

Appendix 6

BENCHMARK - TABLES

Shows the estimated outcomes of fully implementing the Forest Management Plan 1994-2003. The contribution of informal reserves towards the JANIS targets are shown in two ways in the benchmark: 1) those informal reserves which have received up-front accreditation by governments, and 2) all existing informal reserves.

Table 6.1
Biodiversity Values
Reservation Analysis

Benchmark

Forest ecosystem	Estimated pre 1750 area ha	Present area on all lands ha	Area Reserved						
			% of pre 1750 area reserved ¹				Total (including only accredited informal reserves)		
			Formal (gazetted) %	Formal (proposed) %	Informal (accredited) %	Informal (all) %	ha	% ²	Deficit/ Excess ³ ha
Bullich and Yate	2,800	2,440	53.5%	24.3%	0.0%	0.0%	2,176	89.2%	-264
Darling Scarp ⁺⁺	29,000	9,938	4.3%	0.0%	0.6%	1.3%	1,433	4.9%	-2,917
Jarrah Blackwood ⁺⁺	347,200	281,805	1.9%	6.5%	2.5%	7.8%	37,806	10.9%	-14,274
Jarrah Leeuwin ⁺⁺	56,400	19,552	4.5%	0.1%	0.9%	1.4%	3,036	5.4%	-5,424
Jarrah Mt Lindesay ⁺⁺	126,600	44,597	1.5%	6.9%	0.3%	0.5%	11,102	8.8%	-7,888
Jarrah North East ⁺⁺	717,100	350,239	4.4%	8.0%	1.0%	2.2%	95,646	13.3%	-11,919
Jarrah North West ⁺⁺	670,600	499,598	7.2%	2.5%	2.3%	5.6%	80,142	12.0%	-20,448
Jarrah Rate's Tingle	1,500	1,246	62.7%	2.1%	0.0%	0.2%	970	77.8%	-276
Jarrah Red Tingle	350	269	29.4%	32.0%	0.0%	0.1%	215	79.9%	-54
Jarrah Sandy ⁺⁺	107,900	71,092	8.3%	12.9%	1.4%	3.6%	24,400	22.6%	8,215
Jarrah South ⁺⁺	557,300	438,912	8.0%	13.9%	2.6%	6.7%	136,602	24.5%	53,007
Jarrah Unicup ⁺⁺	81,000	29,459	6.1%	11.7%	0.1%	0.2%	14,501	17.9%	2,351
Jarrah Woodland	106,374	67,221	10.9%	7.7%	15.8%	31.8%	36,531	34.3%	20,575
Jarrah Yellow Tingle ⁺⁺	11,600	9,669	14.1%	0.7%	10.1%	13.9%	2,890	24.9%	1,150
Karri Main Belt ⁺⁺	193,000	163,905	19.5%	1.8%	6.6%	14.8%	53,744	27.8%	24,794
Karri Rate's Tingle	1,100	860	66.9%	0.0%	0.0%	0.0%	736	85.6%	-124
Karri Red Tingle	7,200	5,860	38.1%	31.5%	0.0%	0.1%	5,013	69.6%	3,933
Karri West Coast ⁺⁺	14,500	6,274	26.9%	2.4%	0.1%	0.5%	4,254	29.3%	2,079
Karri Yellow Tingle ⁺⁺	15,800	13,264	14.2%	0.6%	7.7%	13.5%	3,558	22.5%	1,188
Peppermint & coastal heath	80,100	70,826	66.6%	5.2%	0.2%	0.2%	57,699	72.0%	45,684
Rocky outcrops	26,400	12,444	16.4%	7.1%	8.7%	19.6%	8,487	32.1%	4,527
Sand dunes	10,300	10,342	95.5%	1.8%	0.1%	0.1%	10,030	97.4%	8,485
Shrub, herb & sedgelands	429,900	296,950	19.5%	12.8%	19.0%	24.6%	220,397	51.3%	155,912
Swamps	15,300	8,069	33.4%	2.4%	4.1%	6.3%	6,105	39.9%	3,810
West'n Wandoo forest ⁺⁺	363,200	146,597	6.9%	7.1%	0.6%	1.8%	53,122	14.6%	-1,358
West'n Wandoo woodland ⁺⁺	163,000	72,078	8.2%	7.1%	0.7%	2.0%	26,023	16.0%	1,573
TOTAL	4,135,524	2,633,506					896,618		272,337

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

++ Ecosystems currently significant for commercial timber yield.

1 For a discussion of lands contained within these categories please see Sections 4.3.1, 4.3.2 and 4.4.1.

2 Represents the percentage of total reserves measured against 'Present area on all lands' for ecosystems with a 100% target and against 'Estimated pre 1750 area' for all other ecosystems.

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

4 Crown lands vested in Commonwealth and Western Australian Governments plus non-accredited informal reserves (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 6.1 (cont.)**Biodiversity Values
Reservation Analysis****Benchmark**

Area Reserved ¹			Area Outside Reserves		
Total (including all informal reserves)			Public Land		Freehold land ⁶ ha
ha	% ²	Deficit/ Excess ³ ha	Outside accredited reserves ⁴ ha	If all informal reserves were included ⁵ ha	
2,177	89.2%	-263	3	2	261
1,646	5.7%	-2,704	2,038	1,825	6,468
56,315	16.2%	4,235	230,983	212,474	13,016
3,331	5.9%	-5,129	7,279	6,984	9,237
11,419	9.0%	-7,571	19,189	18,873	14,306
104,510	14.6%	-3,055	170,531	161,667	84,062
102,598	15.3%	2,008	368,845	346,388	50,611
973	78.1%	-273	98	96	177
216	80.2%	-53	14	13	40
26,745	24.8%	10,560	41,353	39,008	5,339
159,385	28.6%	75,790	283,259	260,475	19,052
14,535	17.9%	2,385	2,864	2,830	12,093
53,552	50.3%	37,596	20,130	3,109	10,559
3,325	28.7%	1,585	5,560	5,125	1,219
69,624	36.1%	40,674	100,161	84,281	10,000
736	85.6%	-124	0	0	124
5,017	69.7%	3,937	93	89	755
4,315	29.8%	2,140	520	458	1,500
4,482	28.4%	2,112	8,283	7,359	1,423
57,701	72.0%	45,686	2,681	2,678	10,447
11,379	43.1%	7,419	3,957	1,066	0
10,034	97.4%	8,489	311	307	0
244,741	56.9%	180,256	40,363	16,018	36,191
6,446	42.1%	4,151	549	208	1,415
57,339	15.8%	2,859	52,071	47,853	41,404
28,110	17.2%	3,660	25,105	23,018	20,950
1,040,651		416,370	1,386,239	1,242,206	350,649

Note: Comparisons between the benchmark and the approaches are made against those figures that include only the accredited informal reserves.

Table 6.2
Old-growth
Reservation Analysis

Benchmark

Old-growth by forest ecosystem	Present area on all lands ha	Area Reserved ¹						
		% of present area on all lands reserved				Total (including only accredited informal reserves)		
		Formal (gazetted) %	Formal (proposed) %	Informal (accredited) %	Informal (all) %	ha	% ²	Deficit / Excess ³ ha
Jarrah Blackwood ⁺⁺	48,496	9.7%	13.4%	4.4%	9.6%	13,324	27.5%	-15,773
* Jarrah Leeuwin ⁺⁺	477	75.0%	0.0%	0.0%	1.3%	358	75.0%	-119
Jarrah Mt Lindesay ⁺⁺	14,005	4.7%	42.2%	1.8%	2.7%	6,827	48.8%	-1,575
* Jarrah North East ⁺⁺	11,595	16.9%	20.1%	4.4%	8.3%	4,794	41.3%	-6,801
* Jarrah North West ⁺⁺	7,923	68.8%	11.1%	3.8%	4.7%	6,628	83.7%	-1,295
* Jarrah Rate's Tingle	1,021	87.6%	3.0%	0.0%	0.2%	924	90.5%	-97
* Jarrah Red Tingle	214	48.2%	47.7%	0.0%	0.2%	205	95.9%	-9
* Jarrah Sandy ⁺⁺	2,171	96.7%	2.2%	0.0%	0.0%	2,149	99.0%	-23
Jarrah South ⁺⁺	160,667	23.3%	25.9%	3.6%	7.1%	84,719	52.7%	-11,681
Jarrah Unicap ⁺⁺	4,739	21.6%	57.8%	1.4%	1.6%	3,828	80.8%	985
Jarrah Woodland	13,235	32.2%	14.5%	32.0%	51.1%	10,414	78.7%	2,473
Jarrah Yellow Tingle ⁺⁺	7,249	21.2%	0.9%	14.1%	18.6%	2,626	36.2%	-1,724
Karri Main Belt ⁺⁺	53,576	47.0%	3.9%	8.8%	21.3%	32,020	59.8%	-125
* Karri Rate's Tingle	674	100.0%	0.0%	0.0%	0.0%	674	100.0%	0
Karri Red Tingle	3,283	71.1%	26.4%	0.0%	0.1%	3,202	97.5%	1,233
* Karri West Coast ⁺⁺	492	90.2%	9.6%	0.0%	0.0%	491	99.8%	-1
Karri Yellow Tingle ⁺⁺	6,969	27.7%	0.6%	11.7%	20.0%	2,788	40.0%	-1,394
* West'n Wandoo forest ⁺⁺	7,865	19.5%	53.8%	3.6%	6.5%	6,053	77.0%	-1,812
* West'n Wandoo woodland ⁺⁺	3,013	26.6%	22.1%	6.8%	11.6%	1,673	55.5%	-1,340
TOTAL	347,663					183,696		-39,079

* Forest ecosystem within which old-growth is rare or depleted with a 100% reservation target. All other ecosystems have a 60% target.

++ Ecosystems currently significant for commercial timber yield.

1 For a discussion of lands contained within these categories please see Sections 4.3.1, 4.3.2 and 4.4.1.

2 Represents the percentage of total reserves measured against 'Present area on all lands'.

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

4 Crown lands vested in Commonwealth and Western Australian Governments plus non-accredited informal reserves (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.

Note:

Comparisons between the benchmark and the approaches are made against those figures that include only the accredited informal reserves.

Table 6.2 (cont.)

Old-growth

Benchmark

Reservation Analysis

Area Reserved ¹			Area Outside CAR Reserve		
Total (including all informal reserves)			Public Land		Freehold land ⁶ ha
ha	% ²	Deficit / Excess ³ ha	Outside accredited reserves ⁴ ha	If all informal reserves were included ⁵ ha	
15,830	32.6%	-13,268	35,172	32,666	0
364	76.3%	-113	119	113	0
6,953	49.6%	-1,450	7,177	7,052	0
5,241	45.2%	-6,354	6,768	6,320	33
6,700	84.6%	-1,222	1,295	1,222	0
927	90.8%	-94	97	94	0
205	96.1%	-8	9	8	0
2,149	99.0%	-23	23	23	0
90,308	56.2%	-6,093	75,948	70,360	0
3,839	81.0%	996	636	625	275
12,932	97.7%	4,992	2,807	288	14
2,951	40.7%	-1,398	4,623	4,298	0
38,712	72.3%	6,566	21,555	14,864	0
674	100.0%	0	0	0	0
3,206	97.7%	1,236	81	77	0
491	99.8%	-1	1	1	0
3,367	48.3%	-815	4,181	3,602	0
6,275	79.8%	-1,590	1,803	1,581	9
1,818	60.3%	-1,195	1,314	1,169	26
202,943		-19,832	163,609	144,361	358

Table 6.3

Reservation Analysis of Indicative Areas of National Estate Values

Benchmark

National Estate Value ¹	Present area on all lands ha	Area reserved ²								Area Outside Reserves	
		% of present area on all lands reserved ³				Total (including only accredited informal reserves)		Total (including all informal reserves)		Public Land	
		Formal (gazetted) %	Formal (proposed) %	Informal (accredited) %	Informal (all) %	ha	% ³	ha	% ³	Outside accredited reserves ⁴ ha	If all informal reserves were accredited ⁵ ha
Criterion A.1											
Refugia	71,138	55.5%	12.1%	20.7%	22.9%	62,786	88.3%	64,396	90.5%	8345	6,734
Centres of relictual flora	84,558	48.3%	18.8%	18.1%	19.9%	72,025	85.2%	73,583	87.0%	12533	10,975
Centres of flora endemism	101,137	20.2%	30.3%	21.8%	24.1%	73,132	72.3%	75,430	74.6%	28005	25,707
Centres of disjunct flora	42,730	22.8%	30.3%	28.6%	30.3%	34,889	81.7%	35,619	83.4%	7841	7,112
Criterion A.2											
Wetlands of national significance	48,146	60.2%	2.5%	2.6%	1.6%	31,453	65.3%	32,159	66.8%	1803	1,097
Aggregations of old-growth forest	178,977	31.7%	23.2%	5.6%	9.4%	108,265	60.5%	115,164	64.3%	70712	63,813
Contemporary fauna refuges	13	61.6%	19.2%	11.6%	15.4%	12	92.3%	12	96.2%	1	0
Criterion A.3											
Vegetation community diversity	6,982	14.7%	21.5%	20.6%	22.5%	3,969	56.8%	4,102	58.8%	3012	2,879
Flora species richness	123,102	18.5%	33.7%	16.7%	19.6%	84,799	68.9%	88,359	71.8%	38235	34,675
Criterion B.1											
Natural landscapes	559,970	44.5%	21.3%	11.5%	14.1%	432,915	77.3%	447,566	79.9%	122565	107,913

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 6.4. Such 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 For a discussion of lands contained within these categories please see Sections 4.3.1, 4.3.2 and 4.4.1.

3 Represents the percentage of this reserve type as measured against 'Present area on all lands'.

4 Crown lands vested in Commonwealth and Western Australian Governments plus non-accredited informal reserves (see section 4.3.2).

5 Crown lands vested in Commonwealth and Western Australian Governments.

Table 6.4

Biodiversity Reservation Analysis - Flora Values

Benchmark

Flora Value	Present area on all lands ha	% of present area on all lands reserved ¹				Total (accounting for accredited informal reserves only) ha % ²	Total (including all informal reserves) ha % ²	Area Outside CAR Reserve		
		Formal (gazetted) %	Formal (proposed) %	Informal (accredited) %	Informal (all) %			Public Land		Freehold land ⁵ ha
								Outside accredited reserves ³ ha	If all informal reserves were included ⁴ ha	
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.	116,283	12.5%	13.6%	13.0%	16.6%	45,331 39.0%	49,539 42.6%	47,999	43,790	22,954
Flora Endemism Areas where the level of endemism is two or more standard deviations above the mean for the region.	221,879	11.9%	18.7%	11.7%	15.1%	93,863 42.3%	101,465 45.7%	110,711	77,155	43,259
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.	151,981	29.5%	12.5%	11.5%	16.0%	81,315 53.5%	88,119 58.0%	73,895	49,566	14,296
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.	211,437	11.7%	23.1%	11.7%	16.8%	98,424 46.6%	109,227 51.7%	102,648	92,989	9,220

- 1 For a discussion of lands contained within these categories please see Sections 4.3, 4.3.2 and 4.4.1.
- 2 Represents the percentage of total reserves measured against 'Present area on all lands'.
- 3 Crown lands vested in Commonwealth and Western Australian Governments, including the non-accredited informal reserves.
- 4 Crown lands vested in Commonwealth and Western Australian Governments.
- 5 Privately owned land, including freehold land owned by Government agencies.

Table 6.5

Indicative Impact Analysis – Native Forest Timber Industry

Benchmark

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 ⁴ m ³ /yr	Chiplog and charlog m ³ /yr	
Swan					
Current available ¹	312,247	0	202,000	27,997	\$56,508,766
Less Stream order 4 extension ²	-636	0	-397	-55	-\$111,068
Benchmark ³	311,611	0	201,603	27,942	\$56,397,698
Central Forest					
Current available ¹	500,771	0	226,000	68,998	\$65,795,830
Less Stream order 4 extension ²	-1,007	0	-430	-131	-\$125,074
Benchmark ³	499,764	0	225,570	68,867	\$65,670,756
Southern Forest					
Current available ¹	337,014	214,000	62,000	637,000	\$117,282,740
Less Stream order 4 extension ²	-1,688	-2,859	-446	-8,510	-\$1,463,567
Benchmark ³	335,326	211,141	61,554	628,490	\$115,819,173
TOTAL					
Current available ¹	1,150,032	214,000	490,000	733,995	\$239,587,336
Less Stream order 4 extension ²	-3,331	-2,859	-1,273	-8,696	-\$1,699,708
Benchmark ³	1,146,701	211,141	488,727	725,299	\$237,887,628

1 Reflects the outcomes of the Forest Management Plan 1994-2003.

2 The increase in width of fourth order stream reserves by 50 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 timber production - see section 4.3.2.

3 Reflects the Forest Management Plan 1994-2003 less the increase in width of fourth order stream reserves and other areas deemed to be informal reserves for accreditation purposes.

4 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 current' applies to 300,000m3 per yr.

Table 6.6
Indicative Impact Analysis
Private Sector Native Forest Timber Industry
Related Employment

Benchmark

	Private Sector	
	Indicative Direct Employment ¹	Indicative Indirect Employment ²
Current situation ³	2,440	2,928
Less Stream order 4 extension ⁴	-17	-20
Benchmark ⁵	2,423	2,908

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.

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.

3 Reflects the outcomes of the Forest Management Plan 1994-2003.

4 The increase in width of fourth order stream reserves by 50 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 timber production - see section 4.3.2.

5 Reflects the Forest Management Plan 1994-2003 less the increase in width of fourth order stream reserves and other areas deemed to be informal reserves for accreditation purposes.

Table 6.7**Reservation Analysis - Significance for Native Forest Timber Values
on CALM Managed Land****Benchmark**

Significance for timber values ²	Total area on CALM managed land ha	Existing Reserved Areas ^{1&3}				Total (accounting for accredited informal reserves only) ha	Total (accounting for all informal reserves) ha	State Forest area available for production ha
		Formal (gazetted) %	Formal (proposed) %	Informal (accredited) %	Informal (all) %			
High	283,031	25.8%	9.4%	4.4%	8.7%	112,081	124,087	158,944
Medium High	555,760	16.5%	16.9%	3.2%	7.2%	203,656	226,048	329,712
Moderate	233,306	2.7%	9.5%	2.3%	6.0%	33,833	42,437	190,870
Medium Low	176,574	7.9%	24.2%	2.0%	5.5%	60,403	66,483	110,091
Low	577,505	10.0%	10.5%	6.3%	16.4%	155,408	213,758	363,747

1 For a discussion of lands contained within these categories please see Sections 4.3.1 and 4.3.2.

2 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.

3 Represents the percentage of this reserve type measured against 'Total area on CALM managed land'.

Table 6.8**Reservation Analysis – Mineral Values****Benchmark**

Areas covered by:	Proposed reserves¹ Ha
<i>Agreement Act Leases</i>	51,154
<i>Mining Act tenements¹</i>	
Pending	16,338
Granted	30,976

¹ Proposed reserves as per the 1994-2003 Forest Management Plan

Mineral Potential²	Proposed reserves¹ Ha
High Areas with a WMP score greater than 90 having moderate to high potential for major deposits eg gold, bauxite.	148,727
Medium Areas with a WMP score of 72-90 having moderate to high potential for significant deposits eg Greenbushes rare metal deposits.	14,786
Low areas with a WMP score of less than 72 having low to moderate potential for deposits of lesser economic significance eg industrial minerals.	159,457

¹ Proposed reserves as per the 1994-2003 Forest Management Plan

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

	Proposed reserves¹ Ha
Identified mineral resources²	3,991

¹ Proposed reserves as per the 1994-2003 Forest Management Plan

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.