



## Flinders Ranges Landscape Quality Assessment Project



**Dr Andrew Lothian  
Scenic Solutions**



**2009**





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**Report for the South Australian Department for Environment  
and Heritage**

**Dr Andrew Lothian  
Scenic Solutions**

**2009**

Cover photograph locations:

St Marys Peak and Sawtooth Ridge, Wilpena Pound  
Heysen Range and Aroona Valley  
Freeling Heights, Arkaroola  
Nepouie Range, south of Arkaroola

Frontispiece: Mt Painter

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Hans Heysen, *Flinders Ranges Landscape*, 1956. National Gallery of Victoria

My first impression upon arrival was that of expanse, of simplicity and beauty of contours; the light flat and all objects sharply defined; distances very deceptive and no appreciable atmospheric difference between the foreground and middle distance... I found the contours of the hills extremely interesting to draw - clear edges without much foliage. .. always a beautiful balance between the pyramid and the circle. ... Forms in the north are more clearly defined (than southern parts of the state), the skies hard blue, and the colour dry and crumbly. Reds, ochres and chocolates are the dominant colour schemes and the blue hills are the keynote. As in all mountainous regions, there was a very evident repetition of forms, and many of the hills in the Aroona Valley... have the appearance of arrested waves on the verge of breaking.

Hans Heysen

Alisa Bunbury, 2002. *Arid Arcadia: Art of the Flinders Ranges*. Art Gallery of South Australia. P. 67



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## FLINDERS RANGES LANDSCAPE QUALITY ASSESSMENT PROJECT SUMMARY

### CHAPTER 1 INTRODUCTION

The Flinders Ranges Landscape Quality Assessment Project was commissioned by the South Australian Department for Environment and Heritage and carried out by Dr Andrew Lothian of Scenic Solutions. The project commenced in October 2008 and was completed in February 2009.

The study area was defined as covering the Flinders Ranges north of Hawker concentrating on the highland regions to provide a landscape context for the Arkaroola area thus enabling its scenic significance to be assessed. The highlands included the Elders – Wilpena – Heysen Range, Mt Hack – Mt Uro – Patawarta Hill, and the Gammons – Arkaroola – Freeling Heights.

#### Project Methodology

The methodology has been developed and refined over a succession of seven studies by the author and is robust, reliable and effective.

The project involved photographing the region and classifying it into landscape units on the basis of which the region was sampled by photographs. A survey instrument was prepared and placed on the Internet and participants invited to complete it. At the same time, landscape factors which are those characteristics of the landscape likely to contribute to its scenic quality, were scored independently by a small group. Following completion of the Internet survey, the results were analysed in depth, including the use of predictive models using multiple regression analysis, to gain a full understanding of the landscape quality present in the region. Mapping of its landscape quality was then undertaken.

### CHAPTER 2 SCENIC QUALITY OF ARID MOUNTAINOUS LANDSCAPES

Chapter 2 commences by tracing the history of human appreciation of mountainous landscapes, highlighting the significant changes in attitude which occurred in the 17<sup>th</sup> century when the prevailing view of mountains as wastelands haunted by devils gave way to feelings of awe and eventually to

an appreciation of their outstanding scenic qualities.

Based on an evolutionary perspective, landscape theory contends that humans prefer landscapes which are survival enhancing. However there are obvious difficulties in the application of this to arid mountainous landscapes. An interesting aspect of this study therefore was to examine the results in the light of theory.

#### Cultural and individual differences

Chapter 2 describes studies which have shown strong commonality in landscape preferences across cultures and individuals.

#### Use of photographs in landscape surveys

Chapter 2 describes studies that if the landscape photographs meet certain criteria, the resulting landscape preferences will be comparable to those obtained from site surveys.

### Chapter 3 SIGNIFICANCE OF FLINDERS RANGES LANDSCAPE

The perception and significance of the Flinders Ranges landscape is examined through the eyes of the indigenous Adnyamathanha people and those of early explorers and colonists and of artists such as Hans Heysen.

Over recent decades, considerable attention has been given to the assessment, management and protection of the environmental qualities of the Flinders Ranges and these initiatives are summarised.

The popularity and perception of the Flinders Ranges among visitors is examined.

### CHAPTER 4 ACQUIRING THE DATA

The collection of data on which the scenic quality survey was based is described. The Flinders Ranges landscapes are described and classified. The chapter describes the photography of the Flinders Ranges, the criteria for the selection and choice of photographs. The design of the Internet survey and its implementation on the Internet

are described. Finally, the identification and scoring of landscape factors is described.

### Landscape survey

The survey comprised 127 scenes of the Flinders Ranges plus 20 scenes from elsewhere in South Australia to provide a State-wide benchmark for ratings. The Internet survey was launched on Thursday 27 November and concluded on Tuesday 23 December, a total of 27 days.

Following its launch, over 700 invitations to participate were emailed to hundreds of addresses including many tour operators, stations and businesses in the Flinders Ranges region together with schools, councils and NRM Boards including those in the mid north of South Australia.

On 15 December a notice was sent out across part of the State Public Service inviting participation in the Flinders Ranges survey. Prior to it commencing, approximately 380 had completed the survey with an average completion rate of 84%. This dropped to 66% during the week of Government participation.

By its completion, 3549 people had participated in the survey and 2358 of these had completed all 147 scenes.

### Landscape factors

Landscape factors are those features in the landscape which contribute to its scenic quality. Eight such factors were identified and scored on a 1 – 5 scale by a small group (20). The landscape factors were:

- Terrain – how important or significant were the landforms in the scene
- Dull – Awe inspiring (impressive, spectacular)
- Vegetation – how important or significant was the vegetation in the scene
- Naturalness – how natural it appeared
- Diversity – the busyness of the scene
- Colour – how important or significant was the colour in the scene
- Aridity – lushness – how lush or arid was the scene
- Rockfaces – their steepness and extent

The identification of landscape factors allowed the analysis of the ratings to go beyond the mere description of the ratings to understand *why* scenes gained the ratings they did.

## CHAPTER 5 ANALYSIS OF FLINDERS RANGES SURVEY DATA

The ratings of those participants who had completed 110 or more scenes were analysed. This added a further 94 participants to the 2358 who had completed all 147 scenes, making a total of 2452 participants.

The data set was examined for cases of strategic bias, i.e. where the participant used the survey to fulfill their own objectives, for example to achieve high ratings of all scenes or conversely to lower the ratings. After setting thresholds, two ratings of 1s and 28 ratings of 10s, totaling 30 in all, were deleted from the data set, leaving 2422 data entries for analysis.

The sample of 2422 provided a confidence interval of 1.99; in other words, at a 95% confidence level, the responses were +/- 1.99% of the true value. This was an excellent confidence interval.

### Participants

Analysis of postcodes of all participants indicated that participants from the Flinders Ranges totaled 175 or 5.1% of the survey's participants which is four times higher than their 1.3% of the State population. The high proportion of participants from Adelaide, 75.5%, was slightly higher than the proportion of the State's population who lived in Adelaide, 73.2%.

There were more female participants than males (60% females, 40% males), 35% of participants were in 25 – 44 age group and a further 53% were in the middle age group (45 – 64), the majority were tertiary educated (90% with diplomas or degrees), and 80% were born in Australia.

In comparison with the South Australian community, the participants were better educated, somewhat older, with more females and more Australian-born. Despite this, the ratings were not found to be biased by these characteristics.

Out the 3549 participants a remarkably high number, 1760 (50%), had climbed (or attempted to climb) St Marys Peak, while 70 (20%) had been on the Ridgetop tour at Arkaroola.

Participants were most familiar with the Wilpena area followed by Arkaroola. Being



slightly familiar, increased ratings by 8.2% while being very familiar increased ratings by 12.4%.

Some 680 (19%) of the 3545 participants provided comments on the survey. Dominant themes were the quality of the photographs (negative and positive comments), the beauty of the Flinders Ranges, concerns about land management, opposition to mining in the Flinders Ranges and Arkaroola in particular, comments about the survey (again positive and negative) and the stimulus the survey gave some to visit the Flinders Ranges.

### Landscape factors

Analysis of landscape factors included the distribution of scorings, the relationship of scores and standard deviations, correlations between landscape factors, and the relationship between the landscape factors and the ratings.

Very high correlations were identified between the spectacular and terrain landscape factors, vegetation and aridity, and terrain and rockfaces. The landscape factors which correlated most strongly with ratings were spectacular, diversity and terrain.

### Models

Multiple regression analysis was used to quantify the relationship of the landscape factors with the ratings. The model was:  $Y = 2.72 + 0.62 \text{ spectacular} + 0.24 \text{ diversity} + 0.18 \text{ terrain} + 0.16 \text{ vegetation} + 0.07 \text{ naturalness} + 0.01 \text{ rockfaces} - 0.02 \text{ colour} - 0.12 \text{ lusharid}$  ( $F = 434.0$ ,  $df 1, 124$ ,  $p < 0.001$ ,  $R^2 = 0.85$ ). This model explained 85% of the variance. A simpler model with only one factor but only 7% less predictability was:  $Y = 2.84 + 1.10 \text{ spectacular}$  ( $F = 434.0$ ,  $df 1, 124$ ,  $p < 0.001$ ,  $R^2 = 0.78$ ). Use of this model could predict scenic quality rating based on a simple scoring of spectacular landscape factor.

### Ratings

The highest rated area was Wilpena Pound followed by the Heysen and Elder Ranges, all in the 7 - 7.2 range. The Mt Painter area together with the Gammon Ranges and Freeling Heights were in the 5.8 – 6.3 range. The central ranges were around 6. The flatter areas north-west of the ranges were lower at 4.4

Each area was examined in detail and ratings derived for each area. The ratings of each of the scenes in the area were summarised together with the landscape factor scores and regression models derived for each area.

The Elder – Wilpena – Heysen Range had the highest scores for spectacular, diversity, vegetation and colour. The Mt Painter area had the highest score for terrain while the Freeling Heights had the highest score for naturalness. Aridity was highest for the far northern other areas, while the Elder – Wilpena – Heysen Range exhibited the greatest lushness.

The ratings derived for each area are summarized below.

### Elder – Wilpena – Heysen Range

Elder Range	7
Moralana	6
Wilpena Pound rim	7
Wilpena Pound interior	5
- above Edeowie Gorge	6
Edeowie Gorge	8
View north from St Marys Peak	8
ABC Range	6
Bunyerroo Valley	6
Heysen Range south of Brachina	6
Gorges	7
Aroona Valley	7
Heysen Range north of Brachina	7
Mt Samuel, Chace, Loves Mine & Mt Elkington ranges, Walls of China	6
Trezona, Grindstone and Druids Ranges, Bunkers	5
Flatter areas outside ranges	4 - 5
West of ranges to Leigh Ck Rd.	4
Lake Torrens plains	3

### Central ranges

Chambers Gorge	7
Mt Hack Range, Campbell Hill Range, Mt Uro Range, Patawarta Hill, Jubilee Range, Stirrup Iron Range,	6
Lower ranges	5
Undulating wooded land	5
Flatter, barer land	4

### Gammon Ranges

Rugged highland areas of the Gammons including Mt McKinlay, McKinlay Bluff, Cleft Peak, Mt John Roberts	7
Remaining highland areas including Mainwater Pound, Mt Rowe and the Balcanoona Range	6
Lower ranges, including Yankaninna Range, Warden Hill, Mt Searle	5
Surrounding plains	4

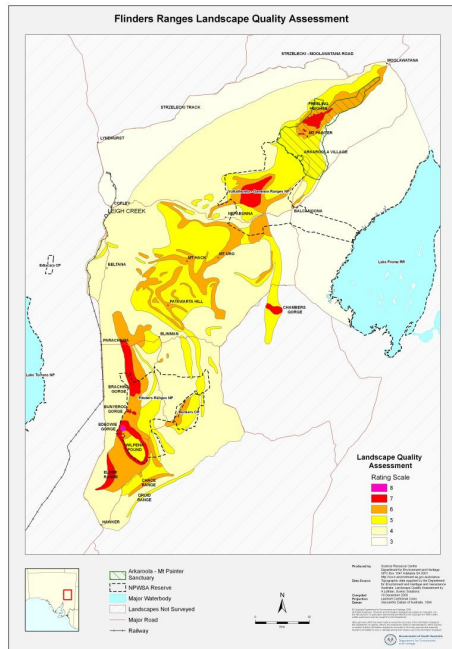
**Arkaroola – Mt Painter – Freeling Heights**

Arkaroola	5
Mt Jacob area	5
Nepouie Range	6
Mt Painter area	6
Southern and granite escarpments of Freeling Heights, north of Yudnamunta Gorge	7
Remainder of Freeling Heights, Mawson Plateau, Hidden Valley, other escarpments	6

**Other areas**

Lake Frome plains	3
Northern areas NW of ranges	4
Flat areas (sth of Lyndhurst – Moolawatana Rd)	3

Mapping the scenic quality of the Flinders Ranges involved detailed review and assessment of each area. The Table and the Figure indicate the areas for each rating. The 6, 7 and 8 ratings represent the scenic highland areas and they totaled 2180 sq km or 16.7% of the area (excluding '3' rated areas).



**Scenic quality rating of the Flinders Ranges**

**Flinders Ranges scenic quality ratings**

Rating	Area (sq km)	%
4	7804	60.00
5	2958	23.24
6	1745	13.42
7	429	3.30
8	7	0.05
	13007	100.00

Note: Omits '3' rated area which comprises plains

**CHAPTER 6 DISCUSSION AND CONCLUSIONS**

Chapter 6 examined a number of issues arising from the project: setting the threshold level of 6 for scenic quality protection, comparison of the results with the Development Plan and earlier attempts to measure the region's scenic quality, comments relating to policy and planning, and the relationship of the findings to landscape theory.

The completion of this survey of scenic quality preferences for the Flinders Ranges in South Australia is a landmark in that it is the first known survey of arid mountainous landscape quality anywhere, certainly in Australia and possibly the world.

The Flinders Ranges present a unique landscape, one which resonates closely with Australians and South Australians in particular. The history of its settlement has been woven into the folklore of the State and the images created by Hans Heysen and other artists and photographers have reinforced its iconic stature.

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## GLOSSARY

DEH is the South Australian Department for Environment and Heritage.

*Scenic quality, or landscape quality*, refers to the perceived aesthetic quality of the landscape. The two terms are regarded here as interchangeable. Scenic value and landscape values refer similarly to the perceived aesthetic quality of the landscape.

*Quality* refers to the aesthetic value of a scene, generally on a high – low continuum.

*Landscape* comprises the physical characteristics that are present including land form, land use, land cover, the presence of water and other attributes.

*Land form* is the terrain of the landscape including cliffs, plains, sand dunes, hills, valleys.

*Land cover* refers mainly to the presence of vegetative cover, trees, shrubs and grasses, but may refer also to crops.

*Land use* covers human use of the land including agriculture and forests, but also non-uses such as national parks and conservation reserves.

*Landscape units* are areas of similar physical characteristics.

*Landscape factors* refer to the perceived significance of certain physical features and qualities in the landscape.



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