

Appendix 8

APPROACH B-TABLES

Explores the flexibility provisions in the application of the JANIS criteria with lower levels of reservation than approach A.

Table 8.1
Biodiversity Values
Reservation Analysis

Approach B

Forest Ecosystem	Estimated pre 1750 area ha	Present area on all lands ha	CAR Reserve System under this Approach ¹			
			Possible New Reserves ha	Total area reserved under this approach ² ha		Level of reservation under this approach ^{2&3} %
* Bullich and Yate	2,800	2,440	0 to 0	2,176 to 2,176	89.2% to 89.2%	
Darling Scarp ⁺⁺	29,000	9,938	1,271 to 1,880	2,694 to 3,168	9.3% to 10.9%	
Jarrah Blackwood ⁺⁺	347,200	281,805	18,226 to 22,235	46,775 to 57,058	13.5% to 16.4%	
Jarrah Leeuwin ⁺⁺	56,400	19,552	5,680 to 6,178	8,463 to 8,743	15.0% to 15.5%	
Jarrah Mt Lindesay ⁺⁺	126,600	44,597	5,772 to 6,823	16,603 to 17,766	13.1% to 14.0%	
Jarrah North East ⁺⁺	717,100	350,239	19,002 to 22,614	98,181 to 105,311	13.7% to 14.7%	
Jarrah North West ⁺⁺	670,600	499,598	4,116 to 18,546	79,761 to 97,011	11.9% to 14.5%	
* Jarrah Rate's Tingle	1,500	1,246	0 to 98	970 to 1,069	77.9% to 85.8%	
* Jarrah Red Tingle	350	269	0 to 0	215 to 215	80.0% to 80.0%	
Jarrah Sandy ⁺⁺	107,900	71,091	276 to 835	24,658 to 25,190	22.9% to 23.3%	
Jarrah South ⁺⁺	557,300	438,912	10,599 to 12,982	135,906 to 145,490	24.4% to 26.1%	
Jarrah Unicap ⁺⁺	81,000	29,459	0 to 0	12,097 to 14,501	14.9% to 17.9%	
Jarrah Woodland	106,374	67,221	2,913 to 3,530	37,254 to 38,605	35.0% to 36.3%	
Jarrah Yellow Tingle ⁺⁺	11,600	9,669	1,415 to 1,916	4,053 to 4,258	34.9% to 36.7%	
Karri Main Belt ⁺⁺	193,000	163,905	65 to 193	53,762 to 53,912	27.9% to 27.9%	
* Karri Rate's Tingle	1,100	860	0 to 0	736 to 736	85.6% to 85.6%	
Karri Red Tingle	7,200	5,860	0 to 0	5,013 to 5,013	69.6% to 69.6%	
Karri West Coast ⁺⁺	14,500	6,274	132 to 228	4,384 to 4,478	30.2% to 30.9%	
Karri Yellow Tingle ⁺⁺	15,800	13,264	899 to 2,822	4,336 to 5,863	27.4% to 37.1%	
Peppermint/coastal heath	80,100	70,826	0 to 0	57,699 to 57,699	72.0% to 72.0%	
Rocky outcrops	26,400	12,444	1,407 to 1,538	9,075 to 9,110	34.4% to 34.5%	
Sand dunes	10,300	10,342	0 to 0	10,030 to 10,030	97.4% to 97.4%	
Shrub/herb/sedgeland	429,900	296,950	27,440 to 27,685	224,617 to 226,341	52.2% to 52.6%	
Swamps	15,300	8,069	310 to 318	6,064 to 6,111	39.6% to 39.9%	
West'n Wandoo forest ⁺⁺	363,200	146,597	3,574 to 7,728	50,483 to 55,403	13.9% to 15.3%	
West'n Wandoo woodland ⁺⁺	163,000	72,077	2,565 to 7,660	27,533 to 32,898	16.9% to 20.2%	
TOTAL⁸	4,135,524	2,633,503	122,526 to 127,674	943,575 to 968,118	22.8% to 23.4%	

* Rare forest ecosystem with a 100% reservation target. All other forest ecosystems have a reservation target of 15%.

++ Ecosystems currently significant for commercial timber yield

1 Expressed as a range reflecting variations in approach to reserve design.

2 Includes only accredited informal reserves.

3 Represents the percentage of this reserve type measured against 'Present area on all lands' for rare ecosystems and against 'Estimated pre-1750 area' for all other ecosystems.

4 As measured against the quantitative JANIS targets without taking into account the scientific, economic & social flexibility provisions.

5 For a discussion of lands contained within this category please

6 Crown lands vested in Commonwealth and Western Australian Governments.

7 Privately owned land, including freehold land owned by Government agencies.

8 Minimum and Maximum Total figures shown are sums of complete approaches, rather than sums of the columns above.

Table 8.1 (cont.)
Biodiversity Values
Reservation Analysis

Approach B

Deficit / Excess ha ^{2&4}	Area Outside CAR Reserve ¹			
	Non-accredited informal reserves ⁵ ha		Other Public Land ⁶ ha	
-264 to -264	1 to 1	2 to 2	261 to 261	
-1,656 to -1,182	16 to 92	286 to 684	6,468 to 6,468	
-5,305 to 4,978	17,365 to 18,460	194,366 to 203,554	13,016 to 13,016	
3 to 283	4 to 41	1,568 to 1,811	9,237 to 9,237	
-2,387 to -1,224	214 to 228	12,311 to 13,460	14,306 to 14,306	
-9,384 to -2,254	8,807 to 8,861	157,095 to 162,175	78,971 to 81,077	
-20,829 to -3,579	21,962 to 23,056	330,015 to 346,169	50,611 to 50,611	
-275 to -177	0 to 2	0 to 96	177 to 177	
-54 to -54	0 to 0	13 to 13	40 to 40	
8,473 to 9,005	2,307 to 2,361	38,256 to 38,994	5,077 to 5,339	
52,311 to 61,895	23,821 to 24,095	250,549 to 259,860	19,052 to 19,052	
-53 to 2,351	34 to 139	2,830 to 5,129	12,093 to 12,093	
21,297 to 22,649	16,712 to 17,076	1,514 to 2,368	10,390 to 10,524	
2,313 to 2,518	359 to 370	3,822 to 4,038	1,219 to 1,219	
24,812 to 24,962	16,455 to 16,482	83,538 to 83,661	10,000 to 10,000	
-124 to -124	0 to 0	0 to 0	124 to 124	
3,933 to 3,933	4 to 4	89 to 89	755 to 755	
2,209 to 2,303	27 to 33	269 to 358	1,500 to 1,500	
1,966 to 3,493	747 to 790	5,231 to 6,715	1,423 to 1,423	
45,684 to 45,684	2 to 2	2,678 to 2,678	10,447 to 10,447	
5,115 to 5,150	2,941 to 3,125	273 to 464	-63 to -35	
8,485 to 8,485	4 to 4	307 to 307	0 to 0	
160,132 to 161,856	22,523 to 23,457	11,944 to 12,723	36,143 to 36,154	
3,769 to 3,816	360 to 407	183 to 183	1,415 to 1,415	
-3,997 to 923	4,673 to 4,708	46,170 to 50,464	40,351 to 40,942	
3,083 to 8,448	2,151 to 2,155	16,657 to 21,904	20,367 to 20,490	
319,295 to 343,838	142,992 to 144,444	1,179,013 to 1,198,854	343,379 to 346,633	

Table 8.2
Old-growth
Reservation Analysis

Approach B

Old-growth by forest ecosystem	Present area on all lands ha	CAR Reserve System under this Approach ¹			
		Possible New Reserves ha	Total area reserved under this approach ² ha	Level of reservation under this approach ^{2&3} %	
Jarrah Blackwood ⁺⁺	48,496	8,425 to 10,759	21,216 to 23,300	43.7% to 48.0%	
* Jarrah Leeuwin ⁺⁺	477	64 to 103	422 to 460	88.4% to 96.6%	
Jarrah Mt Lindesay ⁺⁺	14,005	3,012 to 4,183	9,698 to 10,798	69.3% to 77.1%	
* Jarrah North East ⁺⁺	11,594	5,311 to 5,718	9,660 to 9,902	83.3% to 85.4%	
* Jarrah North West ⁺⁺	7,923	742 to 843	7,209 to 7,689	91.0% to 97.0%	
* Jarrah Rate's Tingle	1,021	0 to 97	924 to 1,021	90.5% to 100.0%	
* Jarrah Red Tingle	214	0 to 0	205 to 205	95.9% to 95.9%	
* Jarrah Sandy ⁺⁺	2,171	0 to 6	2,149 to 2,155	99.0% to 99.2%	
Jarrah South ⁺⁺	160,667	7,477 to 9,608	88,605 to 90,580	55.1% to 56.4%	
Jarrah Unicap ⁺⁺	4,739	0 to 0	2,628 to 3,828	55.5% to 80.8%	
Jarrah Woodland	13,235	1,147 to 1,208	10,537 to 10,674	79.6% to 80.7%	
Jarrah Yellow Tingle ⁺⁺	7,249	1,126 to 1,757	3,507 to 3,871	48.4% to 53.4%	
Karri Main Belt ⁺⁺	53,576	47 to 141	32,034 to 32,141	59.8% to 60.0%	
* Karri Rate's Tingle	674	0 to 0	674 to 674	100.0% to 100.0%	
Karri Red Tingle	3,283	0 to 0	3,202 to 3,202	97.5% to 97.5%	
* Karri West Coast ⁺⁺	492	1 to 1	492 to 492	100.0% to 100.0%	
Karri Yellow Tingle ⁺⁺	6,969	634 to 1,704	3,307 to 4,119	47.4% to 59.1%	
* West'n Wandoo forest ⁺⁺	7,865	1,234 to 1,234	6,938 to 6,938	88.2% to 88.2%	
* West'n Wandoo woodland ⁺⁺	3,012	1,050 to 1,050	2,793 to 2,793	92.7% to 92.7%	
TOTAL⁸	347,662	32,644 to 36,085	210,174 to 210,376	60.5% to 60.5%	

* Rare forest ecosystem with a 100% reservation target. All other forest ecosystems have a reservation target of 15%.

++ Ecosystems currently significant for commercial timber yield

1 Expressed as a range reflecting variations in approach to reserve design.

2 Includes only accredited informal reserves.

3 Represents the percentage of this reserve type measured against 'Present area on all lands' for rare ecosystems and against 'Estimated pre-1750 area' for all other ecosystems.

4 As measured against the quantitative JANIS targets without taking into account the scientific, economic & social flexibility provisions.

5 For a discussion of lands contained within this category please

6 Crown lands vested in Commonwealth and Western Australian Governments.

7 Privately owned land, including freehold land owned by Government agencies.

8 Minimum and Maximum Total figures shown are sums of complete approaches, rather than sums of the columns above.

Table 8.2 (cont.)

Old-growth

Approach B

Reservation Analysis

Deficit / Excess ha ^{2&4}	Area Outside CAR Reserve ¹					
	Non-accredited informal reserves ⁵ ha		Other Public Land ⁶ ha		Freehold land ⁷ ha	
-7,882 to -5,798	1,920 to	1,932	23,265 to	25,361	0 to	0
-55 to -16	0 to	0	16 to	55	0 to	0
1,296 to 2,395	49 to	92	3,157 to	4,214	0 to	0
-1,935 to -1,693	123 to	127	1,539 to	1,779	26 to	33
-714 to -234	11 to	38	223 to	676	0 to	0
-97 to 0	0 to	2	0 to	94	0 to	0
-9 to -9	0 to	0	8 to	8	0 to	0
-23 to -17	0 to	0	17 to	23	0 to	0
-7,795 to -5,820	6,237 to	6,258	63,829 to	65,826	0 to	0
-215 to 985	11 to	91	625 to	1,744	275 to	275
2,596 to 2,733	2,330 to	2,441	217 to	243	14 to	14
-842 to -478	266 to	280	3,098 to	3,475	0 to	0
-111 to -4	6,884 to	6,912	14,550 to	14,629	0 to	0
0 to 0	0 to	0	0 to	0	0 to	0
1,233 to 1,233	4 to	4	77 to	77	0 to	0
0 to 0	0 to	0	0 to	0	0 to	0
-875 to -63	454 to	493	2,397 to	3,169	0 to	0
-927 to 0	0 to	138	781 to	781	8 to	8
-220 to 0	0 to	33	164 to	164	23 to	23
-12,601 to -12,399	18,596 to	18,761	118344 to	118374	346.41 to	353.8

Table 8.3

Reservation Analysis of Indicative Areas of National Estate Values

Approach B

National Estate Value ¹	Extant area ha	CAR Reserve System under this Approach ²				Area Outside CAR Reserve ²					
		Possible New Reserves ha		Total area reserved ha		Total area reserved %		Non-accredited informal reserves ³ ha		Other Public Land ⁴ ha	
<i>Criterion A.1</i>											
Centres of disjunct flora	42,730	12,554 to	14,342	39,181 to	39,854	91.7% to	93.3%	136 to	346	2,740 to	3,203
Centres of flora endemism	101,137	21,091 to	21,721	82,958 to	84,211	82.0% to	83.3%	1,550 to	1,639	15,377 to	16,540
Centres of relictual flora	84,558	14,450 to	14,859	77,139 to	78,423	91.2% to	92.7%	763 to	860	5,373 to	6,559
Refugia	71,138	5,182 to	6,643	64,019 to	65,764	90.0% to	92.4%	1,359 to	1,510	4,008 to	5,601
<i>Criterion A.2</i>											
Aggregations of old-growth forest	178,977	16,790 to	18,470	119,328 to	120,771	66.7% to	67.5%	6,562 to	6,729	51,644 to	52,920
Contemporary fauna refuges	13	0 to	0	11 to	12	88.5% to	92.3%	0 to	0	0 to	0
Wetlands of national significance	48,146	195 to	510	31,463 to	31,637	65.3% to	65.7%	603 to	663	1,016 to	1,129
<i>Criterion A.3</i>											
Flora species richness	123,102	22,119 to	27,109	99,220 to	101,695	80.6% to	82.6%	2,009 to	2,376	19,330 to	21,437
Vegetation community diversity	6,982	1,921 to	2,166	5,160 to	5,261	73.9% to	75.4%	113 to	116	1,607 to	1,705
<i>Criterion B.1</i>											
Natural landscapes	559,970	45,986 to	49,438	456,557 to	458,227	81.5% to	81.8%	13,468 to	13,482	83,785 to	85,440

- 1 Some national estate values presented in this table, such as refugia and centres of flora endemism, are derived from similarly named biodiversity values listed in Table 7.4. In these cases national estate values represent subsets of the total areas which have been identified through the application of thresholds for condition and integrity. In most instances the application of thresholds for indicative national estate significance has involved the identification of these values within natural landscapes of 40 hectares or larger. For a detailed explanation of thresholds for indicative national estate values, see the separate report National Estate Identification and Assessment in the South-West Forest Region of Western Australia.
- 2 Expressed as a range reflecting variations in approach to reserve design.
- 3 For a discussion of lands contained within this category please see Section 4.3.2.
- 4 Crown lands vested in Commonwealth and Western Australian Governments.

Table 8.4

Biodiversity Reservation Analysis - Flora Values

Approach B

Flora Value	Present area on all lands ha	CAR Reserve System under this Approach ¹		Area Outside CAR Reserve ¹					
		Possible New Reserves ha	Total area reserved under this approach ² ha & % ³	Non-accredited informal reserves ⁴ ha	Other Public Land ⁵ ha	Freehold land ⁶ ha			
<p>Flora Disjunctiveness Areas with concentrations of disjunct species (those with populations separated by a substantial geographic distance from other populations, such that they are unlikely to interbreed) two standard deviations or more above the mean for the region.</p>	116,283	16,064 to 17,931	52,855 to 53,635 45.5% to 46.1%	3,454 to 3,728	36,241 to 36,747	22,954 to 22,954			
<p>Flora Endemism Areas where the level of endemism is two or more standard deviations above the mean for the region.</p>	221,879	28,907 to 30,176	108,082 to 112,507 48.7% to 50.7%	6,196 to 6,626	59,918 to 63,913	43,259 to 43,259			
<p>Relictual Flora Areas with concentrations of relictual species (those of phylogenetic interest for primitive or relictual characteristics) two standard deviations or more above the mean for the region.</p>	151,981	20,065 to 20,228	91,461 to 92,481 60.2% to 60.9%	5,525 to 5,648	39,556 to 40,698	14,296 to 14,296			
<p>Flora Species Richness Areas of flora species richness (from a richness prediction map generated from site records and the distribution maps from species habitat models) two or more standard deviations above the mean for the region.</p>	211,437	39,412 to 40,563	124,108 to 128,334 58.7% to 60.7%	8,179 to 8,545	65,703 to 69,563	9,220 to 9,220			

1 Expressed as a range reflecting variations in approach to reserve design

2 Includes only accredited informal reserves

3 Represents total area reserved as a percentage of "present area on all lands"

4 For a discussion of lands contained within this category please see Section 4.3.2

5 Crown lands vested in Commonwealth and Western Australian Governments

6 Privately owned land, including freehold land owned by Government agencies

Table 8.5
Indicative Impact Analysis – Native Forest Timber Industry

Approach B

For each Region	Area available for timber production ha	TIMBER YIELD			Gross Value of wood products at Mill Gate \$/yr
		Karri Sawlog Grade 1&2 m ³ /yr	Jarrah Sawlog Grade 1&2 ¹ m ³ /yr	Chiplog and charlog m ³ /yr	
Swan					
Range under this approach	320,034 to 321,133	0 to 0	203,710 to 203,923	28,234 to 28,264	\$56,987,253 to \$57,046,657
% of current	102.3% to 102.6%	0.0% to 0.0%	100.8% to 101.0%	100.8% to 101.0%	100.8% to 101.0%
Deficit/Addition	7,151 to 8,250	0 to 0	1,710 to 1,923	237 to 267	\$478,487 to \$537,891
Central Forest					
Range under this approach	466,232 to 475,187	0 to 0	201,618 to 214,333	61,554 to 65,436	\$58,697,453 to \$62,399,229
% of current	92.9% to 94.7%	0.0% to 0.0%	89.2% to 94.8%	89.2% to 94.8%	89.2% to 94.8%
Deficit/Addition	-35,546 to -26,591	0 to 0	-24,382 to -11,667	-7,444 to -3,562	-\$7,098,377 to -\$3,396,601
Southern Forest					
Range under this approach	326,849 to 336,819	197,281 to 207,712	59,789 to 60,788	587,234 to 618,283	\$109,101,539 to \$113,731,456
% of current	96.5% to 99.4%	92.2% to 97.1%	96.4% to 98.0%	92.2% to 97.1%	93.0% to 97.0%
Deficit/Addition	-11,853 to -1,883	-16,719 to -6,288	-2,211 to -1,212	-49,766 to -18,717	-\$8,181,201 to -\$3,551,284
TOTAL²					
Range under this approach	1,123,085 to 1,123,169	197,281 to 207,712	466,116 to 478,045	677,022 to 711,983	\$224,786,245 to \$233,177,342
% of current	97.9% to 98.2%	92.2% to 97.1%	96.0% to 97.4%	94.1% to 97.6%	94.4% to 97.6%
Deficit/Addition	-30,278 to -30,194	-16,719 to -6,288	-23,884 to -11,955	-56,973 to -22,012	-\$14,801,091 to -\$6,409,994

1 The level of cut for jarrah is currently 490,000 m³ pa for the next 6 years - to the year 2004. The analysis uses the forecast drop in resource of 38% to 300,000m³ for jarrah sawlogs using the resource base of the current management plan. From 2004 the % of current¹ applies to 300,000m³ per annum.

2 Minimum and maximum total figures shown are sums of complete approaches, rather than sums of the columns above.

Table 8.6
Indicative Impact Analysis
Private Sector Native Forest Timber Industry
Related Employment

Approach B

	Private Sector	
	Indicative Direct Employment ¹	Indicative Indirect Employment ²
Current situation	2,440	2,928
Range under this approach	2,291 to 2,374	2,749 to 2,849
Range of Indicative Impacts**	-149 to -65	-179 to -78

** The increase in width of fourth order stream reserves from 150 metres to 200 metres and other areas deemed to be informal reserves for accreditation purposes results in a decrease in the area of forest available for native forest timber production and reflects a reduction against the current situation of 17 direct jobs and 20 indirect jobs. This reduction is included in the employment impacts outlined above.

1 Direct employment in this analysis covers employment from the forest to the first point of sale. It includes private sector employment in logging and haulage, sawmilling, resawing and dressing, woodchip milling and charcoal manufacturing. Public sector employment impacts are shown at Box 4.2.

2 In the absence of any multiplier directly mirroring the industry, a multiplier of 2.2 was used to calculate indirect employment impacts. That is, for every 10 direct jobs lost because of reserve changes, an additional 12 jobs are lost in the wider community.

Table 8.7

Reservation Analysis - Significance for Native Forest Timber Values on CALM Managed Land

Approach B

Significance for timber values ³	Total area on CALM managed land ha	CAR Reserve System under this Approach					Non-accredited Informal ⁴ Reserves Ha	Range of State forest area available for production ^{4&6} ha
		Existing Reserved Areas ^{1&2}			Possible New Reserves ⁴ ha	Total ^{4&5} ha		
		Formal (gazetted) %	Formal (proposed) ⁴ %	Informal ⁴ (accredited) %				
High	283,031	25.8%	8.1% to 8.8%	4.0% to 4.5%	10,480 to 20,402	119,102 to 129,445	11,637 to 12,100	141,949 to 151,829
Medium High	555,760	16.5%	14.4% to 14.9%	3.1% to 3.1%	19,509 to 26,269	211,540 to 215,190	23,067 to 23,373	317,503 to 320,847
Moderate	233,305	2.7%	8.4% to 9.4%	2.1% to 2.2%	8,086 to 12,136	41,336 to 43,127	8,617 to 8,680	181,498 to 183,352
Medium Low	176,574	7.9%	17.9% to 21.9%	1.9% to 2.1%	5,908 to 7,438	55,168 to 63,482	6,017 to 6,372	107,074 to 115,035
Low	577,500	10.0%	7.8% to 8.8%	5.9% to 6.0%	14,927 to 16,373	152,114 to 159,637	57,794 to 58,287	360,067 to 367,099

1 Represents the percentage of this reserve type measured against 'Total area on CALM managed lands'

2 For a discussion of lands contained within this category please see Section 4.3.2

3 Relates to sustained yield over the next 40 years. These values should not be interpreted as depicting current standing gross bole timber value. The values (high to low) depict the potential contribution of the areas to the scheduled woodflow and were derived on the basis of species, site potential, silvicultural history, timber inventory and disease status.

4 Expressed as a range reflecting variations in approach to reserve design

5 Includes only accredited informal reserves.

6 Excludes non-accredited informal reserves

Table 8.8
Reservation Analysis – Mineral Values

Approach B

Areas covered by:	Total new reserves under this approach ¹ ha	
<i>Agreement Act Leases</i> ²	55,784	to 58,755
<i>Mining tenements, leases and licences</i> ³		
Pending	12,738	to 20,210
Granted	53,816	to 56,525

1 Expressed as a range reflecting variations in approach to reserve design. Includes new reserves proposed under this approach and reserves proposed under the Forest management Plan 1994-2003, less those designated to remain as State forest under this approach.

2 Where the creation of new reserves in these tenements is to be avoided, discussions will be held with affected Companies to ensure that any changes to their statutory property rights will only proceed with their agreement. to ensure that any changes to their statutory property rights will only proceed with their agreement.

Mineral Potential ²	Total new reserves under this approach ¹ ha	
High areas with a WMP score greater than 90 having moderate to high potential for major deposits. eg gold, bauxite	181,225	to 181,477
Medium areas with a WMP score of 72-90 having moderate to high potential for significant deposits. eg Greenbushes rare metal deposits	23,193	to 35,590
Low areas with a WMP score of less than 72 having low to moderate potential for deposits of lesser economic significance eg industrial minerals.	194,999	to 208,096

1 Expressed as a range reflecting variations in approach to reserve design. Includes new reserves proposed under this approach and reserves proposed under the Forest management Plan 1994-2003, less those designated to remain as State forest under this approach.

2 Weighted mineral potential (WMP) is an estimate of mineral potential which makes some Allowance for relative economic significance:

	Total new reserves under this approach ¹ ha	
Identified mineral resources ²	3,496	to 3,598

1 Expressed as a range reflecting variations in approach to reserve design. Includes new reserves proposed under this approach and reserves proposed under the Forest management Plan 1994-2003, less those designated to remain as State forest under this approach.

2 Mineral resources in the ground, identified, demonstrated and often quantified on the basis of past exploration and mining activities. This data is drawn on to develop further exploration and mining proposals.