



North East NSW Wilderness Assessment

UNE and LNE CRA Regions



NORTH EAST NSW WILDERNESS REPORT

**UPPER NORTH EAST AND LOWER
NORTH EAST CRA REGIONS**

Environment Australia

A project undertaken for
the Joint Commonwealth NSW Regional Forest Agreement Steering Committee
as part of the
NSW Comprehensive Regional Assessments
Project number NA33/EH

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PROJECT SUMMARY

This report describes a project undertaken as part of the comprehensive regional assessments of forests in New South Wales. The comprehensive regional assessments (CRAs) provide the scientific basis on which the State and Commonwealth Governments will sign regional forest agreements (RFAs) for major forest areas of New South Wales. These agreements will determine the future of these forests, providing a balance between conservation and ecologically sustainable use of forest resources.

Project objective/s

Methods

Key results and products

1. INTRODUCTION TO THE WILDERNESS ASSESSMENT OF NORTHERN NSW

While a dual approach of wilderness assessment is undertaken, protection requirements in the CRA process is linked solely to the National Wilderness Inventory (NWI), owned and compiled by the Commonwealth. The nationally agreed criteria stipulate that, ninety percent, or more if practicable, of the area of High Quality Wilderness that meets minimum area requirements should be protected in reserves. High Quality Wilderness is defined as having a minimum NWI rating of 12 and a minimum size of 8,000 hectares, or 5,000 hectares abutting the coast (Commonwealth, 1997).

The NSW State Wilderness Act, although autonomous to the CRA, is used in validating the NWI database. Part of the Act requires on-ground validation, which is directly transferred to the NWI. In UNE, information from the NPWS layer was incorporated into the delineation of wilderness, not the database per se. The assessment for UNE was conducted as a joint process with the involvement of NPWS, SFNSW and other State stakeholders. The assessment for LNE was managed solely within the Commonwealth Government. The LNE assessment covers the Commonwealth's obligations for wilderness according to the CRA/RFA requirements.

2. ASSESSING WILDERNESS USING THE NWI

The National Wilderness Inventory (NWI) is a geographic information system, which analyses wilderness values across the Australian landscape by using a set of indicators to measure the essential attributes of wilderness - remoteness and naturalness.

The NWI upgrade revealed that 13 areas in the UNE region and 11 areas in the LNE region currently meet the national criteria. All these areas overlap and/or abut existing State reserves. For ease of reference the areas of High Quality Wilderness will be referred to by the name of the Reserve they partially link to; this naming does not mean to pre-empt any decisions on reserving future wilderness areas. The 13 UNE areas are: Bundjalung, Banyabba, Tenterfield Creek (east and west), Chaelundi, Guy Fawkes (north and south), Washpool, Gibraltar Range/Nymboida, Torrington and Border Ranges (east, west and mid). The 11 LNE areas are: New England, Werrikimbe, Barrington Tops, Oxley Wild Rivers, Wollemi (south, north, north west and north east), Yengo, Putty and Parr. Some of these areas are part of a larger wilderness polygon and the portion inside the CRA Region is very small.

The JANIS criteria which deal specifically with wilderness identification and assessment in the CRA/RFA process and how each criterion was addressed in UNE/LNE is illustrated the following paragraphs.

Potential (high quality wilderness) areas are required to have a minimum National Wilderness Inventory (NWI) wilderness quality value of 12. In addition, minimum thresholds for each of the wilderness quality indicators can be set within the regional context to take into account the importance of remote versus natural values. For example, without thresholds a very remote area with some disturbance may still be considered potential high quality wilderness, whereas a threshold of biophysical naturalness of 4 would cut that area from consideration. In UNE, thresholds were not applied, as agreed between all Stakeholders, and Commonwealth and State Government departments involved in the delineation process. One area identified in UNE, Chaelundi, may have been an issue in this regard if thresholds were applied, however it was agreed at delineation that the NWI database had possibly graded the area too low from the outset. Chaelundi was given a Biophysical Naturalness rating of three because of the presence of both grazing leases and possible pasture grasses. It was therefore assumed to have endured grazing pressure impact. The ruggedness of the terrain, which is not accounted for in the NWI, would lessen the overall impact and subsequently the disturbance rating. Consequently thresholds were not applied in this area because it would not affect the delineation of the High Quality Wilderness areas.

For areas encompassing forested wilderness, JANIS recommends a size threshold of 8000 hectares. However, thresholds of less than 8000 hectares may apply to areas contiguous with the sea or which adjoin wilderness areas in adjacent regions. Several such regions existed in UNE: the Border Ranges and Tenterfield Creek were small areas, which abutted larger High Quality Wilderness areas in Queensland.

Other factors, which are implicit to the assessment of Wilderness Quality but are not used in determining the NWI rating, may need to be considered. The presence of "nodal" areas with very high remote and natural values (eg Wilderness Quality > 14) may provide an indication of their significance and may guide the future management of identified wilderness areas. Conversely, the impacts of exotic plants and feral animals on biophysical naturalness can leave an area of potential High Quality Wilderness out of delineation.

The criterion which applies to wilderness protection is:
“ninety percent, or more if practicable, of the area of high quality wilderness that meets minimum area requirements should be protected in reserves (JANIS 1997 15)”.

The JANIS report includes the following guidelines for determining appropriate boundaries for areas of high quality wilderness:

1. potential areas identified using the NWI database will be considered in a regional context to ensure their viability as wilderness, including considerations of shape;
2. both ecological and management features such as topography, water catchment boundaries, roads and other transport routes, may be useful when delineating boundaries; and
3. wilderness values will also need to be maintained by appropriate management and design of wilderness areas.

3. RFA SCOPING AGREEMENT

In 1996, the Commonwealth and NSW Governments endorsed a Scoping Agreement for all NSW RFAs, whereby they agreed to utilise the JANIS criteria in developing a CAR reserve system. The Agreement outlines the individual assessments required for the CRA component of each RFA. With regards to wilderness, it states, "This assessment will include wilderness areas identified under the provisions of the NSW Wilderness Act 1987 in addition to the National Wilderness Inventory (NWI) analysis of wilderness in the region." Furthermore, the Agreement states that, "The NWI analysis will be refined by the application of disturbance information from old-growth forest surveys, improved information on the nature of road access and additional information of relevance."

The Agreement also lists three wilderness-related map outputs required in each CRA. These are:

- a map showing all wilderness areas identified under the provisions of the Wilderness Act 1987 and of NWI wilderness quality and size above agreed thresholds (as defined by JANIS);
- a map identifying rational boundaries for protection of wilderness values; and
- a map of rational boundary options for wilderness areas.

For areas already identified as wilderness under the Wilderness Act, investigations will be brief and aimed at validating the NWI wilderness indicators. It is recognised that some areas of existing identified and declared wilderness areas will not meet the NWI 12 threshold. Such areas however meet the requirements of the Wilderness Act and may represent lower quality wilderness; be capable of restoration, or be needed for management purposes.

For areas identified by the NWI as having significant wilderness qualities, outside the existing NSW identified wilderness, and/or areas that have been nominated (but not yet assessed) under the Wilderness Act, a more detailed assessment will be conducted to meet the requirements of the Wilderness Act as well as validating the NWI wilderness indicators. Assessments will be consistent with previous assessments conducted in NSW, involving aerial inspections, ground-truthing, consideration of past land uses and other relevant data. It will include assessments of wilderness-based recreational values and landscape integrity. Where necessary to maintain the integrity of wilderness values and establish rational boundaries, disturbed areas which can be restored to a natural state within a reasonable timeframe and areas needed for wilderness management purposes may be included within identified wilderness boundaries.

4. METHODS

4.1 NATIONAL WILDERNESS INVENTORY

The National Wilderness Inventory (NWI) is a computer-based mapping system which conceives wilderness as being part of a spectrum of remote and natural conditions which vary in intensity from undisturbed to urban (Lesslie and Taylor, 1985).

4.2 INDICES OF WILDERNESS QUALITY

The NWI measures wilderness quality across the landscape by using four wilderness quality 'indicators' that represent the two essential attributes of wilderness; remoteness and naturalness. The indicators 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; and
- 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 a wide range of geographical information and forms the basis of the NWI analysis.

4.3 PRIMARY DATABASE

The primary data required for wilderness analysis consists of detailed infrastructure and land use information as outlined in Table 1. The storage of this data within the NWI Primary and Wilderness databases is described in full in the NWI Handbook [Lesslie and Maslen, 1995].)

Table 4a: Primary Data Layers

Primary Data Layer	Description	Usage
Land cover	All polygonal land cover information; including natural cover, cultural cover, built up areas, reservoirs etc.	Establishes areas for wilderness quality survey (natural areas), and in calculating Remoteness from Access, Remoteness from Settlement, Apparent Naturalness, and Biophysical Naturalness.
Lines	All linear information required for wilderness analysis; including roads and tracks,	For use in calculating Remoteness from Access and Apparent Naturalness.

	railways, and other linear infrastructure.	
Points	All point features required for wilderness analysis, including settlements, buildings, other point infrastructure.	For use in calculating Remoteness from Access, Remoteness from Settlement and Apparent Naturalness.

Table 4b: Primary Data Sources available for updating the NWI in UNE

Primary Data Layer	Data Provider	Source	Date	Scale
API Growth Stages	NSW NPWS	Aerial Photo interpretation	1986-1997	1:25000
API disturbance codes	NSW NPWS	Aerial Photo Interpretation	1986-1997	1:25000
SF Management History Logging Records	State Forests of NSW	Forest Management Records	to1998	1:15,000
SF Management History Unmapped Logging Records	State Forests of NSW	Forest Management Records	to1998	1:15,000
SF Management History Grazing leases	State Forests of NSW	Forest Management Records	to1998	1:15,000
SF Management History TSI records	State Forests of NSW	Forest Management Records	to1998	1:15,000
SF Management History sawmill sites	State Forests of NSW	Forest Management Records	to1998	1:15,000
LIC Roads	NSW NPWS	LIC Roads Maps	to 1997	1:100,000
SF Operational Roads	State Forests of NSW	SFNSW Maps	to 1998	1:15,000

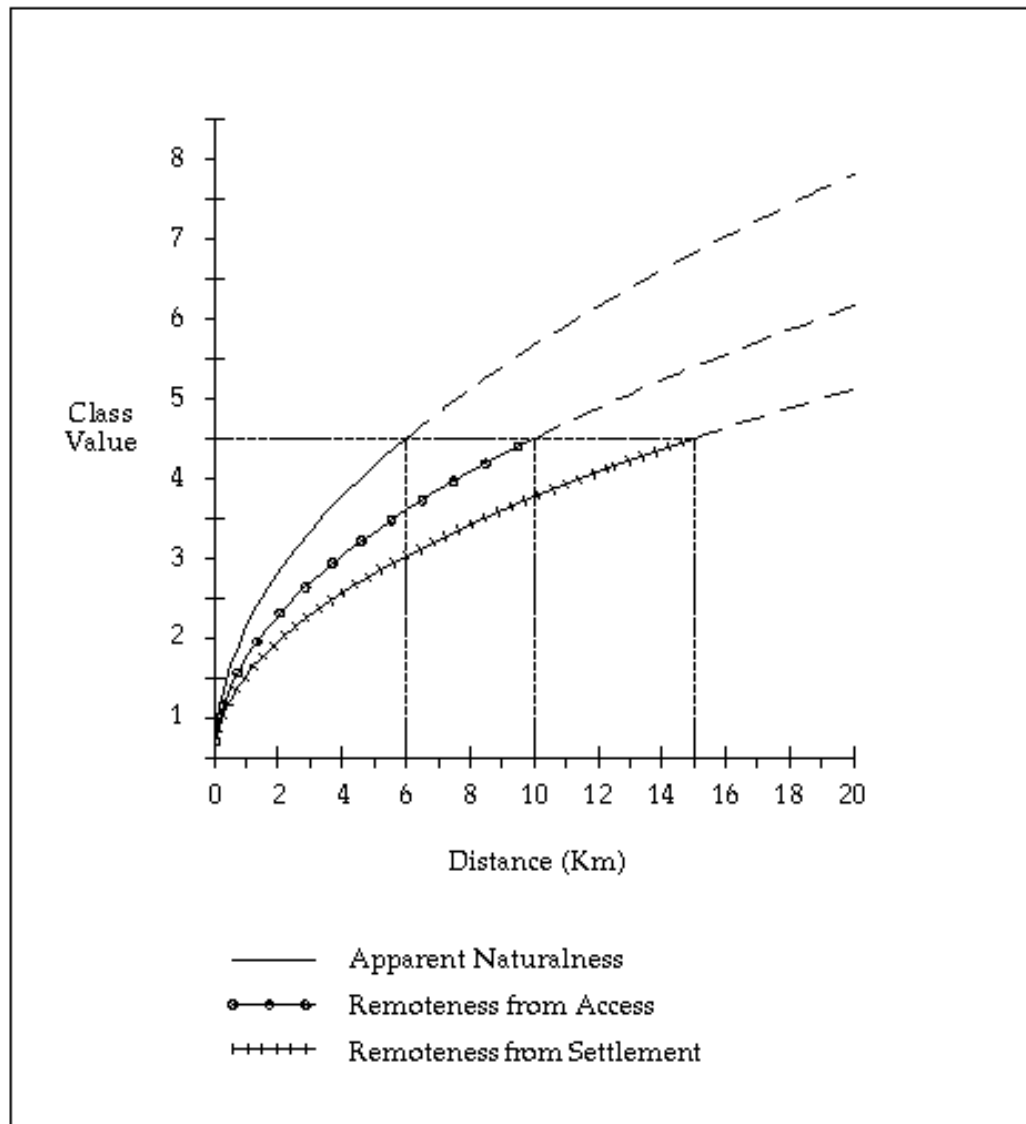
Table 4c: Primary Data Sources available for updating the NWI in LNE

Primary Data Layer	Data Provider	Source	Date	Scale
Broad Old Growth Mapping data	NSW NPWS	Aerial Photo interpretation	c1995	1:25000
SF Management History Logging Records	State Forests of NSW	Forest Management Records	to1998	1:15,000
SF Management History Unmapped Logging Records	State Forests of NSW	Forest Management Records	to1998	1:15,000
LIC Roads	NSW NPWS	LIC Roads Maps	to c.1997	1:100,000
SF Operational Roads	State Forests of NSW	SFNSW Maps	to 1998	1:15,000

4.3 WILDERNESS QUALITY DATABASE

The information contained in the Primary Database is utilised to create the Wilderness Quality Database. For each of the three distance-based wilderness indicators, primary data is graded according to its associated impact. The Remoteness from Access and Remoteness from Settlement indicators utilise four categories or grades of impact, whilst three grades are used in determining Apparent Naturalness (Figure 4a).

Figure 4a - The Classification of Distance Based Indicator Values



The analysis process for deriving the three distance-based indicators is outlined below, as a sequence of four steps. (For a detailed description of this process refer to the National Wilderness Inventory - Handbook of Procedures, Content and Usage, Lesslie and Maslen, 1995.)

1. Grading feature impacts - For each indicator, point, line and polygon features are grouped into the appropriate impact grade (for example, Remoteness from Access grades 1 to 4).
2. Distance Calculation - Distance (in metres) is calculated between each sample point and the nearest feature in each grouped coverage generated above.
3. 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.

4. 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 fourth indicator, Biophysical Naturalness (BN), 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, the treatment and harvesting of timber and agricultural land practices, such as cropping. However, where more reliable data is available, information on a range of other disturbances is also included.

The types of disturbance data typically used to derive the BN layer includes information on:

- timber harvesting
- regional information on grazing
- air photo interpretation (API)
- land tenure
- grazing leases
- vegetation communities
- mining sites.

The rating scheme adopted for upgrading the Biophysical Naturalness indicator in the Northern region is as shown in Tables 4d and 4e. The actual Decision Rules used to interpret the data are found in Appendix 1. The data layers used for this update are shown in Tables 2 and 3.

Table 4d: Biophysical Naturalness rating scheme as applied to the Upper North East region

Indicator Value	NWI Descriptor for Upper North East regional update
5 High	No evident disturbance from grazing or logging; natural water bodies, API code of “nil disturbance”.
4	Non-intensive disturbance in Rainforest*; unmapped logging events with no API evidence of disturbance; other forest management events considered to have made minimal impact.
3	Grazing lease (SF only) with pasture grasses present, weeds present, some evidence of logging from API and associated logging records.
2	Intensive record of disturbance in Rainforest*; some multiple logging records, evidence of logging from API.
1 Low	Multiple, recent and intensive logging records with evidence of disturbance in API.
0	Agricultural, urban and developed land, pine and other exotic plantations, reservoirs.

* Re-evaluated at time of delineation.

Table 4e: Biophysical Naturalness rating scheme as applied to the Lower NorthEast region

Indicator Value	NWI Description for Lower North East regional update
5 High	No evident disturbance from grazing or logging; natural water bodies.
4	Non-intensive disturbance in rainforest; unmapped logging events with

	no BOG evidence of disturbance; events considered to have made minimal (and/or completely recovered) impact.
3	Evidence of disturbance in BOGM with older or non-intensive logging events and/or anecdotal records of logging; Young forest with some records of logging.
2	Intensive record of disturbance in Rainforest; more recent and intensive logging records with evidence of disturbance in BOGM.
1 Low	Multiple logging records with either evidence of disturbance from BOGM or young forest.
0	Agricultural, urban and developed land, pine and other exotic plantations, reservoirs.

* Re-evaluated at time of delineation.

4.3 DERIVING WILDERNESS QUALITY

A total wilderness quality (WQ) index is produced by summing the standardised 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 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 2.

Each grid cell across the project area is assigned a value for each of the NWI indicators. Areas with WQ index equal to or above 12 are considered significant. The presence of areas of very high NWI value, termed 'nodal areas'

(ie NWI > WQ 12), can help in assessing the significance of potential areas.

4.4 UPDATING THE NATIONAL WILDERNESS INVENTORY IN THE NORTHERN REGION

As stated previously, the NWI values for the northern region were updated as a requirement of the CRA/RFA process.

4.5 DELINEATING NWI HIGH QUALITY WILDERNESS IN NORTHERN NSW

The rules used in delineating rational and manageable boundaries for wilderness areas in Upper NorthEast NSW followed the rules set in the JANIS policy document. In addition, it was added to the Wilderness assessment Project Specification, at EHTC July 1998 (10/98 – 6) that members of EHTC, NPWS and SF be included in the actual delineation of the High Quality Wilderness. The members included two from NPWS, one from SF, two from EHTC and one from EA, with the NWI officer nearby for data query. The rules that were followed for the delineation of UNE were as follows:

- all wilderness areas had a low perimeter-to-area ratio, except for those on the border of the CRA region which abutted other High Quality Wilderness;
- wherever possible boundaries included complete catchments and the entirety of distinctive topographic features such as massifs, plateaus, gorges and escarpments;
- where the use of natural features was impossible, boundaries followed features or infrastructure which are clearly identifiable "on the ground", such as permanent roads, National Park boundary fences or vegetation/cleared land interfaces;
- boundaries were set to include buffers, wherever possible, to protect high quality wilderness from future disturbances on adjacent land;
- boundaries were set at a minimal distance (20m) from bordering roads and other disturbed sites;

- relatively small disturbed areas which are capable of being restored may be included within a delineated wilderness if to do so would:
 - enhance the wilderness quality of the surrounding or adjacent wilderness; or
 - result in the amalgamation of otherwise separate nodes of high quality wilderness;
 - boundaries associated with impoundment's should follow the high water mark; and
 - the use of point-to-point straight lines or contour lines, which are not apparent "on the ground", should be avoided wherever possible.
- some small areas of wilderness 11 or 10 were included in the delineation; just as some areas of wilderness quality 12 were excluded from the "rational boundaries".

5. RESULTS

5.1 DELINEATED NWI RESULTS FOR UNE

The NWI upgrade revealed that thirteen areas in the UNE CRA region meet the JANIS criteria for defining "high quality wilderness" (minimum NWI rating of 12 and a minimum size of 8000 hectares) (Table 5a). The NSW components of Tenterfield Creek and the Border Ranges meet the minimum size threshold when considered together with the adjoining wilderness areas in Queensland.

The combined extent of the thirteen delineated wilderness areas in the UNE region is 302074 hectares, as shown in Table 5a.

The metadata for delineated NWI is provided in the Appendix.

Table 5a: Extent of NWI High Quality Wilderness in Dedicated Reserves

Polygon number	Place	Total Area (ha)	Area in Reserves (ha)	Proportion in Reserves (%)
1	Border Ranges NP (east)	1,244	671	54
2	Border Ranges NP (west)	485	393	81
3	Border Ranges NP (mid)	51	Nil	Nil
4	Tenterfield Creek (east)	634	Nil	Nil
5	Tenterfield Creek (west)	3,413	Nil	Nil
6	Torrington	38,066	18,367	48.3
7	Bundjalung	9,672	9,663	99.9
8	Washpool	60,085	48,825	81.3
9	Banyabba	12,989	11,786	90.7
10	Gibraltar Range /Nymboida	51,032	42,938	84.1
11	Guy Fawkes River NP (north)	15,388	5,910	38.4
12	Guy Fawkes River NP (south)	98,696	53,144	53.8

13	Chaelundi	10,319	4,995	48.4
	Total	302,074	196,692	65.1

NB: figures are indicative only

5.2 CONCLUSION

To determine the reservation status for JANIS high quality wilderness, the delineated areas of NWI high quality wilderness were intersected with the existing land tenure boundaries (Figure 5b). This integration found that approximately 196,692 ha (65%) of the approximate 302,074 ha of delineated wilderness are currently within dedicated reserves (Table 5b and 5c).

Table 5b: Extent of NWI High Quality Wilderness on Different Land Tenures (HECTARES)

Polygon Number	Place	National Park or Nature Reserve	State Forest	Timber Reserve	Purchased National Park	Private Land	Vacant Crown Land	Leasehold Crown Land
1	Border Ranges NP (east)	671	569	3.7	Nil	Nil	Nil	Nil
2	Border Ranges NP (west)	393	92	Nil	Nil	Nil	Nil	Nil
3	Border Ranges NP (mid)	Nil	51	Nil	Nil	Nil	Nil	Nil
4	Tenterfield Creek (east)	Nil	Nil	Nil	Nil	288	Nil	346
5	Tenterfield Creek (west)	Nil	Nil	Nil	Nil	1,610	Nil	1,803
6	Torrington	18,367	493	Nil	Nil	5,476	642	13,088
7	Bundjalung	9,663	1	Nil	Nil	8	Nil	Nil
8	Washpool	48,825	2,027	Nil	Nil	3,012	2,011	4,210
9	Banyabba	11,786	380	Nil	Nil	815	8	Nil
10	Gibraltar Range /Nymboida	42,930	4,024	Nil	8	1,082	Nil	2,988
11	Guy Fawkes River NP (north)	4,901	404	Nil	1,009	3,145	1,982	3,947
12	Guy Fawkes River NP (south)	49,596	4,539	Nil	3,548	4,450	1,168	35,395
13	Chaelundi	4,995	5,244	63	Nil	17	Nil	Nil
Total		192,127	17,824	66.7	4,565	19,903	5,811	61,777

NB: figures are indicative only

The delineated wilderness quality layer for the UNE CRA region exists within various tenures. A large portion of high quality wilderness lies within private and leasehold land, particularly in Torrington, Guy Fawkes and Tenterfield Creek, with small portions also occurring in Banyabba, Gibraltar Range/Nymboida, Bundjalung, Washpool and Chaelundi (Figure 2 and 3). The identification of wilderness according to JANIS requires 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, p15). Given the requirements of JANIS and that 27% of the delineated wilderness occurs on non-available tenure (private and leasehold), appropriate measures must be put in place by the managing state agency to ensure wilderness values on private and leasehold land are maintained/adequately protected beyond the completion of the RFA. This is in accordance with the Technical Framework that states that “The rules for determining the conservation requirements, the issue of including private land, and how final priorities for conservation are presented in the Integration phase will need to be determined through further negotiation.”

The JANIS target of protection of 90% or more of high quality wilderness can be achieved on public land (Table 8a). However, by removing those wilderness areas that lie within private and leasehold tenures from analysis, the ha area of some of the remaining delineated wilderness polygons (or parts of each individual polygon) will fall below 8000ha, thereby decreasing further the area where protection of wilderness values can be guaranteed (Figure 4). This is apparent for example in northern Guy Fawkes and in the southwest corner of Gibraltar Range/Nymboida.

Table 5c: DELINEATED NWI HIGH QUALITY WILDERNESS WITH PRIVATE AND LEASEHOLD TENURES REMOVED

	Delineated Wilderness		High Quality Wilderness cut to tenure (non-available) + 8000ha+ polygons			
	ha	%	ha		%	
Reserved	196,692	65	181,550		91	
Excluded (private/lease)	81,680	27	N/A		N/A	
Available	23,702	8	18,150		9	
Total	302,074	100	199,700		100	

NB: figures are indicative only

6. RESULTS

6.1 DELINEATED NWI RESULTS FOR LNE

The NWI upgrade revealed that eleven areas in the LNE CRA region meet the JANIS criteria for defining "high quality wilderness" (minimum NWI rating of 12 and a minimum size of 8000 hectares) (Table 6b). The NSW components of Wollemi meet the minimum size threshold when considered together with the wilderness areas adjoining the south west end of the LNE CRA Region boundary.

The combined extent of the eleven delineated wilderness areas in the LNE region is 496996 hectares, as shown in Table 6b.

The metadata for delineated NWI is provided in the Appendix.

Table 6a: Extent of NWI High Quality Wilderness in Dedicated Reserves

Polygon number	Place	Total Area (ha)	Area in Reserves (NP/NR only) (ha)	Proportion in Reserves (NP/NR only) (%)
1	New England NP	32648	31658	97
2	Oxley wild Rivers NP	105791	67291	63.6
3	Werrikimbe	16821	15664	93.1
4	Barrington Tops	55531	52437	94.4
5	Wollemi NP (NE)	247	247	100
6	Wollemi NP (NW)	159	159	100
7	Wollemi NP (N)	2803	2635	94
8	Wollemi NP (South)	144854	142127	98.1
9	Putty	15908	11	0.1
10	Yengo	99367	96187	96.8
11	Parr SRA	22867	22867	100
	Total	496996	431283	86.8

NB: figures are indicative only

6.2 CONCLUSION

To determine the reservation status for JANIS high quality wilderness, the delineated areas of NWI high quality wilderness were intersected with the existing land tenure boundaries (Figure 5). NB: Only National Parks/Nature Reserves, State Forest and private tenures (part) were available for the analysis. This integration found that approximately 431283 ha (87%) of approximately 496996 ha of delineated wilderness are currently within National Parks/Nature Reserves (dedicated reserves) (Table 6b and 7b); see Figure 6 also.

Table 6b: Extent of NWI High Quality Wilderness on Different Land Tenures

Polygon Number	Place	National Park or Nature Reserve	State Forest	Other Tenure	Private Property (part)
1	New England NP	31658	4	253	733
2	Oxley wild Rivers NP	67291	202	37886	412
3	Werrikimbe	15664	0	1157	0
4	Barrington Tops	52437	2628	323	143
5	Wollemi NP (NE)	247	0	0	0
6	Wollemi NP (NW)	159	0	0	0
7	Wollemi NP (N)	2635	0	168	0
8	Wollemi NP (South)	142127	247	1768	712
9	Putty	11	14702	1195	0
10	Yengo	96187	0	1660	1520
11	Parr SRA	22867	0	0	0
Total		431283	17783	44410	3520

NB: figures are indicative only. Information on other land tenure classifications including purchased national park, vacant crown land and leasehold crown land was unavailable at the time of the analysis.

The identification of wilderness according to JANIS requires 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, p15). The minimum JANIS target of ninety percent of the identified high quality wilderness can be achieved if state forest tenure, being available for negotiation, is incorporated as protected wilderness.

Approximately nine percent of the total identified wilderness area lies on unavailable tenure (private and leasehold). A one hundred percent target for wilderness can be achieved where the negotiable state forest tenure is included and where the proportion of private and leasehold tenure that falls within the nine percent “other tenure” category can be guaranteed protected beyond the completion of the RFA. The Technical Framework states that “The rules for determining the conservation requirements, the issue of including private land, and how final priorities for conservation are presented in the Integration phase will need to be determined through further negotiation.”

7. OUTCOMES FOR REGIONAL FOREST AGREEMENTS

While the minimum wilderness reservation requirements of JANIS (90%) can be met, a practicability assessment (or other validation) would need to be conducted if a reservation level less than 100% is sought. There is a practicable constraint to achieving the maximum target of 100% in the LNE CRA Region, which incorporates a large area of Crown Leases. None of the delineated areas (complete polygons) of high quality wilderness are currently located entirely within dedicated reserves. Optimal protection of wilderness values in NorthEast NSW requires that a minimum of 90% of NWI high quality wilderness be reserved. Where this is impractical (ie private and leasehold land) other protective mechanisms should be pursued such as the establishment of joint agreements between the relevant government agencies and private landowners or leaseholders.

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9. APPENDIX

Metadata statements

METADATA CATEGORY	CORE METADATA ELEMENT	DESCRIPTION
DATASET	Title	UNE Comprehensive Regional Assessment (CRA) Region - National Wilderness Inventory (NWI) Delineated Boundary
	Custodian	Environment Australia
	Jurisdiction	Australia
	CRA Project Name	Wilderness Assessment - UNE
	CRA Project Number	
CONTACT ADDRESS	Contact organisation	ERIN Heritage team
	Contact position	NWI Co-ordinator
	Mail Address 1	GPO Box 787
	Mail Address 2	
	Suburb/Place/Locality	Canberra
	State/Locality 2	ACT
	Country	Australia
	Postcode	2601
	Telephone	(02) 6217 2049
	Facsimile	(02) 6217 2000
	Electronic mail address	NWI.Communal@erin.gov.au
DESCRIPTION	Abstract	The delineated boundary of the National Wilderness Inventory (NWI) database for UNE, defines the boundary of high quality wilderness according to the definition in the JANIS criteria. (See Notes below). This is where wilderness quality >12 and area is > 8,000 ha, or 5,000ha on the coast.
	Search Word	Land Cover, Heritage, Wilderness, Forest, Disturbance, Human Environment, Land Use Survey, GIS.
	Geographic Extent Name(s)	UNE RFA Region
	Geographic Extent Polygon(s)	28.00'N, 150.30'W, 34.00'S, 154.00'E
	Type of feature	Polygon
	Attribute/Field List	none
	Attribute/Field Description	Nwi_delin-id: identifies the NWI polygons
	Scale/Resolution	1:100, 000
DATASET CURRENCY	Beginning date	August 1998

	Ending date	September 1998
DATASET STATUS	Progress	to be digitised
	Maintenance and update frequency	As required
DATASET ENVIRONMENT	Software	Arc/Info
	Computer Operating System	UNIX
	Dataset Size	0.1 Mb
ACCESS	Stored Data Format	Digital polygons (Arc/info)
	Available format types	ArcView shapefile
	Access constraints	Publicly available with written permission of the custodian. Acknowledgment and Data Agreements are required.
DATA QUALITY	Lineage	<p>The UNE CRA region NWI update of Wilderness Quality 12 and above of 8,000 ha and above was scaled to 1:100,000. The area of WQ 12 and above which abutted west of the CRA region was included as an area over 8,000ha.</p> <p>The resultant polygons were delineated by overlaying 1:100,000 topographic map sheets and NPWS tenure to derive "rational boundaries". Local knowledge of terrain from NSW NPWS, SF and EHTC stakeholders was used.</p> <p>Data for the NWI was the best available at August 1998 though some datasets may have been sourced prior to this date.</p> <p>Refer to the UNE/LNE CRA Report for reasons to explain delineation choices specific to the UNE update.</p>
	Positional accuracy	1:100,000
	Attribute accuracy	Attribute accuracy is unknown. No ground truthing or further tests were completed by EA. However, attributes from the NWI database, from which this layer has been derived are classified according to feature codes as described in the National Wilderness Inventory Handbook, Second Edition, 1995. Verification of feature codes was done at summary level (ie grades of impact) using expert knowledge and results of interim analysis.
	Logical consistency	Topological checks undertaken in Arc/Info, all source data checked prior to analysis, some allowance given to dangles in line data, otherwise consistency ensured. NWI database point data consistency ensured through Arc/Info.
	Completeness	Complete for the UNE CRA region.
NOTES	Notes	<p>Refer to National Wilderness Inventory Handbook of Procedures, Content and Usage, Second Edition, Australian Government Publishing Service, Canberra, May 1995.</p> <p>Refer to "Nationally Agreed Criteria for the Establishment of a Comprehensive, Adequate and Representative Reserve System for Forests in Australia" - A report by the Joint ANZECC/MCFFA National Forest Policy Statement Implementation Sub-committee.</p>

		Commonwealth of Australia, 1997. Additional metadata: National Wilderness Inventory (NWI) Database UNE Comprehensive Regional Assessment (CRA) Region. Dataset name: nwidelin.shp
METADATA DATE	Metadata date	September 1998
METADATA COMPLETED BY	Metadata sheet compiled by	Rachael Dash - ERIN Heritage Team
FURTHER INFORMATION	Further information	

METADATA CATEGORY	CORE METADATA ELEMENT	DESCRIPTION
DATASET	Title	LNE Comprehensive Regional Assessment (CRA) Region - National Wilderness Inventory Database (NWI)
	Custodian	Environment Australia
	Jurisdiction	Australia
	CRA Project Name	Wilderness Assessment - LNE
	CRA Project Number	
CONTACT ADDRESS	Contact organisation	ERIN Heritage Team
	Contact position	Heritage Team Director
	Mail Address 1	GPO Box 787
	Mail Address 2	
	Suburb/Place/Locality	Canberra
	State/Locality 2	ACT
	Country	Australia
	Postcode	2601
	Telephone	(02) 6217 2049
	Facsimile	(02) 6217 2000
	Electronic mail address	NWI.Communal@erin.gov.au
DESCRIPTION	Abstract	<p>The description of the data for the LNE region is in accord with the National project outlined below.</p> <p>The Australian National Wilderness Inventory (NWI) is an environmental database and a set of modelling procedures which are designed to assist in the planning and management of remote and natural lands in Australia.</p> <p>NWI 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 development. Indicators are: Remoteness from Settlement, Remoteness from Access, Apparent Naturalness and Biophysical Naturalness.</p> <p>A range of measurements are calculated and processed to produce values for each of the four wilderness quality indicators. These indicators are, in turn, processed to produce a total wilderness quality index. The NWI database consists of all measurements used to derive wilderness indicator values, the wilderness indicator values themselves, and a final Wilderness Quality index.</p>
	Search Word	Land Cover, Heritage, Wilderness, Forest, Disturbance, Human Environment, Land Use Survey, GIS, NWI.
	Geographic Extent Name(s)	LNE RFA Region
	Geographic Extent Polygon(s)	34.00°N, 150.30°W, 30.00°S, 154.00°E

	Type of feature	Grid
	Attribute/Field List	Value (grids)
	Attribute/Field Description	<p>grdra - value: Remoteness from access ranking 0-5*. 5 being very remote.</p> <p>grdbn - value: Biophysical naturalness ranking 0-5. 5* being of very high biophysical naturalness.</p> <p>grdrs - value: Remoteness from settlement ranking 0-5*. 5 being very remote.</p> <p>grdan - value: Apparent naturalness ranking 0-5*. 5 being high apparent naturalness.</p> <p>*(The significant indicator values range from zero to five although values outside this range do occur. There is an assumption that five provides sufficient remoteness or naturalness, thus subsequent values are truncated. Using this methodology, the maximum Wilderness Quality value becomes 20.)</p> <p>grdwq - value: Wilderness quality ranking 0-20. 20 being the highest wilderness quality. (wilderness quality is derived from combining grdra, grdbn, grdrs, grdan, grdwq layers)</p>
	Scale/Resolution	500m
DATASET CURRENCY	Beginning date	January 1986
	Ending date	October 1998
DATASET STATUS	Progress	Complete
	Maintenance and update frequency	As required
DATASET ENVIRONMENT	Software	Arc/Info (ArcView)
	Computer Operating System	UNIX
	Dataset Size	approx. 500 Mb each grid
ACCESS	Stored Data Format	Digital Arc/Info grid
	Available format types	Arc/Info Grid
	Access constraints	Publicly available with written permission of the custodian. Acknowledgment and Data Agreements are required.
DATA QUALITY	Lineage	<p>LNE CRA region baseline data was collected from 1:250,000 scale National Topographic Map Series (digitised by the NWI team). Land cover and grdbn were updated using Broad Old Growth Mapping project from the IAP (NSW NPWS) at 1:25,000; Management History Database Logging and unmapped logging layers (NSW State Forests) at 1:25,000. Grdra and grdan were updated using updated roads (NSW LIC) at 1:25,000 and operational roads (NSW State Forests) at 1:15,000..</p> <p>Data was the best available at 28 September 1998 but all datasets were sourced prior to this date.</p> <p>Refer to the National Wilderness Inventory Handbook (reference below) for a complete detailed account of the</p>

		basic methodology used for the national database. The UNE/LNE CRA Report will give an account of the ratings for Biophysical Naturalness specific to the LNE update.
	Positional accuracy	Remoteness from Settlement - 1:250,000 Remoteness from Access - 1:25,000 Apparent Naturalness - 1: 250,000 Biophysical Naturalness - 1:25,000 Wilderness Quality - 1:250,000
	Attribute accuracy	Attributes are classified according to feature codes as described in the National Wilderness Inventory Handbook, Second Edition, 1995. Verification of feature codes done at summary level (ie grades of impact) using expert knowledge and results of interim analysis.
	Logical consistency	Topological checks undertaken by Arc/Info, all source data checked prior to analysis, some allowance given to dangles in line data, otherwise consistency ensured. NWI database point data consistency ensured through Arc/Info.
	Completeness	Database covers all natural land cover areas only, and all records contain standard NWI attributes. Complete for the LNE CRA region.
NOTES	Notes	Refer to National Wilderness Inventory Handbook of Procedures, Content and Usage, Second Edition, Australian Government Publishing Service, Canberra, May 1995. Additional metadata: National Wilderness Inventory (NWI) Delineated Boundary LNE Comprehensive Regional Assessment (CRA) Region Dataset name: grdra, grdbn, grdrs, grdwq, grdan
METADATA DATE	Metadata date	October 1998
METADATA COMPLETED BY	Metadata sheet compiled by	Rachael Dash, ERIN Heritage Team
FURTHER INFORMATION	Further information	