

Wilderness of the Eastern Victorian Forests

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Preface

This report outlines the analyses undertaken and the consequent results of the analysis of wilderness in Eastern Victorian forest areas. It has been undertaken using the methodology developed by the Australian Heritage Commission (AHC) through the National Wilderness Inventory (NWI).

The assessment is essentially the same as that undertaken as part of the Deferred Forest Agreement (DFA) for Victoria in 1995. The only difference between this analysis and that undertaken for the DFA relates to the inclusion of Wilsons Promontory. Given that this report covers the whole of Eastern Victoria, the inclusion of Wilsons Promontory in the analysis was considered appropriate.

For the purposes of the Comprehensive Regional Assessments (CRA), Victoria has been divided into five regions, East Gippsland, Central Highlands, the North East, Gippsland and the West. In the assessment of wilderness it is considered appropriate to undertake the analysis in the wider regional context of the forests of Eastern Victoria given their broad similarity. This report therefore satisfies the analysis of wilderness across the first four CRA regions as described above.

A more detailed understanding of the current policy framework, and future forest commitments (agreements), behind this, and other reports that contribute to the Victorian CRAs, is provided in the Background Paper - Regional Forest Agreement, East Gippsland Victoria. (1996).

Wilderness of the Eastern Victorian Forests Report

1. BACKGROUND

The assessment of wilderness has been undertaken as part of the Comprehensive Regional Assessment (CRA) process for Victoria. This assessment of wilderness quality and delineation of areas of high wilderness quality is not the first undertaken in forested areas of Victoria and is similar to that jointly undertaken by the State and Commonwealth Governments as part of the 1995 Victorian Deferred Forest Assessment (Commonwealth, 1995). This analysis has been undertaken using the National Wilderness Inventory (NWI) data and methods as a basis.

2. PREVIOUS WILDERNESS ASSESSMENTS

In 1988, the Victorian Land Conservation Council (LCC) commenced a statewide investigation of Wilderness. The purpose of the investigation was to make recommendations to the Victorian Government on the identification, reservation and use of wilderness areas and other areas of high wilderness quality.

An important initial input to the LCC investigation was the 'Survey of Wilderness Quality in Victoria' undertaken by Preece and Lesslie (1987). This survey was jointly funded by the Victorian Government and the Australian Heritage Commission (AHC), and was the pilot study for the National Wilderness Inventory which has since been extended to other States.

The survey mapped the variation in wilderness quality across the major natural areas of the State. Measures of wilderness quality are essentially 'remoteness' from access, structures and settlement and 'naturalness', both apparent and biophysical. (See Section 5 - Data and Methods).

However, the survey did not draw lines around wilderness areas. It is a tool that can assist planners and decision-makers in identifying areas of high wilderness quality which could be further investigated for their potential to be set aside as wilderness areas.

In addition to this wilderness quality information, the LCC (LCC, 1990) used the guidelines and principles for wilderness prepared for the Council of Nature Conservation Ministers (CONCOM, now the Australian and New Zealand Environment and Conservation Council) by a technical group of State and Commonwealth representatives. These include a guideline referring to a minimum of 25,000 ha for a wilderness area. Other guidelines covered by the technical group and the LCC referred to the use of catchment boundaries for wilderness areas, wherever possible, as well as other factors.

Using this information, the LCC identified 15 new wilderness areas in the State, as well as three additions to the Pilot and Byadbo Wilderness areas in New South Wales. The LCC also endorsed the two existing wilderness areas in the State (Big Desert and Avon) as well as two additions to the former Big Desert Wilderness Park.

During the three years of this investigation, the LCC undertook extensive consultation with all the major stakeholder groups as well as many individuals with an interest in wilderness issues. This process also involved a consideration of the social and economic implications of setting aside wilderness areas. The outcome was a balance between the many competing uses for these areas of public land and setting aside areas for wilderness protection.

The LCC also identified 24 other areas of the State outside the recommended wilderness areas where wilderness-related values of remoteness and naturalness should be recognised and protected, while still providing for some existing uses that are excluded in wilderness areas.

Subsequently, the Victorian Government established 22 wilderness areas and 20 remote and natural areas under the provisions of the National Parks Act 1975. Gazetted wilderness areas

now comprise nearly 4% of the State and almost 10% of public land. Remote and natural areas comprise a further 1% of the State.

3. THE CRITERIA

With respect to the identification of areas with high wilderness quality, the minimum criteria used in this assessment were areas with a NWI wilderness quality of greater than or equal to 12 and larger than a minimum threshold of 8000 hectares. In some instances more rigorous criteria using the four wilderness quality indicators were used. These criteria are consistent with the Proposed Nationally Agreed Criteria for the Establishment of a Comprehensive, Adequate and Representative Reserve System for Forests in Australia (JANIS, 1996). For wilderness the criteria also propose that 'Ninety percent, or more if practicable, of the area of high quality wilderness that meet minimum area requirements should be protected in reserves.'

The concept of wilderness embraces measures of remoteness, naturalness and lack of disturbance. The National Forests Policy Statement (NFPS) (p 11) says 'forested wilderness areas will be protected by means of reserves developed in the broader context of protecting wilderness values of all lands.' Consistent with this, non-forest vegetation types have been included where they form a mosaic within largely forested wilderness identified in this current assessment.

The approach taken in this assessment is to first identify and delineate areas of high wilderness quality and then calculate the percentage of these areas within the existing reserve system.

4. REGIONALISATION

Arising out of a workshop held by the AHC in 1993 it was recognised that wilderness occurs in many different environments or broad regions across Australia. These range from the arid and semiarid areas to the Alps, from the South East to Cape York, as well as on the coast. For both the DFA and subsequent CRA's, the East Victorian forests have been considered as one such region.

Alpine (non forest) areas have been included in this analysis as it is appropriate and sensible to consider the mosaic nature of forest and alpine communities occurring in eastern Victoria. Similarly, heathlands form a mosaic within forest communities in East Gippsland and have also been included in the analysis. In addition, to remove either of these communities from the analysis would be extremely difficult and be meaningless in the context of an overall wilderness assessment.

5. DATA AND METHODS

The National Wilderness Inventory procedure and information for eastern Victoria forms the basis of wilderness assessment work in this report. The task was to apply the NWI methodology developed by Lesslie and Maslen (1995). The wilderness inventory procedure involves the collation and analysis of data to produce a database of 'wilderness quality' across the region. This process was undertaken using GIS techniques.

Considerations of wilderness in the NWI are based on the concept of wilderness as part of a continuum of remote and natural conditions that vary from essentially undisturbed to urban (Lesslie and Taylor, 1985). NWI assessments do not assume any biocentric or anthropocentric view of wilderness. Emphasis is instead placed on identifying and assessing the common environmental attributes upon which a multiplicity of wilderness-related benefits are based. The procedure can more properly be described as a remote and natural lands assessment. The program is designed to measure variation in wilderness quality in the landscape using consistent and objectively measurable criteria.

5.1 Indices of Wilderness Quality

Wilderness survey work is implemented by measuring variation in wilderness quality across the landscape using four wilderness quality 'indicators' that represent the two essential attributes of wilderness; remoteness and naturalness. These are derived from the definition of wilderness quality as the extent to which a location is remote from and undisturbed by the influence of modern technological society. These indicators are:

- **Remoteness from Settlement**
remoteness from places of permanent occupation;
- **Remoteness from Access**
remoteness from established access routes;
- **Apparent Naturalness**
the degree to which the landscape is free from the presence of permanent structures associated with modern technological society;
- **Biophysical Naturalness**
the degree to which the natural environment is free from biophysical disturbance caused by the influence of modern technological society.

Fundamental to the NWI is the creation of two databases; a primary database and a wilderness quality database. The primary database consists of the wide range of geographical information required for the calculation of wilderness indicator values. GIS-based modelling techniques are applied to the primary database to produce a second database, the wilderness quality database.

5.2 Primary Data Base

The primary data required for wilderness analysis is detailed infrastructure and land use information as outlined in the following table. The storage of this data within the GIS is described in the NWI Handbook (Lesslie and Maslen 1995).

Table 5.1 : Primary Data Layers

Data Layers	Description	Data Source
Primary Data Layer land_cov	All polygonal land cover information; including natural cover, cultural cover, built up areas, reservoirs etc.	<u>Central Highlands</u> CNR, 1:100 000 incl. natural disturbance AUSLIG, 1:250 000 incl. built-up areas NWI, 1:100 000 incl. densely settled areas <u>East Gippsland</u> CNR, 1:100 000 incl. tree (vegetation) floristics land management areas built-up areas <u>Other areas</u> NWI, 1986 incl. land cover
lines	All linear information required for wilderness analysis; including roads and tracks, railways, other linear infrastructure (and linear water features for 'arid' analysis areas) etc.	<u>Central Highlands</u> CNR, 1:100 000 incl. roads utilities

		<u>East Gippsland</u> CNR, 1:100 000 incl. linear features
		<u>Other areas</u> NWI, 1986 incl. linear features
points	All point features required for wilderness analysis; including settlements, buildings, other point infrastructure, (including water points in 'arid' analysis areas) etc.	<u>Central Highlands</u> CNR, 1:100 000 incl. settlements historic sites fires AUSLIG, 1:250 000 topo-250k
		<u>East Gippsland</u> CNR, 1:100 000 incl. point features
		<u>Other areas</u> CNR, 1:100 000 incl. point features

5.3 Wilderness Quality Database

Framework:

Survey procedures allow wilderness quality data to be compiled for any area at any level of resolution. However, for operational convenience and to facilitate access and use of the database, a standard spatial framework has been used. In the Eastern Victorian Forests, this framework consists of individual survey units tied to the national 1:100 000 topographic mapping grid.

The wilderness quality database is created by establishing sampling point lattices over all areas mapped as natural cover within the project area. A lattice of 500-metres easting by 500-metres northing was used for the Eastern Victorian Forests.

Analysis Process:

A detailed description of the analysis process is presented in the NWI Handbook. For each of the distance-based indicators, primary data is graded according to its associated impact. Remoteness from Access and Remoteness from Settlement take into account four grades of impact, whilst three grades are used in determining

Apparent Naturalness.

The analysis process for deriving the three distance-based indicators is outlined below, as a sequence of four steps.

i) Grading feature impacts:

For each indicator, point, line and polygon features are grouped into the appropriate impact grade (eg Remoteness from Access grades 1 to 4).

ii) Distance Calculation:

Distance (in metres) is calculated between each sample point and the nearest feature in each grouped coverage generated in (i) above.

iii) Minimum Weighted Distance Calculation:

For each indicator, the distance measures are standardised using a weighting factor that reflects the grade of impact. This, in effect, converts all distances to be equivalent to those of high impacting features. The minimum, effectively the closest, of the standardised distances is recorded.

iv) Indicator Classification:

Minimum standardised distances are classified to produce consistent Remoteness from Settlement, Remoteness from Access, and Apparent Naturalness classes, with values of 0 to at least 5. The resultant classification of the three indicators is shown in Figure 5.1.

The fourth indicator, Biophysical Naturalness, is based upon the assumption that the degree of change sustained by an ecosystem is directly related to the intensity and duration of interference. For the NWI, land use considerations are generally restricted to the grazing of stock and the harvesting of timber. However, in the Eastern Victorian Forests, where more reliable data was available, information on a range of other disturbances was also included. These disturbances are outlined in the table below:

Table 5.2

Primary Data Layer	Data Source
biophysical naturalness	<u>Central Highlands and East Gippsland</u> CNR, 1:100 000 incl. logging mining tramways grazing fuel reduction burning dieback <u>Other areas</u> bio - NWI, 1986

The rating scheme for Biophysical Naturalness used in the Eastern Victorian Forests is outlined in the table below:

Table 5.3 : Biophysical Naturalness class assignment rules for Eastern Victorian Forests

Value	Central Highlands	East Gippsland	Remainder of Eastern Victorian Forests
5	undisturbed and non-palatable vegetation	undisturbed and non-palatable vegetation	unlogged areas and ungrazed areas
4	no recorded grazing during last 50 years in palatable alpine EVCs or no grazing recorded during last 30 years in palatable non alpine EVCs.	fuel reduction burning areas; selective logging, mining, grazing before 1933 and palatable vegetation without grazing records but having significant unknown disturbance	areas that have been selectively logged in the past, for which no logging operations are current or planned; or low intensity grazing country, previously grazed but no longer subject to grazing
3	areas where disturbance levels are unknown.	areas where disturbance levels are unknown.	areas that have been clear-felled in the past (with or without shelterwood) for which no logging operations are planned; or high intensity grazing country, previously

2	recorded and modelled selective logging and mining; grazing recorded during last 50 years in palatable alpine EVCs or grazing recorded during last 30 years in palatable non alpine EVCs.	areas of selective logging, mining and grazing since 1933	grazed but no longer subject to grazing areas that have been selectively logged in the past, and that are designated for logging operations; or low intensity grazing country subject to continuing grazing
1	areas where records of clear-fell logging exists.	areas where records of clear-fell logging exist	areas that have been clear-felled in the past (with or without shelterwood), and that are designated for logging operations; or high intensity grazing country subject to continuing grazing

A total wilderness quality index is produced by summing the standardized values obtained for the three distance-based wilderness quality indicators, truncated at a maximum of class 5, and the Biophysical Naturalness value. The standard process is additive, resulting in a total wilderness quality scale ranging from a minimum value of 0 to a maximum value of 20 assigned to each grid cell of 25ha covering the region. This procedure rests on the assumption that each indicator contributes independently and equally to total wilderness quality.

The process of deriving a total wilderness quality index is illustrated in Figure 5.2.

This analysis for the Eastern Victorian Forests updated, where necessary, the previous assessment of wilderness quality used by the LCC in its statewide investigation into wilderness (LCC 1990). The update has used revised datasets with information at finer resolution than was available to the LCC, and refinements to the process such as the classification of roads.

5.4 Data verification and validation

The analyses undertaken in the Old-growth and National Estate projects in the East Gippsland and Central Highlands regions assisted in verifying the data. In the remainder of the Eastern Victorian Forests this additional verification has not occurred.

6. SETTING THRESHOLDS FOR WILDERNESS QUALITY

The AHC is currently working on the development of a consistent approach to wilderness identification and delineation at a national level. The current assessments for forest areas outlined below will contribute to that consistent national approach.

The method used to delineate thresholds for identification of areas of high wilderness quality varied across the Eastern Victorian forests region as described below.

6.1 East Gippsland and Central Highlands Project Areas

Each grid cell across these project areas was assigned a value for each of the NWI indicators. The frequency distribution of these values for each of the three distance based indicators of wilderness quality were examined, together with a knowledge of the effect key features have on these values. Following a sensitivity analysis, a value of 1.75 (on a scale from 0 to 5, ie. most disturbed to least disturbed) was selected as a valid threshold point. In the case of biophysical naturalness, anything with a value less than 5 (least disturbed) was not considered an area of high wilderness quality.

The thresholds used by the LCC in its examination of Victoria's wilderness (LCC 1990, 1991) were judged to be a good starting point for consideration of wilderness quality in the regional assessment context. When the LCC conducted their analysis, NWI classes ranged from 0 (low) to 8 (high). This equates with the present continuum for the NWI from 0 (low) to 20 (high). The LCC determined that high wilderness values existed where the index was class 5 and above (on the old scale). The equivalent value on the 0-20 continuum is 12.

For both the East Gippsland and Central Highland studies, it was agreed that areas with NWI values according to the following thresholds were considered significant:

wilderness quality index for potential areas	³ 12.0
with each indicator:	
remoteness from access	³ 1.75
remoteness from settlement	³ 1.75
apparent naturalness	³ 1.75
biophysical naturalness	= 5.0

In addition the concept of nodal areas was adopted from the Wet Tropics wilderness analysis undertaken as part of the Wet Tropics planning process in cooperation with the NWI (Maslen and Lesslie, 1994.) Nodal areas are locations of very high NWI value which were used as a guide to help rank the significance of the potential areas (see below). These were delineated within potential areas and were determined using the following thresholds:

remote from access	³ 2.8
remoteness from settlement	³ 3.1
apparent naturalness	³ 3.2
biophysical naturalness	= 5.0

The identified areas were ranked to signify relative levels of significance: medium, high, and very high wilderness quality. Areas were ranked in the first instance by applying size thresholds in relation to the potential and nodal areas. Size is generally considered to be a major factor in assigning a value to places with significant wilderness quality. Theoretically, the larger the area, the more ecologically secure it will be and the greater the perception of the area as wilderness by the community.

The following size thresholds were driven by natural breaks in the data, and form the basis for ranking significance under this value:

very high significance	- area must contain nodal area ³ 2000ha
	- potential + nodal area ³ 25 000ha
high significance	- area contains nodal area ³ 2000ha
	- potential + nodal area ³ 18 000ha
medium significance	- area contains nodal area ³ 25ha
	- potential + nodal area ³ 8 000ha

East Gippsland Results

In East Gippsland this process produced 3 places of very high significance (Coopracambra, Sandpatch and Snowy), 2 of high significance (Petrel and Tingaringy), and 5 of medium significance (see below).

The significance of the medium areas in East Gippsland was reconsidered by examining their integrity and context within the landscape. For instance, areas with rugged topography, location on the coast, or areas incorporating entire catchments were considered to retain their integrity and wilderness quality despite being less extensive. Perimeter to area ratio was also examined for the areas in question.

These deliberations resulted in the retention of the Upper Buchan, Upper Brodribb, Tamboon and Cape Howe areas. The Errinundra area was determined as being below threshold because of the fragmentation of the area with high wilderness quality and resultant poor integrity.

Central Highlands Results

In the case of the Central Highlands there were no areas that were above threshold using these criteria.

6.2 Remainder of the Eastern Victorian Forests

The detailed process outlined above was also undertaken for the Wilsons Promontory area within the Gippsland RFA region. Wilsons Promontory had not been included in the previous DFA analysis. One area was identified.

A different assessment was undertaken for the remainder of the Eastern Victorian forests to that just described for East Gippsland and Central Highlands. Areas of wilderness quality 12 and greater than 8,000 ha were considered significant (see section 7.2) and accordingly appropriate topographic boundaries were delineated.

7. BOUNDARY DELINEATION PROCESS

Two different approaches were undertaken to delineate areas of high wilderness quality in the Eastern Victorian Forests Region.

7.1 East Gippsland and Central Highlands Project Areas

In the East Gippsland and Central Highland areas the results of assessments and boundary delineation undertaken as part of the joint AHC/ NRE National Estate assessments were used. The data sets used in these assessments were developed only 2 years ago, so further analysis was considered unnecessary.

In these projects the process of delineating boundaries aimed, to:

- maximise integrity (context);
- minimise area to perimeter ratio;
- remove linear and fragmented areas less than 2 kilometres in width;
- draw boundaries based on natural features in the landscape.

Wherever possible, the boundaries adopted followed topographic features, such as catchment divides; in other cases nearby features affecting wilderness quality, such as roads were followed.

In East Gippsland several areas of high wilderness quality which adjoin areas with similar values in New South Wales and to the west of the project area, for example Cape Howe (Vic) lies adjacent to Nadgee Nature Reserve (NSW), when considered together are above threshold.

In a similar manner Nungatta National Park (NSW) and Coopracambra (Vic), and the Byadbo Wilderness Area (NSW) and Tingaringy (Vic) lie adjacent to each other and were considered together.

7.2 Remainder of the Eastern Victorian Forests

In the remainder of the region, which had not previously been assessed jointly by the AHC and NRE, it was recognised that the LCC had undertaken previous assessment of wilderness on a statewide basis and delineated wilderness areas as part of that process. In seven instances the current NWI analysis identified areas of wilderness quality 12 and greater than 8,000 ha which the LCC (1991) had previously delineated as wilderness areas or remote and natural areas namely; Avon, Mt Darling/Snowy Bluff, Razor/Viking, Wabba, Indi addition to Pilot & Davies Plain, MacAlister and Yarrarabulla Creek. In each case the boundaries previously identified by the LCC were examined and found to be consistent with those identified using the principles outlined in 7.1 above. As a result the LCC determined boundaries were adopted.

In the north-east of the State, two areas with wilderness quality 12 and greater than 8,000 ha were identified when they had not been previously; the Mt Sassafras and Dartmouth areas. In the instance of Mt Sassafras it was confirmed that the impact of recent timber harvesting had reduced the area of wilderness quality 12 and above to be below the 8,000 ha threshold. In the Dartmouth area boundaries were delineated for the area using the above principles.

8. RESULTS

The wilderness assessment of the Eastern Victorian forests identified 18 areas that meet the threshold requirements (see Table 1 and Map 1). Nine of these areas are within the East Gippsland Region. A number of areas in the Eastern Victorian forests identified as Remote and Natural Areas identified by the LCC did not meet the quality or size thresholds used in this assessment. This does not mean that the remote and natural values of these areas are not important in the context in which the LCC identified them. The Dartmouth area of high wilderness quality was identified and boundaries delineated as part of the current assessment.

9. RESERVATION ANALYSIS

The reservation analysis is summarised in Table 1. Those areas included within the existing legislated reserve system were considered to be protected.

10. CONCLUSION

In the Eastern Victorian forests region 95% of the total area delineated as significant for high wilderness quality is already protected in the existing reserve system (see Table 1). This satisfies the proposed nationally agreed reserve criteria requirement that 'Ninety percent, or more if practicable, of the area of high quality wilderness that meet minimum area requirements should be protected in reserves.' (JANIS, 1996)

11. REFERENCES

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Tables and Figures

Table 5.1 Primary Data Layers

Table 5.2 Disturbances

Table 5.3 : Biophysical Naturalness class assignment rules for Eastern Victorian Forests

Table 1 Summary of Protection of Areas of High Wilderness Quality

Figure 5.1 Classification of Distance Values Figures

Figure 5.2 Total Wilderness Quality Index Figure

Map of Areas of High Wilderness Quality

Table 1 : Summary of Protection of Areas of High Wilderness Quality

Area	Total Hectares	Reserve Status	Hectares Reserved
Cape Howe	7,120	Full	7,120
Sandpatch	28,540	Part	17,150
Petrel	10,960	Full	10,960
Tamboon	5,000	Full	5,000
Coopracambra	28,050	Part	25,460
Upper -Brodribb	5,310	Part	4,850
Tingaringy	25,250	Part	25,060
Snowy	54,560	Full	54,560
Buchan	12,580	Full	12,580
Avon	39,650	Full	39,650
Razor/Viking	15,700	Full	15,700
Mt Darling/Snowy Bluff	40,400	Full	40,400
Wabba	19,700	Full	19,700
Indi Addition to Pilot & Davies Plain	24,300	Full	24,300
MacAlister	33,300	Full	33,300
Yarrarabulla Creek*	13,000	Full	13,000
Dartmouth	26,950	Part	20,370
Wilson's Promontory	33,228	Full	33,228
Totals#	423,688		402,388

Figure 5.1
The Classification of Distance-based Indicator Values

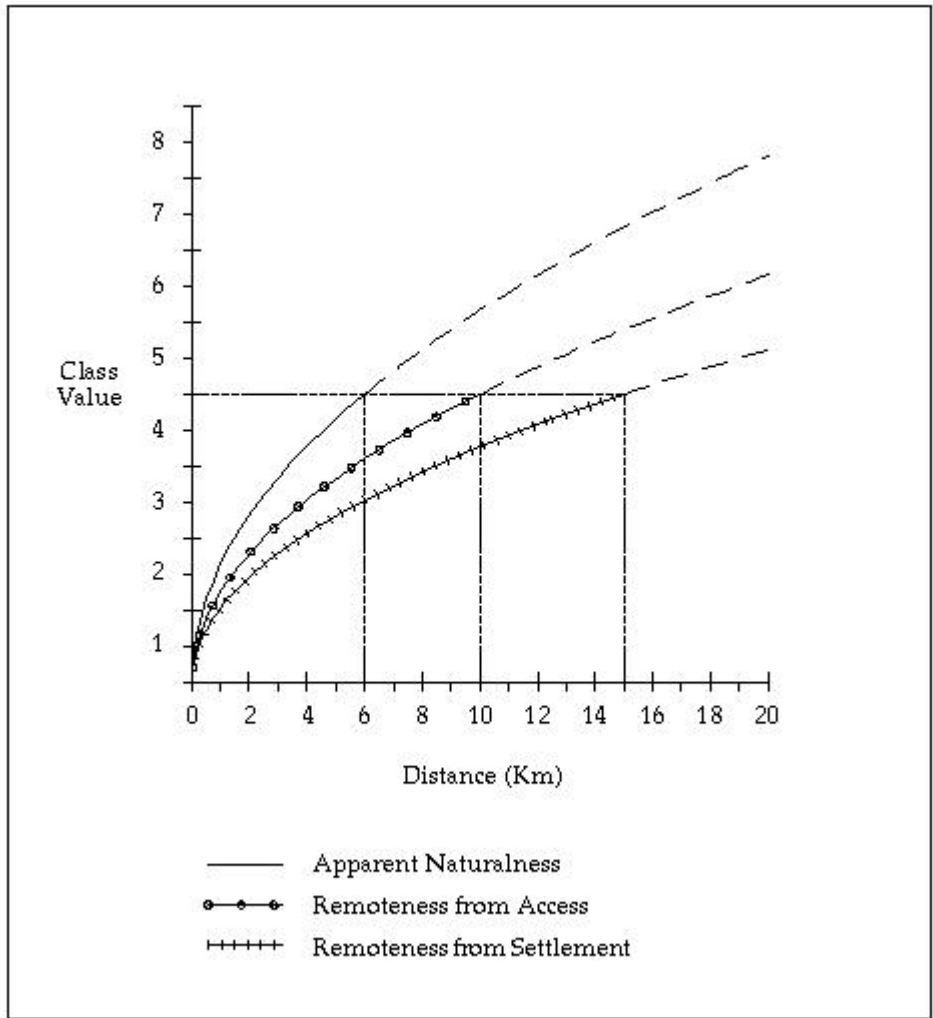


Figure 5.2
Deriving Wilderness Quality

