.	Contemporary images: very few record superlative natural phenomena, particularly coral spawning and whale migration		Professional: coral spawning 	Snapshot: coral spawning 	P, WL and BW	Whitsundays	Clear water, coral assemblages, whales and other marine fauna	sense of naturalness, sense of discovery

NOTES

Ref # RSoOUV code from DSEWPaC table

NP or A Natural Phenomena or Aesthetic aspect of Criterion vii

Lens P - Panoramic; WL - Above water level; BW Below water level

Table 4.16: Analysis of visitor perceptions

Ref #	NP or A	1. Statement of Values (RSoOUV)	2. Evidence of values from our research	3. Evidence (Image or Data Set)	(image)	(image)	4. Lens	5. Exemplar Places	6. Environmental Attributes	7. Experiential Attributes
1	A	The GBR is of superlative natural beauty above and below the water, and provides some of the most spectacular scenery on earth.	Visitor perceptions: Virtually no evidence of panoramic-scale aesthetic values was evident in the visitor perception research and tourism literature reviewed. The superlative beauty of the GBR is evident in the strong connection between naturalness and beauty, conveyed through the experience of being in a vast natural place - below water, on the water/islands, and from places where expansive views are available - along with the experiences of engaging with elemental qualities of nature and the tranquillity of contemplating nature.	Visitor perception data	NA	NA	WL and BW	NA	Reefs Reef communities: fish, corals Marine animals: large, iconic Pristine environment Ocean and clear, blue waters Elemental: weather, wind, roughness, large marine animals, the otherness of the marine environment	Sense of beauty Sense of naturalness Sense of tranquility
1.1	NP	It is one of a few living structures visible from space, appearing as a complex string of reefal structures along Australia's northeast coast.	Visitor perceptions: Strong recognition of the GBR as a wonder of the world, linked to its vast scale and complexity. Research confirms a very high level of recognition nationally and internationally and a strong desire to see and experience it. The concept of a 'brag-able' place indicates its high community esteem and the value put on the opportunity to visit. Visiting the reef is seen as a once in a lifetime opportunity.	Visitor perception data	NA	NA	WL and BW	NA	Scale of the reef as an entity	Sense of beauty (dramatic, spectacular)
1.2	A	From the air, the vast mosaic patterns of reefs, islands and coral cays produce and unparalleled aerial panorama of seascapes comprising diverse shapes and sizes.	Visitor perceptions: Little data on the aesthetic experience of seeing the GBR from the air was revealed through the literature reviewed. The combination of islands, cays, reefs and in places mainland coast contributed strongly to an appreciation of the beauty of the land and waterscapes of the reef.	Visitor perception data	NA	NA	WL	Whitehaven Beach	Islands Cays land/water edges Sandy beaches - pristine	Sense of naturalness Sense of beauty (composition) Sense of remoteness
1.3	A	The Whitsunday Islands provide a magnificent vista of green vegetated islands and white sandy beaches spread over azure waters.	Visitor perceptions: the island scenery, pristine beaches, remarkably blue waters were revealed in the literature as a highly valued part of visiting the GBR. Aesthetic experience of islands extends across length and GBR and its not limited to Whitsundays.	Visitor perception data	NA	NA	WL	Whitsundays: specific places	Islands Water - many blues and its clarity Coastal scenery - water/land edge Sandy beaches	Sense of beauty Sense of naturalness Sense of tranquility
1.4	A	This contrasts with the vast mangrove forests in Hinchinbrook Channel, or the rugged vegetated mountains and lush rainforest gullies periodically cloud-covered on Hinchinbrook Island.	Visitor perceptions: the beauty of the GBR is reflected in the island landscapes and their settings. The particular qualities identified in the RSoOUV were not specifically mentioned in the literature reviewed.	Visitor perception data	NA	NA	WL		Islands Water - many blues and its clarity Coastal scenery - water/land edge	Sense of beauty Sense of naturalness Sense of tranquility
1.5	NP	On many of the cays there are spectacular and globally important breeding colonies of seabirds.	Visitor perceptions: The aesthetics associated with birds and bird colonies was seldom mentioned in the literature.	Visitor perception data	NA	NA				

Ref #	NP or A	1. Statement of Values (RSoOUV)	2. Evidence of values from our research	3. Evidence (Image or Data Set)	(image)	(image)	4. Lens	5. Exemplar Places	6. Environmental Attributes	7. Experiential Attributes
1.5	NP	On many of the cays there are spectacular and globally important breeding colonies of marine turtles and Raine Island is the world's largest green turtle breeding area.	Visitor perceptions: Encounters with marine animals such as turtles are a significant aestehtic experience on the GBR, however none of the literature reviewed referenced breeding colonies.	Visitor perception data	NA	NA	BW			
1.6	NP	On some continental islands, large aggregations of over-wintering butterflies periodically occur.	Visitor perceptions: The aesthetic experience offered by these butterfly aggregations were not evident in the literature.	Visitor perception data	NA	NA				
1.7	A	Beneath the ocean surface, there is an abundance and diversity of shapes, sizes and colours: for example spectacular coral assemblages of hard and soft corals, and thousands of species of reef fish provide a myriad of brilliant colours, shapes and sizes.	Visitor perceptions: For visitors, it is the underwater world that represents the outstanding aesthetic experience, based on the literature reviewed. The colour, abundance and diversity of animals, especially on the reefs, combines with the forms and shapes of the reefs, and the potential for encounters with large, iconic and rarer marine animals to create a remarkable 'once in a lifetime' experience.	Visitor perception data	NA	NA	BW	Reefs	Reefs Reef communities: fish, corals Marine animals: large, iconic Pristine environment Ocean and clear, blue waters Elemental: weather, wind, roughness The otherness of the marine environment	Sense of beauty Sense of naturalness Sense of tranquility Sense of discovery Sense of the spiritual
1.8	A	The internationally renowned Cod Hole is one of many significant tourist attractions.	Visitor perceptions: The research revealed that the GBR is an iconic destination, renown internationally with strong evidence of its desirability as a place to visit at a global scale. Little of the evidence examined referred to specific places	Visitor perception data	NA	NA	All		The whole GBR	Sense of discovery
1.9	NP	Other superlative natural phenomena include the annual coral spawning, migrating whales, and significant spawning aggregations of many fish species.	Visitor perceptions: Witness and encountering corals, fish and other marine animals was one of the most important aesthetic experiences reveal in the literature. The number, diversity and colours of fishes, corals and other reef animals as remarked on in all the research. Opportunities to encounter larger, iconic and rarer marine animals likewise. Coral spawning, fish spawning and whale migrations were not specifically mentioned in the literature.	Visitor perception data	NA	NA	WL and BW		Reefs Open waters Marine animals: large, iconic	Sense of discovery Sense of naturalness

NOTES

Ref # RSoOUV code from DSEWPaC table

NP or A Natural Phenomena or Aesthetic aspect of Criterion vii

Lens P - Panoramic; WL - Above water level; BW Below water level

Table 4.17: Analysis of community perceptions

Ref #	NP or A	1. Statement of Values (RSoOUV)	2. Evidence of values from our research	3. Evidence (Image or Data Set)	(image)	(image)	4. Lens	5. Exemplar Places	6. Environmental Attributes	7. Experiential Attributes
1	A	The GBR is of superlative natural beauty above and below the water, and provides some of the most spectacular scenery on earth.	Community perceptions: The vast, interconnected web of life that makes up the GBR was recognised in the literature reviewed and was especially evident for the Queensland and Reef coast communities. Natural beauty was the predominant value expressed across all communities in relation to the GBR. Its iconic and World Heritage status was a source of pride and responsibility for Queensland communities. The idea that the GBR is one of the 'wonders of the world' was strongly expressed.	Community perception data	NA	NA	P, WL, BW		Whole property	Sense of beauty Sense of remoteness Sense of tranquillity
1.1	NP	It is one of a few living structures visible from space, appearing as a complex string of reefal structures along Australia's northeast coast.	Community perceptions: The GBR as a whole place was strongly valued, and specific note was made in the GBRMPA stakeholder workshops and survey of its 'visibility from space' as an expression of the value of the whole, interconnected place.	Community perception data	NA	NA	P		Whole property	Sense of naturalness
1.2	A	From the air, the vast mosaic patterns of reefs, islands and coral cays produce and unparalleled aerial panorama of seascapes comprising diverse shapes and sizes.	Community perceptions: The vast scale and spectacular qualities of the GBR appeared to be more appreciated by the Queensland communities than was revealed in the visitors perceptions literature, perhaps reflecting their greater opportunity to visit the GBR in a variety of ways and to appreciate its scale from the air as part of domestic flights within Queensland.	Community perception data	NA	NA	P		Whole property	Sense of beauty Sense of remoteness
1.3	A	The Whitsunday Islands provide a magnificent vista of green vegetated islands and white sandy beaches spread over azure waters.	Community perceptions: islands, cays, coastlines, beaches, bays and estuaries all featured strongly for the Queensland and Reef coast communities, indicating an appreciation of the diversity of the landscape and the distinctive patterns and compositions created by various elements in combination. Views from the water and the land were appreciated. This appeared to reflect a more wholistic appreciation that that evident in the literature on visitor perceptions.	Community perception data	NA	NA	P, WL		Islands and island groups Cays Coastline, bays and estuaries Associated reefs Seascapes Land-water edges	Sense of beauty Sense of naturalness
1.4	A	This contrasts with the vast mangrove forests in Hinchinbrook Channel, or the rugged vegetated mountains and lush rainforest gullies periodically cloud-covered on Hinchinbrook Island.	Community perceptions: the diversity of landscapes, and the contrasts between land and water - in forms, colours and textures was strongly evident in the Queensland and Reef coast communities. Views from the water and the land were appreciated.	Community perception data	NA	NA	P, WL		Views and vistas Land and vegetation forms Land-water edges	
1.5	NP	On many of the cays there are spectacular and globally important breeding colonies of seabirds.	Community perceptions: Appreciation of the natural beauty of these aggregations of birds exists but appears not to be widespread. This may reflect the accessibility of these locations, or that people have a stronger aesthetic response to other elements of the place.	Community perception data	NA	NA			Species	

Ref #	NP or A	1. Statement of Values (RSoOUV)	2. Evidence of values from our research	3. Evidence (Image or Data Set)	(image)	(image)	4. Lens	5. Exemplar Places	6. Environmental Attributes	7. Experiential Attributes
1.5	NP	On many of the cays there are spectacular and globally important breeding colonies of marine turtles and Raine Island is the world's largest green turtle breeding area.	Community perceptions: The abundance of wildlife encountered in the marine environment is an important aspect of the aesthetic experience noted from one source as a feature distinguishing it from the experiences in a terrestrial environment.	Community perception data	NA	NA			Iconic marine species - megafauna	Sense of discovery Sense of naturalness
1.6	NP	On some continental islands, large aggregations of over-wintering butterflies periodically occur.	Community perceptions: Other than a general appreciation of nature and wildlife, this value did not appear in the literature.	Community perception data	NA	NA				
1.7	A	Beneath the ocean surface, there is an abundance and diversity of shapes, sizes and colours: for example spectacular coral assemblages of hard and soft corals, and thousands of species of reef fish provide a myriad of brilliant colours, shapes and sizes.	Community perceptions: the reef itself is regarded as offering the outstanding aesthetic experience because of its complexity, beauty, species richness. It is iconic and held in the highest regard for its natural beauty across the Queensland, Reef and the Australian community.	Community perception data	NA	NA	BW		Reef Reef communities Diversity and abundance of species	Sense of beauty Sense of naturalness
1.8	A	The internationally renowned Cod Hole is one of many significant tourist attractions.	Community perceptions: The Cod Hole as a location was not mentioned. The GBR as a whole place is recognised by the Queensland, Reef coast and Australian communities as a unique part of Australia, connected to Australian identity and a source of pride for Queenslanders. It is regarded as a 'wonder of the world'.	Community perception data	NA	NA			Whole property	Sense of naturalness
1.9	NP	Other superlative natural phenomena include the annual coral spawning, migrating whales, and significant spawning aggregations of many fish species.	Community perceptions: recognised by some Reef coast stakeholders as an amazing phenomena	Community perception data	NA	NA			Marine environment	Sense of discovery

NOTES

Ref # RSoOUV code from DSEWPaC table

NP or A Natural Phenomena or Aesthetic aspect of Criterion vii

Lens P - Panoramic; WL - Above water level; BW Below water level

Table 4.18: Analysis of experts data

Ref #	NP or A	1. Statement of Values (RSoOUV)	2. Evidence of values from our research	3. Evidence (Image or Data Set)	(image or data set)	(image)	4. Lens	5. Exemplar Places	6. Environmental Attributes	7. Experiential Attributes
1	A	The GBR is of superlative natural beauty above and below the water, and provides some of the most spectacular scenery on earth.		The Great Barrier Reef provides some of the most spectacular scenery on earth and is of exceptional natural beauty (Lucas et al 1997:52)			P		the reef as a whole	sense of beauty
			Lucas(et al 1997:53) note aesthetic importance will include the important *in absentia* or existence values associated with a World Heritage Area . . that correlate with community perception of the site being 'free from disturbance'	The vast and relatively unpopulated extent of the northern section of the Great Barrier Reef may be seen as the marine equivalent of the Serengeti Plains (Lucas et al 1997:52)	The iconic barrier reef. Islands and island groups, sharks, birds, monsoon storms, wilderness, clear water, remoteness, diversity of fish and coral, shelf diving with sheer drops to 1000m - breathtaking (GBRMPA staff workshop 2012)		P	Northern section of the reef		sense of naturalness; sense of remoteness
1.1	NP	It is one of a few living structures visible from space, appearing as a complex string of reefal structures along Australia's northeast coast.					P			
1.2	A	From the air, the vast mosaic patterns of reefs, islands and coral cays produce and unparallelled aerial panorama of seascapes comprising diverse shapes and sizes.		The vast extent of reef and island systems produces an unparalleled aerial vista (Lucas et al 1997:52)	A chain of coral cays, stunning vista from the air, deep black holes, honeycomb reefs (GBRMPA staff workshop 2012)		P	Swains Reef	pattern of reef and island systems	sense of beauty, sense of remoteness
					Reef flats, clear lagoons, coral cays and patch reefs, visual mosaic from air (GBRMPA staff workshop 2012)	Images selected (GBR National Landscapes Steering Committee Submission)	P	Capricorn Bunker Group	pattern of reef and island systems	sense of beauty, sense of remoteness
1.3	A	The Whitsunday Islands provide a magnificent vista of green vegetated islands and white sandy beaches spread over azure waters.		rich variety in landscapes and seascapes within a small area, such as the Whitsunday Islands, which includes sweeping beaches and rugged mountains with dense and diverse vegetation and adjacent pristine fringing reefs (Lucas et al 1997:52)	Landscape of 'untouched' islands - drowned landscape of submerged mountains, whales, sand dunesl clear water, sunsets, hoop pines, vine forests on islands (GBRMPA staff workshop 2012)	Images selected (GBR National Landscapes Steering Committee Submission)	P, WL	Whitsunday Islands	diversity of land and seascapes in a small area including beches, rugged mountains, diverse vegetation and fringing reefs	sense of beauty
1.4	A	This contrasts with the vast mangrove forests in Hinchinbrook Channel, or the rugged vegetated mountains and lush rainforest gullies periodically cloud-covered on Hinchinbrook Island.		Individual islands range from towering forested continental islands of immense size and exceptional beauty (such as Hinchinbrook Island rising steeply from sand beaches to 1000 metre peaks) to small cays clad in rainforest and peripatetic (mobile) unvegetated sand cays (Lucas et al 1997:52)	Scenic beauty, vistas, sunsets, isolation, remoteness, wilderness experience (GBRMPA staff workshop 2012)	Images selected (GBR National Landscapes Steering Committee Submission)	P, WL	Hinchinbrook Island	forested high continental islands, sand beaches, vegetated and unvegetated cays	sense of beauty

Ref #	NP or A	1. Statement of Values (RSoOUV)	2. Evidence of values from our research	3. Evidence (Image or Data Set)	(image or data set)	(image)	4. Lens	5. Exemplar Places	6. Environmental Attributes	7. Experiential Attributes
				Extensive mangrove communities provide another example of exceptional natural beauty including the outstanding mangrove channels of Hinchinbrook Island (Lucas et al 1997:52)	Spectacular mountains overlooking mangrove forests and channels (GBRMPS staff workshop 2012)		P, WL	Hinchinbrook Island and channels	mangrove communities	sense of beauty
1.5	NP	On many of the cays there are spectacular and globally important breeding colonies of seabirds.		Significant aesthetic value is also derived from large breeding colonies of birds (Lucas et al 1997:52)	Lots of seabirds nesting, watching lively courtings and baby chicks (GBRMPA staff workshop 2012)		WL	Michaelmas Cay, Green Island	large breeding colonies of birds	
1.5	NP	On many of the cays there are spectacular and globally important breeding colonies of marine turtles and Raine Island is the world's largest green turtle breeding area.			At nesting time, 30,000 turtles in a night (GBRMPA staff workshop 2012)		WL	Raine Island	large breeding colonies of turtles	Sense of discovery
1.6	NP	On some continental islands, large aggregations of over-wintering butterflies periodically occur.		Significant aesthetic value is also derived from . . . . great concentrations of overwintering butterflies (Lucas et al 1997:52)			WL		aggregations of butterflies.	
1.7	A	Beneath the ocean surface, there is an abundance and diversity of shapes, sizes and colours: for example spectacular coral assemblages of hard and soft corals, and thousands of species of reef fish provide a myriad of brilliant colours, shapes and sizes.		Fringing reefs have very high aesthetic values also. Within the marine fauna there is a huge diversity in fishes' size, shape and colour which provides very special experiences for visitors to the underwater environments. The great diversity of marine life includes numerous conspicuous and colourful animals which collectively produce an extraordinary spectacle (Lucas et al 1997:52)	Ribbon reefs, long and spectacular, diversity of coral and fish, spectacular diving, geomorphology of this area is extraordinary (GBRMPA staff workshop 2012)		BW		fringing reefs in general; diversity in the shape size and colour of fishes, aggregations of fish many species and groups of organisms, including the polyclad turbellarians, the echinoderms, in particular the feather stars, fishes, hard corals, octocorals and bryozoans, particularly the lace corals	Sense of beauty; Sense of discovery
1.8	A	The internationally renowned Cod Hole is one of many significant tourist attractions.		Potato Cod near Lizard Island and the megafauna at sites like the Yongala wreck, have demonstrated their singular value through the attraction of numerous international tourists as divers and snorkellers (Lucas et al 1997:52)	Coral diversity, fish diversity, deep sea drop-off, shark population, dwarf minke whales, blue lagoon is spectacular (GBRMPA staff workshop 2012)		BW	Lizard Island; Yongala Wreck	megafauna	Sense of discovery
1.9	NP	Other superlative natural phenomena include the annual coral spawning, migrating whales, and significant spawning aggregations of many fish species.		the presence of humpback whales and other marine mammals provides an additional superlative natural phenomenon which is highly valued by people (Lucas et al 1997:52)			WL, BW		whales and other marine mammals	Sense of discovery
				occurrences of spectacular wildlife including immense whale-sharks (Lucas et al			WL, BW	northern section of the reef	whale sharks	Sense of discovery

Ref #	NP or A	1. Statement of Values (RSoOUV)	2. Evidence of values from our research	3. Evidence (Image or Data Set)	(image or data set)	(image)	4. Lens	5. Exemplar Places	6. Environmental Attributes	7. Experiential Attributes
				1997:52)						

NOTES

Ref # RSoOUV code from DSEWPaC table

NP or A Natural Phenomena or Aesthetic aspect of Criterion vii

Lens P - Panoramic; WL - Above water level; BW Below water level

APPENDIX 6: GBRMPA STAKEHOLDER WORKSHOP 'AESTHETIC' RESPONSES

Natural element	Workshop type	Mentions	Expressions of value
Total Ecosystem	Stakeholder	3	Colour Ecosystem integrity outstanding Largest coral reef system in the world Visitor satisfaction Iconic (2) High scenic value Wow factor Beautiful areas above and below the water; the natural beauty of both underwater and exposed Dive and view our pristine coast Outstanding Universal Value (OUV); World Heritage Majestic and calming Remote experiences Enjoy solitude and freedom of space Existence value
	TO		-
	LMAC	9	Wonder of nature The wonder of the Reef and the keyhole view it provides into the workings of our ocean. Outstanding biological values Natural beauty Natural beauty, no high rises! Extremely pristine - want to keep it this way for a long time. Pristine, unique, Beauty Pristine environment Variety of Aesthetics Sensual Soothing Calming Wet From a naturalist point of view and also tourism GBRWHA branding Images

Natural element	Workshop type	Mentions	Expressions of value
Islands & cays	Stakeholder	3	Sight-seeing; things to see; nice place to live and visit. Clear water Topography adds to aesthetic values. Distinct vegetation/ rocky headlands Limited vegetative diversity Sense of well-being and health Beautiful view from water and mainland High value biodiversity (2). Flora and fauna on islands Megafauna Beautiful, romantic Unique! Pristine Iconic (2) Connection with place Remote areas Natural beauty Landscapes Incredible Wow factor
	TO	1	Beautiful
	LMAC	9	God's country Beauty natural most important Beautiful to be on and look at Shallow, very silty Beautiful White sandy beaches Vistas and water quality Natural beauty Untouched environment Scenic beauty, National Inspiring beauty Fantastic Natural Beauty Scenic, relaxing Outstanding

Natural element	Workshop type	Mentions	Expressions of value
			Scenic underwater Scenery
Beaches, coastline, and coastal vegetation	Stakeholder	3	Beauty is fundamental Pristine Looks pretty Iconic Beautiful, romantic Nice place to be Changing Visual amenity Clean sands, stable dunes, white beaches, clean water Pleasure of being able to access remote areas Biodiversity Natural beauty (2) Beautiful, pristine, clean beaches, clean and safe
	TO		
	LMAC	5	11 out of 10 Local landscape feature Coastal opportunity for region Very beautiful harbour, examples of mangroves Aerially obvious Colours of Northern Australia Sensual Soothing Calming Wet Seascapes
Mangroves	Stakeholder	2	Looks great Muddy, smelly green Beauty of the landscape
	TO		
	LMAC	2	Vital part of ecosystem Beauty Icon of inshore habitats
Estuaries, Bays, Inlets	Stakeholder	2	Beautiful High aesthetic values due to limited access Great landscapes Dramatic landscape

Natural element	Workshop type	Mentions	Expressions of value
			The landscape itself Magic and beauty of the place What sells 'it' to everyone Special/ unique Life
	TO	1	Inland landscape to the mountains
	LMAC	3	Dunal aquifer Rainforest Beach health Wilderness Vast area of shallow, fast-moving water Beautiful and undeveloped White sandy beaches Vistas and water quality Views, vistas and scenic values Beauty
Catchments	Stakeholder	2	Scenic value (unpolluted) Clean water and stable embankments Influences liveability
	TO		
	LMAC	1	visual beauty
Wetlands	Stakeholder	2	Natural beauty Attractive landscape feature - boggy reeds/ sedges, frogs, small fish, birds High visual appeal
	TO		
	LMAC	1	natural beauty
Salt marsh, salt flats, mud flats, intertidal	Stakeholder	1	Low aesthetic value unless you understand the ecosystem function Clean looks great Not valued for aesthetics but many people do think it's beautiful
	TO		
	LMAC	1	Sand drifts
Seagrass Meadows	Stakeholder	1	Swimming over it (clear water)
	TO		
	LMAC	3	Dugongs Seagrass is not very pretty, but so much depends on

Natural element	Workshop type	Mentions	Expressions of value
			it
Coral Reefs	Stakeholder	3	Important for tourism Image of healthy GBR Visual Iconic - international image Authentically beautiful Outstanding natural values Beautiful reef Remote coral cays, deserted islands Pisitonia Natural values Looks good Natural wonder Recognised world-wide
	TO	1	Unique Diversity of life
	LMAC	10	A mystical part of nature Fascinating Aesthetic values Very high Fantastic Beauty, colour Reputation Iconic Natural wonder Tropical association 6% of GBR is coral Exotic Scenic underwater Outstanding and unique Valuable to QLD
Inter reefal habitat and lagoonal floor	Stakeholder		Natural environment
GBR lagoon	Stakeholder	0	
	TO		
	LMAC		
Fish habitat	Stakeholder	3	Benefits to tourism Lots of bigger/fatter coral trout

Natural element	Workshop type	Mentions	Expressions of value
			Keep the system healthy The more natural the environment, the more appealing for fishers. As close to nature, the more appealing/important the area is Network of healthy areas
	TO		
	LMAC		
Deep water access / Open water	Stakeholder	2	Good for the soul Wilderness Important to make sure shipping doesn't impact aesthetics, shipping incidents can be catastrophic. Beauty of the landscape Open ocean, underwater, islands, beauty Overall attractiveness Visual amenity
	TO		
	LMAC	2	Continental slope: Clean environment Many people from Sydney and Melbourne comment on the blue water Fabulously beautiful
Terrestrial landscapes	Stakeholder	1	Green space Attractive sea/tree changes Highly variable Pleasing to look at Strong characteristic of the coastline
	TO		
	LMAC	1	Dunes: Casuarinas, flowers, insects, animals and plant species; pioneering plant species
Species diversity	Stakeholder	3	Colour, beauty Want to see it, especially coral Affects tourism, and resident lifestyle Important visual Iconic Beauty which draws interest to the reef. Awesome beauty Maintain the beauty of the reef. Good to know that they exist
	TO		
	LMAC	4	plenty of space

Natural element	Workshop type	Mentions	Expressions of value
			Island, reef, coral
Threatened/ Protected Species	Stakeholder	2	Major expectation of visitors Enjoyment from seeing these species Cultural icons Snubfin - ugly cute makes it interesting to look at
	TO		
	LMAC		
Bony Fish	Stakeholder	2	Lifestyle, relaxation of recreational fishing Iconic Natural environment Looking at beautiful fish Get customers to appreciate reef Photos Everyone enjoys a good seafood meal
	TO		
	LMAC	4	Diving and photography Visual beauty Icons of the reef 1500 different species Aquariums Colour Soothing to watch (dentists waiting rooms have tanks set up) Smell, taste
Seabirds / Shorebirds	Stakeholder	1	Iconic Enhance experience for tourists Beautiful to see Varied Part of beauty of coast
	TO	1	Sea Eagles nest on eastern side of Mt Archer
	LMAC		
Megafauna	Stakeholder	1	Linked to image healthy system Very diverse, highly visible Iconic, unique, recognisable Empathic response of people with creatures - connect with marine environment. Enhance tourism experience Healthy nesting areas = beautiful beaches

Natural element	Workshop type	Mentions	Expressions of value
	TO		Dugongs Rare sight in Whitsundays now, plenty of turtles
	LMAC	8	Magical animal Stirs empathy for all creatures. The salty tears of the turtle, evocative and awesome. Important People love looking at them! Iconic WOW factor Ten out of ten Unique To most
Spawning (coral and fish)	Stakeholders	1	Such a unique and amazing event
	TO		
	LMAC		
Sedimentation	Stakeholder	1	Good clean sand/mud
	TO		
	LMAC		
Ocean Currents	Stakeholder	2	Flotsam/jetsam Self flushing known around the world Peace of mind for population residents
	TO		
	LMAC		
Connectivity	Stakeholder	2	Iconic Healthy connectivity = beautiful waterways Very important to see the natural beauty Healthy indicator Intrinsic value
	TO		
	LMAC	1	From space
Water quality	Stakeholder		
	TO		
	LMAC	6	Clear, clean water is much more pleasant than turbid water Very clear water improves aesthetics Water is life Clear water Healthy and bio diverse-looking habitats

Natural element	Workshop type	Mentions	Expressions of value
			Beautiful, amazing place Visual values Sense of world beauty being lost Quality of water looks good

APPENDIX 7: EXAMPLES OF GREAT BARRIER REEF DOCUMENTARIES

Scenic films

IMAX - Great Barrier Reef (2006) 39 minutes

("Take the experience home")

Actors: Philip L. Clarke, Rosalind Ayres, David Gulpilil

Directors: George Casey

Writers: George Casey, Mose Richards

Producers: George Casey, Mike Day, Paul Novros

Studio: Vista Point Ent

The thrill and excitement of the IMAX experience come to your home theater with this stunning DVD, digitally mastered from the original 70 mm print. The Great Barrier Reef unveils the most colorful and diverse undersea world known to man. Viewers will experience not only the enchanting beauty of the reef, you will also learn of its complex ecosystem, the symbiotic relationships that exist and the extreme fragility of this environment.

NOVA: Treasures of the Great Barrier Reef (2006) 54 minutes

Narrator: Stacy Keach

Directors: Tina Dalton, Studio: PBS

Swim through a day in the life of Australia's greatest natural wonder, and view the undersea world's brilliant colours and extraordinary inhabitants.

Elements - Beyond the Reef, Sights and Sounds: Relax with the Refreshing Sights and Sounds of the Tropical Waters of Australia's Great Barrier Reef (DVD & CD Set)

The Great Barrier Reef is one of a very few great natural wonders in the world, stretching for almost 1,300 miles along the northeastern coast of Australia. It is the largest group of coral reefs in the world and is the only living organism that can be seen from space. Enjoy the DVD with crisps, stunning picture quality and surround sound, and the CD featuring the beautiful, relaxing sounds of the reef.

Nature's Beauty - the Great Barrier Reef (2004)

Studio: Quantum Leap

Explore the turquoise waters of the Great Barrier Reef and see the underwater world with tropical fish up close on this DVD from the comfort of an armchair.

Secrets of the Great Barrier Reef (2010) 47 minutes

Down Under, just a few nights after the November full moon - when water temperature and tides are just right - one of nature's most extraordinary events explodes into life. Thousands of coral join in an elaborate mating ritual, a synchronized dance of naturally occurring phenomena that help increase the coral's odds of survival.

Academic or DVDs incorporating new technology

Australia's Great Barrier Reef (2004) 52 minutes

Studio: Quantum Leap

Combines 3D computer animation of dramatic scenes in ancient seas with the latest scientific discoveries about reefs to provide a striking insight into Australia's Great Barrier Reef.

Secrets of the Great Barrier Reef

Directors: Ross Isaacs

Producers: Ocean Planet Images

Filmed in Vivid high definition HDTV, this journey on Australia's Great Barrier Reef reveals the secrets of how animals utilise special effects to increase their odds of survival on the coral reef. Witness the extraordinary colours and patterns of the amazing life forms inhabiting this jewel of the natural world.

The Great Barrier Reef [1999] [DVD Release Date 2003] 39 minutes

Studio: Escapi Media Bv

Filmed by the Science Museum of Minnesota using the dramatic hi-definition IMAX film system, 'The Great Barrier Reef' examines this legendary oceanic formation off the coast of Australia. Examining the reef as a complex ecosystem in its own right the film discovers the beauty but also the diversity and fragility of undersea life in the Great Barrier Reef.

Smithsonian Networks - Secrets of the Great Barrier Reef (2010) 47 minutes

Part of the extraordinary Smithsonian Networks documentary series, Secrets of the Great Barrier Reef is a true-life exploration of the wondrous world beneath the waves of Australia's Great Barrier Reef. From the vibrantly beautiful coral, to the uniquely beautiful marine life, to the man-made perils that threaten this underwater paradise, Secrets of the Great Barrier Reef lives up to its title as a fascinating expose of this submerged natural world. A breathtaking treasury, perfect for armchair travelers as well as public library collections.

VHS videos still for sale

Jacques Cousteau's Rediscovery Of The World - Australia: The Last barrier (VHS)

Studio: Turner Home Entertainment

Run Time: 60 minutes

Coral Sea Dreaming: the Great Barrier Reef [VHS] (1994) 55 minutes

Directors: David Hannan

Language: Castillian

Studio: Beckmann

A visual and musical film, with no commentary, that took 4 years to complete. Specially developed underwater cameras capture life amongst the coral reefs off the coast of Australia.

Scary DVDs

Underwater World Double Feature: Killers of the Great Barrier Reef/King of the Underwater World (2007) 182 minutes

Actors: Leslie Nielson, Dr. Walter Starck

Killers of the Great Barrier Reef: The Great Barrier Reef, an oasis of life off Australia in a barren ocean where beauty and terror live side by side. Come meet the hidden killers, the crocodiles...the sea snakes...the toadfish...the moray eel...and the most venomous creature on Earth, the deadly Box Jellyfish

Direct Downloads

Fearless Planet Season 1, Ep. 3 "Great Barrier Reef" (2007) 44 minutes

The Great Barrier Reef abounds with life. But it is under attack from above and below the water. A team of marine biologists and geologists investigate the clues of how the reef was born, what makes it thrive and how it may disappear within our lifetime.

Network: Discovery Channel

This season is also available in HD.