electoral research paper

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Redistribution Forward Estimates 1984 - 1999

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Forward

In December 2003 a number of officers from the AEC, Australian Bureau of Statistics (ABS) and acknowledged academics met in Canberra to discuss this paper. As a result of discussions a project between the AEC and ABS has commenced to develop a more accurate model of projecting enrolment. The project is continuing.

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Contents

Abstract

A unique feature of the Australian redistribution process is the use of forward enrolment projections which is specified in Section 63A of the *Commonwealth Electoral Act 1918 (CEA).* Electoral boundaries are drawn on current enrolment figures, which can deviate +/- 10% from the State average. In addition, the redistribution committee use projected data; these projections are based on what the enrolment of each Census Collection District is likely to be in three and a half years, the midpoint of the redistribution period. The methodology employed is an algorithm used by the Australian Bureau of Statistics named the cohort-component methodology and as a projection mechanism has a high degree of confidence amongst demographers.

The accuracy of these projections can only be assessed after the fact. It must be remembered that the projections are estimates and therefore can never be entirely accurate and contain an element of uncertainty. The most obvious indicator of accuracy is the difference between the forecast enrolment and the actual enrolment. In terms of redistribution the accuracy of the real figures, while important, is of less concern than the deviation, which has until recently been +/- 2.5% (now +/- 3.5%) of the State average at the time, that is 3.5 years from the date of the redistribution.

It should also be noted that a major performance indicator of redistribution is malapportionment. The *CEA* specifies that redistribution must occur if more than one-third of the Divisions in a State deviate from the State average by more than 10% for a period of more than 2 months. To date no redistribution has been triggered as a result of this criterion.

This paper compares the actual enrolment deviations of each redistributed Division with the projected deviation and observes that in many cases the deviation has been well above or below the estimated deviation and recommends that the AEC seek advice from the Australian Bureau of Statistics into an alternative methodology for projecting enrolment figures.

Purpose

The purpose of this report is to analyse the accuracy of enrolment projections used in the redistribution process.

Background

The conduct of redistributions is governed by the *Commonwealth Electoral Act 1918* (CEA). In addition the Constitution plays a part in apportioning the electoral districts

among the States and Territories. This paper focuses on one redistribution criterion, in particular enrolment projections.

At a federal level electoral districts have been drawn on a criteria of equal population for some time. The theoretical and legislative basis for substantially equal populations is simple and convincing – each person's vote should have equal weight in the election of representatives. This is achieved by ensuring that at the time of the redistribution no one division deviates by more or less than 10% of the State average.

Redistributions at a federal level changed in 1984 when an additional mathematical principle was supplemented to the criteria for determining electoral boundaries. In 1984 the *Commonwealth Electoral Act 1918, s.25S(3*) was changed so that the redistribution committee would need to take into account the following:

(a) As far as practicable ensure that 3 years and 6 months after the State or Territory had been redistributed, the number of electors enrolled in each Electoral Division in the State or Territory be equal.

(b) Community of interests within the proposed Electoral Division, including economic, social and regional interests.

(c) Means of communication and travel within the proposed Electoral Division.

(d) The trend of population changes within each State and Territory.

(e) The physical features and area of the proposed Electoral Division.

(f) The boundaries of existing Divisions in the State or Territory

The inclusion of a requirement to have all divisions equal at some time in the future was a result of certain recommendations from the Joint Select Committee on Electoral Reform. The Committee's view was that a better method of ensuring equality in enrolments was to be achieved by having areas of high population growth start well below the quota and areas of population decline start above the quota, and at some point in time the two would converge. The date of three years and six months was chosen at it represented the mid point of the seven year redistribution cycle.

The requirement for Redistribution Committees to ensure that each Division was as far as practicable equal in enrolment numbers 3 years and 6 months from the time of redistribution required that the redistribution committee have access to projected enrolment figures. The planning and design of such projected figures depends greatly on the availability of reliable, accurate, relevant and recent data and the ability to analyse and interpret these data. Since the accuracy of any population projection can only be evaluated after the event, this report attempts to evaluate the accuracy of forward enrolment projections by comparing the estimate to the actual figures obtained from the enrolment system.

The first redistributions that required projected enrolment figures 3 years and 6 months from the redistribution date occurred in 1984. Constrained by scarce resources, the Redistribution Committees of 1984 sought the best information available to them, and concluded that the assessments of the Divisional Returning Officers provided the soundest estimates, relying as they did on their local knowledge and on inquiries directed to public authorities with knowledge of probable developments in housing and population movements.

In addition the Redistribution Committee made some changes to the 1984 DRO estimates and regarded the final figures sufficient at the time to create all the Divisions as near as practicable as being equal 3.5 years from the time the redistributions took place.

For the 1989 redistributions the CEA was changed in connection with redistribution estimates. The CEA qualified the acceptable deviation that would be allowed in estimating enrolment figures 3 years and 6 months. The CEA 1918, 66(3) prescribed that:

"In making the proposed redistribution, the Redistribution Committee –

(a) Shall as far as practicable, endeavour to ensure that, if the State were redistributed in accordance with the proposed redistribution, the number of electors enrolled in each Electoral Division in the State would not 3 years and 6 months after the State had been redistributed, be less than 98% or more than 102% of the average divisional enrolment of that State at the time."

Consequently the 1989 Redistribution Committees were under a duty to "as far as practicable, endeavour to ensure" that in 3 years and 6 months time enrolments in proposed Divisions would be approximately equal, subject to a variation of 2% above or below the average enrolment for the State.

In pursuing the objective of approximate equally of enrolments in 3.5 years time the Committees sought the best information available, including enrolment trends in recent years and modification of this data by DRO's.

In 1992 the AEC developed a computer program to project enrolment figures for each Census Collection District (CCD) with in the State. This was necessary as the

Redistribution Committee had begun using computer systems to draw new electoral boundaries using CCDs as basic building blocks.

The algorithm used by the AEC relied on growth rates from Statistical Local Areas (SLA) and applied to all CCDs within the SLA. The underlying assumption was that each CCD within the SLA had a similar growth rate.

The computer generated enrolment figures were occasionally modified by DROs on the basis of their local knowledge and approved by the Australian Electoral Officer of the particular State and also the Redistribution Committee. The figures were published and made available to political parties and the general public for use in submissions.

In 1995 the Joint Standing Committee on Electoral Matters (JSCEM) conducted an inquiry into the effectiveness of the redistribution process. The inquiry received suggestions from the Australian Bureau of Statistics (ABS) that an increased role for the ABS in enrolment projections might improve the accuracy of the forecasts. The ABS submission argued that past growth rates might not be an appropriate indicator of future growth rates, particularly SLAs that are in rapid growth or decline.

The JSCEM recommended that the AEC and ABS form a working party to determine the most effective methodology for enrolment projections. Another recommendation was that after the AEC had agreed on the final projected enrolment projections, the projections be forwarded to the ABS for an opinion to be published in the volumes of the AEC enrolment projections.

As a result of the above recommendation the ABS developed a methodology to predict future enrolment figures. The algorithm employed uses a demographic technique named cohort-component methodology, which is accepted as the most accurate population projection methodology. The ABS projections were again based on CCD level and given to DROs to modify where necessary based on their local knowledge. This system has been in place for all redistributions since 1997.

The JSCEM also recommended that the permissible variation for projected enrolments be increased from 2% to 3.5%. The 3.5% requirement has applied to redistributions from 1999.

Measuring Accuracy

In determining if the projected population is accurate it is important to develop a basis for measuring accuracy and at the same time identify benchmarks for determining equality. The latter is important as the basis for projecting enrolment figures is to ensure that all electoral districts are equal within a 2% variation (now 3.5%). The purpose of the projections is to maintain divisional enrolments as equal as possible throughout the redistribution. To this end what we are actually interested in is not the accuracy of the predictions but the deviations from the quota.

The following indicators have been used in measuring the accuracy of the population projections.

Absolute Difference. The absolute difference is obtained by subtracting the actual enrolment from the projected enrolment of the State in absolute terms.

The Quota. The quota is determined by dividing the total enrolment of the State or Territory by the number of electoral divisions within the State or Territory. Thus if a State's enrolled population is 1025840 and there are 12 divisions the quota would be 1025840/12 = 85486.

Deviation from the Quota. The deviation from the quota examines the degree to which the electoral divisions vary from the quota in absolute terms and expressed as a percentage. The methodology adopted in this paper classifies divisions deviating from the projected quota by greater than 2% and those deviating from the projected quota by more than 4%

Mean Difference. The mean difference is the arithmetic mean of the absolute difference. That is the absolute difference divided by the number of electoral divisions.

Mean Deviation. The mean deviation is the arithmetic mean of the sum of the deviations from the quota.

Maximum Deviation. The maximum deviation from the quota from any division in the State or Territory

Minimum Deviation. The minimum deviation from the quota for any Division in the State or Territory

Divs > 2.0 The total number of Divisions which deviate by more than 2% from the quota. This measure is further broken down into 4 categories. The number of Divisions deviating between 2.% and 3.0%, 3.1% and 4%, 4.1% and 5% and those divisions deviating by more than 5%.

Dw Index. This is an index of variation, ranging from 0 to 1. If all Divisions are within the 2% tolerance then the index is set at 0. The index is weighted according to the size of the deviation. The further the index is from 0 the more severe the deviations are. While there will inevitability be difference in the projected and actual enrolment figures, the more significant figure is the deviation from the quota. The variance should be within a 2% range (now 3.5%) at the 3 year and 6 month period. Therefore the number of divisions that fall outside this range is perhaps the most significant benchmark of success in forecasting enrolment projections.

1984 Redistributions

The *Commonwealth Electoral Legislation Amendment Act 1983* made it necessary for all States and the ACT to be redistributed in 1984. The *Representation Act 1983* increased the number of Senators from 10 to 12 and consequently the representation in the House of Representatives of all States except Tasmania was altered.

In all States and the ACT enrolment was projected to December 1987. There was no mathematical methodology employed for these projections, rather DROs were asked

to project enrolment based on their own local knowledge. In addition the Redistribution Committees of 1984 exercised their power to make some changes to the DRO estimates. The results of the redistributions for all States and the ACT can be found in Attachment 1A –1D of this document. Below is a summary of the 1984 redistribution.

State	Projected Enrolment	No. Divs	Mean Deviation	Divs > 2%	% Divs > 2%	Dw
NSW	Dec 1987	51	2.58	25	49.0	.28
VIC	Dec 1987	39	3.04	21	53.8	.35
QLD	Dec 1987	24	3.49	14	58.3	.42
SA	Dec 1987	13	1.61	5	38.4	.09
WA	Dec 1987	13	0.91	4	30.7	.09
TAS	Dec 1987	5	0.55	0	0	0.0
ACT	Dec 1987	2	2.91	2	100	.25

There was no definition of equality prescribed for the 1984 redistributions but since a 2% tolerance was put into place after 1984, this criterion has been used to measure the effectiveness of the 1984 redistributions.

The above table demonstrates that the enrolment estimates were far from satisfactory. A total of 49% of the divisions in NSW deviated by more than 2%, Victoria had 53% of the States divisions deviating by more than 2% and Queensland was the worst positioned State with 58% of the States division's deviating by more than 2%.

Of more concern are those divisions, which were well above or below 2% tolerance. The table below identifies all those divisions that were above or below 4% deviation from the quota (twice the 2%). The States of New South Wales, Victoria and Queensland all recorded deviations greater than 4%. Queensland appears to have been the worst predicted State with 9 of the 24 divisions deviating by more than 4% from the quota. One possible explanation is the unexpected high growth of Queensland and unusually high internal migration.

State	Division	Projected Deviation	Actual Deviation
NSW	Cowper	+0.16	+5.21
NSW	Cunningham	+0.53	-4.33
NSW	Gilmore	-0.40	-4.07
NSW	Greenway	+0.70	-5.45
NSW	Newcastle	-0.89	-5.00
NSW	Phillip	-2.58	+5.59
NSW	Prospect	-0.26	+7.64
NSW	Riverina-Darling	-0.08	-6.16
NSW	Throsby	+0.82	-7.60
NSW	Werriwa	-0.86	+8.59
QLD	Fadden	+0.78	-6.9
QLD	Fisher	+0.20	+5.83
QLD	Forde	+0.38	-6.99
QLD	Herbert	+0.36	+5.25

QLD	McPherson	-0.49	+14.17
QLD	Moreton	+0.16	-4.17
QLD	Oxley	-0.48	-5.15
QLD	Rankin	+0.76	-5.46
QLD	Wide Bay	-0.21	-5.25
VIC	Batman	-0.2	-4.8
VIC	Bruce	+0.3	-5.2
VIC	Holt	0.1	-5.2
VIC	JagaJaga	-0.7	-7.2
VIC	Scullin	0.00	-9.5

1989 Redistributions

In 1989 two States (Victoria and Western Australia) were redistributed. The enrolment projections were for the first time calculated using Local Government Areas and the Redistribution Committees were under obligation to "as far as practicable, endeavour to ensure" that in 3 years six months time enrolments in proposed Divisions should be approximately equal subject to a variation of 2% above or below the State average. The AEC used computer trends from the enrolment system and used an algorithm to extrapolate the projected enrolment figure. Divisional Returning Officers subsequently modified these figures.

The following table summarises the two redistributions in 1989.

State	**Projected Enrolment**	**No. Divs**	**Mean Deviation**	**Divs > 2.0**	**% Divs > 2.0**	**Dw**
VIC	Sept 1992	38	2.24	14	36.8	.24
WA	Sept 1992	14	1.62	3	21.4	.17

The results for both these States in terms of projections improved considerably from the 1984 redistributions. The number of Divisions deviating by 2% fell from 21 to 14 for Victoria. The Redistribution Committee noted the difficulty with the 2% rule:

" The loss of one Division in Victoria, taking the States total down to 38 ensured that substantial changes to divisional boundaries would be necessary. Projected enrolment growth and decline over the 3 ½ year's period is located unevenly across the State and greatly increases the pressure for major alternations in a number of areas. Having regard to the loss or increase in projected enrolment numbers necessary to approximate average enrolment in September 1992, there were three existing Divisions which would need to lose more than 10,000 "future" electors (i.e. lose 10,000 from their projected enrolments), Flinders (16,700), Lalor (15,600), and Burke (14,400), and four other Divisions (Corangamite, Indi, La Trobe and McEwen) which would need to lose between 5,000 and 10,000 'future electors'. Twelve Divisions (Bruce, Chisholm, Deakin, Gellibrand, Goldstein, Henty, Higgins, Isaacs, Kooyong, Maribyrnong, Melbourne and Melbourne Ports) need to gain between 5,000 and 10,000. Only 3 of the existing Divisions could comply with the statutory requirements without alternation, and their continuation unchanged would be dependent on the needs of their neighbours to lose or gain electors. This is an aspect

of the redistribution process frequently misunderstood. If Division A requires 5,000 electors and can get them best, and at times only from Division B and Division B also needs 5,000 electors, then a combined shortfall may have to be met from Division C even though that Division could be left alone because it already met the statutory requirements. Ripple effects may spread through a number of divisions before they are spent."

The difficulties in complying with the new requirement that all divisions deviate no more or less than 2% of the State average 3 years and 6 months from the redistribution date are manifested in the table set out below which identifies those divisions that were above twice the allowed deviation (4%).

State	**Division**	**Projected Deviation**	**Actual Deviation**
VIC	Calwell	-0.5	+5.1
VIC	Corinella	-0.9	+7.0
VIC	Dunkley	-1.2	-4.9
VIC	Flinders	+1.6	-4.6
VIC	Holt	-0.6	-6.3
VIC	JagaJaga	-1.4	-6.4
VIC	Scullin	-1.1	+4.2
WA	Brand	+1.8	+5.1
WA	Canning	-0.8	-5.7

The Divisions of JagaJaga, Scullin and Holt in Victoria were well over the 2% tolerance in both the 1984 and 1989 elections. However in general terms the accuracy of the projections appears to have improved for both Victoria and Western Australia. In 1984 53% of the Division in Victoria were outside the 2% range compared with only 36% for the 1989 redistributions. Western Australia also improved with those divisions falling outside the 2% tolerance form 30.7% to 21.1%. Nonetheless in both States the number of Divisions that were outside 4% of the States average increased. It should be noted that in 1984 there was no 2% tolerance, the redistribution committee were simply asked that as far as practicable the divisions be equal in 3 years and 6 months.

1992 Redistributions.

In 1992 New South Wales, Queensland, South Australia and Tasmania were redistributed. Due to a redistribution for Queensland occurring in 1994 there is little point in comparing actual enrolment figures for this State as the figures in the year 1994 will reflect the new electoral boundaries and thus overtake the projected figures.

In 1992 the AEC began using Census Collection Districts (CCDs) as the basis of the projections and also using the CCDs as building blocks for the Divisions. Accordingly the AEC developed an algorithm to determine the projected enrolment at each CCD. Central to this algorithm was the growth rate for each Statistical Local Area (SLA). The SLA's in Australia are generally equivalent with Local Government Areas and consequently consist of a number of CCDs. The Australian Bureau of

Statistics (ABS) supplied the AEC with growth rates for all CCDs over a 5 year period.

The projected number of electors in each CCD was initially determined by applying the ABS supplied growth rate for each SLA to all CCDs within each SLA. The formulae used to calculate the number of projected electors for a particular SLA was:

$U_p = E_a^{(1 + r) n}$

Where

U_p = Projected enrolment
E_a = Current enrolment
r. = average population growth rate for the SLA
n = time in years until projected date.

A number of assumptions were made in the course of calculating the projections.

- Enrolment trends followed the population trends for Australian citizens aged 18 years and over.
- The enrolment population would continue to grow or decline at the same the same average annual rate as for 18+ citizens grew during the period identified by the growth rate.
- The growth rate applied to a given SLA would apply uniformly to all CCDs within the SLA.

These projections were then referred to the Divisional Returning Officers for review and modification.

In drafting the new boundaries, the Redistribution Committee made use of a new computer system, which was developed by the CSIRO and the AEC. The system displayed all the CCDs with each CCD containing details of current enrolment and projected enrolment. In addition the system displayed the SLA and State electoral boundaries as well as the existing federal electoral boundaries.

By using the mouse to move CCDs from one electoral boundary to another the Redistribution Committees were able to instantly evaluate the proposed electoral boundaries.

The following table summarises the three redistributions in 1992.

State	**Projected Enrolment**	**No. Divs**	**Mean Deviation**	**Divs > 2.0**	**% Divs > 2.0**	**Dw**
NSW	Mar 1995	50	2.32	28	56.0	.24
SA	Mar 1995	12	3.12	8	66.6	.37
TAS	Oct 1995	5	1.89	2	40.0	.15

The number of Divisions where the deviation was greater or less than twice the allowable deviation is as follows.

State	Division	Projected Deviation	Actual Deviation
NSW	Berowra	+0.5	+4.6
NSW	Charlton	0.0	+4.0
NSW	Fowler	-0.5	+5.8
NSW	Gimore	-0.7	-5.0
NSW	Mitchell	+1.2	-4.1
NSW	North Sydney	+1.3	+5.4
SA	Bonython	+0.8	-9.7
SA	Mayo	-1.1	+4.1
SA	Sturt	-0.6	-5.7

1994 Redistributions.

In 1994 Victoria, Queensland and the Australian Capital Territory were redistributed. However, both the A.C.T and Queensland projected figures to 1998. In 1997 both these States were redistributed again, effectively overwriting the projected figures. Only Victoria is analysed.

Once again the AEC used its algorithm to predict the enrolment and the redistribution committee used the ITA system to draft boundaries.

State	Projected Enrolment	No. Divs	Mean Deviation	Divs > 2.0	% Divs > 2.0	Dw
VIC	Jun 1998	37	2.79	21	56.7	.32

The total number of Divisions greater than the 4% is shown below.

State	Division	Projected Deviation	Actual Deviation
VIC	Batman	+0.28	+6.17
VIC	Burke	+1.88	-4.21
VIC	Calwell	+0.84	+4.53
VIC	Corangamite	-1.85	-4.35
VIC	Goldstein	+1.86	+5.69
VIC	Hotham	+1.82	+6.60
VIC	Isaacs	+1.79	-5.27
VIC	La Tribe	-0.58	-5.29
VIC	Melbourne	+0.61	+4.47
VIC	Wills	-0.47	+4.89

1997 Redistributions

In the redistributions prior to 1997, the AEC had employed an algorithm to predict enrolment growth for each CCD by applying a modified component interest formulae to each of the CCDs within a SLA.

In a submission to the JSCEM reviewing the redistribution process, the ABS suggested that the Bureau had developed algorithms that could improve the reliability of projections. The JSEM recommended the ABS and AEC work together on enrolment projections.

The ABS supplied enrolment projections using a cohort component methodology. The approach involves the computation of separate age-sex groups on the basis of separate allowances. The base population is applied with survival rates, birth rates, migration rates and other demographic information. The final product is a population projection, which in this case are enrolment figures at a CCD level.

These projections were once again submitted to the DROs where they were asked to examine and modify if necessary the figures in light of their local knowledge. The projections are also subject to possible modification by the Redistribution Committee.

The ITA system, which the redistribution had previously used was no longer supported and consequently de-commissioned. The AEC developed its own system based on MAPINFO software. The system named Electoral Boundary Mapping System (EBMS) displayed the CCD, LGA and electoral boundaries. Each CCD also contained the current and projected enrolment, enabling the redistribution Committees to move individual or groups of CCDs from one boundary to another and see the results.

The three States that were redistributed in 1997 were Queensland, Western Australia and the Australian Capital Territory. The following table details the results of the projections.

State	**Projected Enrolment**	**No. Divs**	**Mean Deviation**	**Divs > 2%**	**% Divs > 2.0**	**Dw**
QLD	Jun 2001	27	3.69	17	62.9	.41
WA	Jun 2000	14	2.27	9	64.2	.21
ACT	Mar 2001	2	0.67	0	0	0.0

Those divisions where the deviation from the quota was greater or lesser than 4% are outlined below.

State	**Division**	**Projected Deviation**	**Actual Deviation**
QLD	Blair	-1.6	-10.9
QLD	Brisbane	-0.8	+10.9
QLD	Capricornia	+1.6	-5.5
QLD	Griffith	-0.9	+7.0
QLD	Herbert	+1.9	+4.7
QLD	Hinkler	-1.8	-5.6
QLD	Longman	+1.4	-4.2

QLD	McPherson	+1.0	+8.7
QLD	Wide Bay	-0.6	-5.9
WA	Cowan	-0.5	-5.7

1999 Redistributions

The 1999 redistributions were affected by new legislation introduced in Section 63A which enabled the AEC to determine an earlier projection time, which was normally three years and six months, where in the opinion that a further redistribution may be required sooner than seven years.

Section 66(3)(a) of the Act was also changed and required the Committee to " as far as practicable, endeavour to ensure that, if the State or Territory were redistributed in accordance with the proposed redistribution, the number of electors enrolled in each Electoral Division in the State or Territory would not, at the projected time determined under section 63A, be less than 96.5% or more than 103.5% of the average divisional enrolment of that State or Territory at that time."

The AEC continued to employ the services of the ABS and also use the new EBMS systems. Only one State was redistributed in 1999, the State of South Australia. On the basis of population projections the Redistribution Committee was of the opinion that a further redistribution may be required in SA sooner than the mandatory seven years and applied Section 63A(4) of the Act which enabled the projection date of the enrolment to be 30 June 2001.

The table below summarise the SA redistribution.

State	**Projected Enrolment**	**No. Divs**	**Mean Deviation**	**Divs > 3.5%**	**% Divs > 3.5**	**Dw**
SA	Jun 2001	12	1.26	1	8.3	0.02

No divisions had a variation from the quota of more or less than 4%.

1999-2000 Redistributions

Redistributions were conducted in New South Wales and Tasmania in 1999-2000. There was no change in the Redistribution provisions between the 1999 Redistribution and the 1999-2000 Redistributions. The table below summarises the 1999-2000 Redistributions.

State	**Projected Enrolment**	**No. Divs**	**Mean Deviation**	**Divs > 3.5%**	**% Divs > 3.5%**	**Dw**
NSW	Jun 2003	50	2.54	12	24.0	
TAS	Jun 2003	5	1.96	1	20.0	

Those divisions where the deviation from the quota was greater or lesser than 4% are shown below.

State	Division	Projected Deviation	Actual Deviation
NSW	Bradfield	+2.22	+5.17
NSW	Cunningham	-1.09	-5.29
NSW	Eden-Monaro	-0.28	4.57
NSW	Lyne	+2.01	+5.29
NSW	Mitchell	+2.86	+7.16
NSW	Newcastle	+1.85	+5.28
NSW	Reid	+2.71	-10.31
NSW	Sydney	-1.79	+4.12
NSW	Watson	-2.46	-4.33

Summary

The following tables summarise the redistributions between 1984 – 2000.

NSW

Year	Mean Deviation	> 2% (3.5%)	> 4%	Dw	Method
1984	2.58	49.0	19.6	.28	a
1992	2.32	56.0	12.0	.24	c
1999-2000	2.54	24.0	18.0	.11	c

VIC

Year	Mean Deviation	> 2% (3.5%)	> 4%	Dw	Method
1984	3.04	53.8	12.8	.35	a
1989	2.24	36.8	18.4	.24	b
1994	2.79	56.7	27.0	.32	c

QLD

Year	Mean Deviation	> 2% (3.5%)	> 4%	Dw	Method
1984	3.49	58.3	37.5	.42	a
1997	3.69	62.9	33.3	.41	c

WA

Year	Mean Deviation	> 2% (3.5%)	> 4%	Dw	Method
1984	0.91	30.7	-	.09	a
1989	1.62	21.4	14.2	.17	b
1997	2.27	64.2	7.1	.21	c

SA

Year	Mean Deviation	> 2% (3.5%)	> 4%	Dw	Method
1984	1.61	38.4	-	.09	a
1992	3.12	66.6	25.0	.37	b
1999	1.26	8.3	-	.02	c

TAS

Year	Mean Deviation	> 2% (3.5%)	> 4%	Dw	Method
1984	0.55	0	0	.00	a
1992	1.89	40.0	0	.15	b
1999-2000	1.96	20.0	0	.05	c

ACT

Year	Mean Deviation	> 2% (3.5%)	> 4%	Dw	Method
1984	2.91	100	-	.25	a
1997	0.67	0	0	0.00	c

Conclusion

A useful indicator of the success of the projection estimate is the number of divisions within a particular State that deviate by a large proportion from the quota. Previously in this paper the metric used for this indicator has been 4% or twice the allocable deviation. The following table identified those electoral divisions, which have deviated by more than 4% in more than one redistribution.

State	Division	Projected Deviation	Actual Deviation
NSW (1984)	Cunningham	+0.53	-4.33
NSW (1999-2000)	Cunningham	-1.09	-5.29
NSW (1984)	Gilmore	-0.40	-4.07
NSW (1992)	Gilmore	-0.7	-5.00
NSW (1992)	Mitchell	+1.2	-4.1
NSW (1999-2000)	Mitchell	+2.86	+7.16
NSW (1984)	Newcastle	-0.89	-5.00
NSW (1999-2000)	Newcastle	+1.85	+5.28
QLD (1984)	Herbert	+0.36	+5.25
QLD (1997	Herbert	+1.9	+4.7
QLD (1984)	McPherson	-0.49	+14.17
QLD (1997)	McPherson	+1.0	+8.7
QLD (1984)	Wide Bay	-0.21	-5.25
QLD (1997)	Wide Bay	-0.6	-5.9
VIC (1984)	Batman	-0.2	-4.8
VIC (1994)	Batman	+0.28	+6.17
VIC (1989)	Calwell	-0.5	+5.1
VIC (1994)	Calwell	+0.84	+4.53
VIC (1984)	Holt	+0.1	-5.2
VIC (1989)	Holt	-0.6	-6.3
VIC (1984)	JagaJaga	-0.7	-7.2
VIC (1989)	JagaJaga	-1.4	-6.4

All population projections are based on a set of assumptions that are rarely stated explicitly. In general terms the projections assume there will be no deep structural change from one event to another. Projections can never be entirely accurate due to

many unforseen circumstances. In the case of the enrolment projections the actual projected figures are not really important, what is, is the deviation from the average enrolment. At the time of projection the figures have been projected so as to allow no one division to deviate by more or less than 2% (or 3.5% after 1997) of the State average. This criterion is what we can place some measure of accuracy on.

The first projections were made in 1984 with no agreed measure of accuracy. From 1989 until 1999 the allowable deviation from the State average for a division has been +/- 2%. In 1999 this was changed to +/- 3.5 %. It is this requirement that is used to measure the accuracy of projected enrolment.

The 1984 redistribution projections presented to the Redistribution Committees had no ABS input and were based solely on DRO input. In addition the 1984 redistributions used subdivisions as building bocks limiting the flexibility for small-scale modifications of redistributions. In the light of these constraints the 1984 redistribution projections must be seen as successful with the exception of a few divisions. Notably the Division of McPherson, which deviated by more than 14% of the State average.

The 1989 redistributions were aided by a report produced by the AEC, which identified enrolment figures for each electoral division on a monthly basis. These data were used to project figures, which were subsequently modified by DROs. A different approach was used in 1994 and 1997 where the AEC developed algorithms based loosely on the component interest formulae. This algorithm projected enrolment at the CCD level. Since 1997 the AEC employed the ABS to project enrolment for the purposes of redistribution. The actual enrolment figures show no evidence of any improvement in projections between the use of the AEC and the ABS algorithms.

In fact both algorithms demonstrate the difficulties in estimating enrolment figures especially at a low geographical level such as CCD. These difficulties have often resulted in divisions deviating by large values from the state average and consequently divisions being arguably malaportioned mid way in the redistribution cycle.

The following table uses the deviation index (Dw Index) for all States since 1984. A State where there are no deviations above 2% (or 3.5% after 1997) will record an index of 0.0 while a State with a large number of deviations larger than 2% (or 3.5%) will record a figure between 0.1 and 1.0

State	**1984**	**1989**	**1992**	**1994**	**1997**	**1999**	**1999-2000**
NSW	.28		.24				.11
VIC	.35	.24		.32			
QLD	.42				.41		
SA	.09		.37			.02	
WA	.09	.17			.21		
TAS	.00		.15				.05
ACT	.25				.00		

It is generally acknowledged that projecting small area populations is difficult. The AEC has employed a number of different strategies to date and perhaps it is time to revisit the methodology with an aim of improving the estimates. It may also prove to not to be feasible to make any improvements. Nonetheless it is suggested that the AEC, ABS and some academic institutions get together and discuss some of the issues with a view to determining the feasibility of improving the estimates.

APPENDIX 1-A
NSW Redistribution: 1984
Projected Enrolment: December 1987

No.		Projected Enrolment	Actual Enrolment	Abs Difference	Abs Deviation from Quota	Projected deviation	Actual deviation
1	Banks	69298	68510		2.6	-0.20	-2.61
2	Barton	69435	72652		3.3	-0.01	3.28
3	Bennelong	69342	70823		0.7	-0.14	0.68
4	Berowra	68835	71101		1.1	-0.87	1.07
5	Blaxland	69196	68720		2.3	-0.35	-2.31
6	Bradfield	69547	69619		1.0	0.16	-1.03
7	Calare	69568	71186		1.2	0.19	1.20
8	Charlton	69392	69210		1.6	-0.07	-1.61
9	Chifley	69067	70464		0.2	-0.54	0.17
10	Cook	69626	69870		0.7	0.27	-0.68
11	Cowper	69550	74010		5.2	0.16	5.21
12	Cunningham	69809	67297		4.3	0.53	-4.33
13	Dobell	69701	70864		0.7	0.38	0.74
14	Dundas	69425	68963		2.0	-0.02	-1.96
15	Eden-Monaro	69579	70029		0.4	0.20	-0.45
16	Farrer	69854	72428		3.0	0.60	2.96
17	Fowler	70089	68495		2.6	0.94	-2.63
18	Gilmore	69161	67479		4.1	-0.40	-4.07
19	Grayndler	69469	72513		3.1	0.04	3.08
20	Greenway	69923	66511		5.5	0.70	-5.45
21	Gwydir	69642	69235		1.6	0.29	-1.58
22	Hughes	69983	70063		0.4	0.78	-0.40
23	Hume	69947	69752		0.8	0.73	-0.84
24	Hunter	69969	70659		0.4	0.76	0.45
25	Kingsford-Smith	70024	73153		4.0	0.84	3.99

Quota	70345	
Abs Diff	34466	
Mean Diff	1943	
Mean Deviation	2.58	
Max Deviation	9.82	
Min Deviation	0.01	
2.1 - 3	8	15.60%
3.1 - 4	7	13.70%
4.1 - 5	3	5.80%
> 5.1	7	13.70%
Divs > 2.0	25	49.00%

26	Lindsay	69208	69475	1.2	-0.33	-1.24
27	Lowe	69064	72266	2.7	-0.54	2.73
28	Lyne	68936	71729	2.0	-0.72	1.97
29	Macarthur	69724	68062	3.2	0.41	-3.25
30	Mackellar	69477	70202	0.2	0.05	-0.20
31	Macquarie	69165	67606	3.9	-0.39	-3.89
32	Mitchell	69893	69853	0.7	0.65	-0.70
33	New England	69507	72846	3.6	0.10	3.56
34	Newcastle	68820	66829	5.0	-0.89	-5.00
35	North Sydney	69463	71657	1.9	0.03	1.87
36	Page	69078	69730	0.9	-0.52	-0.87
37	Parkes	68952	69053	1.8	-0.70	-1.84
38	Parramatta	69577	70034	0.4	0.20	-0.44
39	Phillip	67650	74279	5.6	-2.58	5.59
40	Prospect	69256	75718	7.6	-0.26	7.64
41	Reid	69435	71770	2.0	-0.01	2.03
42	Richmond	68922	67940	3.4	-0.74	-3.42
43	Riverina-Darling	69382	66013	6.2	-0.08	-6.16
44	Robertson	69249	71788	2.1	-0.27	2.05
45	Shortland	69883	70990	0.9	0.64	0.92
46	St George	69379	70835	0.7	-0.09	0.70
47	Sydney	69846	72322	2.8	0.59	2.81
48	Throsby	70006	64998	7.6	0.82	-7.60
49	Warringah	69640	72126	2.5	0.29	2.53
50	Wentworth	69612	69476	1.2	0.25	-1.24
51	Werriwa	68845	76390	8.6	-0.86	8.59
	Total	3541400	3587593			

APPENDIX 1-B
Vic Redistribution : 1984
Projected Enrolment : December 1987

No.		Projected Enrolment	Actual Enrolment	Abs Difference	Abs Deviation from Quota	Projected deviation	Actual deviation
1	Aston	69256	70664	1408	1.2	-0.1	1.2
2	Ballarat	69177	72025	2848	3.1	-0.2	3.1
3	Batman	69185	66509	2676	4.8	-0.2	-4.8
4	Bendigo	70294	72081	1787	3.2	1.4	3.2
5	Bruce	69550	66235	3315	5.2	0.3	-5.2
6	Burke	68714	74847	6133	7.1	-0.9	7.1
7	Calwell	68886	70525	1639	1.0	-0.7	1.0
8	Casey	69303	70847	1544	1.4	-0.1	1.4
9	Chisholm	68934	70099	1165	0.4	-0.6	0.4
10	Coranamite	69926	73051	3125	4.6	0.8	4.6
11	Corio	69560	68173	1387	2.4	0.3	-2.4
12	Deakin	69498	68716	782	1.6	0.2	-1.6
13	Dunkley	69261	67925	1336	2.8	-0.1	-2.8
14	Flinders	69074	75776	6702	8.5	-0.4	8.5
15	Gellibrand	69361	69348	13	0.7	0.0	-0.7
16	Gippsland	68936	71766	2830	2.7	-0.6	2.7
17	Goldstein	69196	71409	2213	2.2	-0.2	2.2
18	Henty	69537	68631	906	1.8	0.3	-1.8
19	Higgins	69646	68574	1072	1.8	0.4	-1.8
20	Holt	69392	66253	3139	5.2	0.1	-5.2
21	Hotham	69427	71520	2093	2.4	0.1	2.4
22	Indi	70169	73360	3191	5.0	1.2	5.0
23	Issacs	69415	67429	1986	3.5	0.1	-3.5
24	Jagajaga	68895	64847	4048	7.2	-0.7	-7.2
25	Kooyong	69650	69034	616	1.2	0.4	-1.2

Quota	69854	
Abs Diff	83000	
Mean Diff	2128	
Mean Deviation	3.04	
Max Deviation	9.53	
Min Deviation	0.35	
2.1 - 3	6	15.30%
3.1 - 4	4	10.20%
4.1 - 5	3	7.60%
> 5.1	8	20.50%
Divs > 2.0	21	53.80%

26	Lalor	69703	76097	6394	8.9	0.5	8.9
27	La Trobe	69610	69433	177	0.6	0.4	-0.6
28	McEwan	69615	70756	1141	1.3	0.4	1.3
29	McMillian	69471	68712	759	1.6	0.2	-1.6
30	Mallee	69020	70576	1556	1.0	-0.5	1.0
31	Maribyrnong	69044	67585	1459	3.2	-0.4	-3.2
32	Melbourne	69676	70690	1014	1.2	0.5	1.2
33	Melbourne Ports	68965	71778	2813	2.8	-0.6	2.8
34	Menzies	68595	68314	281	2.2	-1.1	-2.2
35	Murray	69145	70721	1576	1.2	-0.3	1.2
36	Scullin	69316	63195	6121	9.5	-0.0	-9.5
37	Streeton	69635	68815	820	1.5	0.4	-1.5
38	Wannon	69324	69498	174	0.5	-0.0	-0.5
39	Wills	69237	68476	761	2.0	-0.2	-2.0
	Total	2704598	2724290	19692			

APPENDIX 1-C
QLD Redistribution : 1984
Projected Enrolment : December 1987

No.		Projected Enrolment	Actual Enrolment	Abs Difference	Abs Deviation from Quota	Projected deviation	Actual deviation
1	Bowman	70376	72123		1.3	0.63	1.30
2	Brisbane	69514	69350		2.6	-0.60	-2.60
3	Capricornia	69958	69452		2.5	0.03	-2.45
4	Dawson	69389	72223		1.4	-0.78	1.44
5	Fadden	70483	66271		6.9	0.78	-6.92
6	Fairfax	69320	70602		0.8	-0.88	-0.84
7	Fisher	70078	75352		5.8	0.20	5.83
8	Forde	70203	66222		7.0	0.38	-6.99
9	Griffith	69545	71969		1.1	-0.56	1.08
10	Groom	70244	71933		1.0	0.44	1.03
11	Herbert	70189	74939		5.3	0.36	5.25
12	Hinkler	70332	70145		1.5	0.56	-1.48
13	Kennedy	70468	71791		0.8	0.76	0.83
14	Leichhartd	69433	72669		2.1	-0.72	2.06
15	Lilley	69939	70759		0.6	0.00	-0.62
16	Maranoa	69698	71888		1.0	-0.34	0.97
17	McPherson	69591	81285		14.2	-0.49	14.17
18	Moncreif	70610	73427		3.1	0.96	3.13
19	Moreton	70046	68230		4.2	0.16	-4.17
20	Oxley	69604	67535		5.1	-0.48	-5.15
21	Petrie	69814	72596		2.0	-0.18	1.96
22	Rankin	70471	67308		5.5	0.76	-5.46
23	Ryan	69397	73255		2.9	-0.77	2.89
24	Wide Bay	69791	67459		5.3	-0.21	-5.25
		1678493	1708783				

Quota	71199	
Abs Diff	67150	
Mean Diff	2798	
Mean Deviation	3.49	
Max Deviation	14.17	
Min Deviation	0.62	
2.1 - 3	4	16.60%
3.1 - 4	1	4.10%
4.1 - 5	1	4.10%
> 5.1	8	33.30%
Divs > 2.0	14	58.30%

APPENDIX 1-D
SA Redistribution : 1984
Projected Enrolment : December 1987

No.		Projected Enrolment	Actual Enrolment	Abs Difference	Abs Deviation from Quota	Projected deviation	Actual deviation
1	Adelaide	71464	73888		1.7	0.22	1.73
2	Barker	70708	71873		1.0	-0.84	-1.05
3	Bonython	71215	72800		0.2	-0.13	0.23
4	Boothby	71727	73258		0.9	0.59	0.86
5	Grey	71613	70716		2.6	0.43	-2.64
6	Hawker	71660	72251		0.5	0.50	-0.53
7	Hindmarsh	70826	73795		1.6	-0.67	1.60
8	Kingston	71621	70627		2.8	0.44	-2.76
9	Makin	70739	70647		2.7	-0.80	-2.74
10	Mayo	71301	74393		2.4	-0.01	2.42
11	Port Adelaide	71742	73568		1.3	0.61	1.28
12	Sturt	71325	72111		0.7	0.03	-0.72
13	Wakefield	71055	74325		2.3	-0.35	2.33
		926996	944252				

Quota	72635	
Abs Diff	21222	
Mean Diff	1632	
Mean Deviation	1.61	
Max Deviation	2.76	
Min Deviation	0.23	
2.1 - 3	5	9.60%
3.1 - 4	0	0.00%
4.1 - 5	0	0.00%
> 5.1	0	0.00%
Divs > 2.0	5	9.60%

APPENDIX 1-E
WA Redistribution : 1984
Projected Enrolment : December 1987

No.		Projected Enrolment	Actual Enrolment	Abs Difference	Deviation from Quota	Projected deviation	Actual deviation
1	Brand	68050	70997		1.3	-0.36	1.31
2	Canning	68500	68263		2.6	0.30	-2.59
3	Cowan	68500	70970		1.3	0.30	1.27
4	Curtin	68400	69785		0.4	0.15	-0.42
5	Forrest	68600	71154		1.5	0.45	1.54
6	Freemantle	68200	69587		0.7	-0.14	-0.70
7	Kalgoorlie	68150	71064		1.4	-0.21	1.41
8	Moore	68500	71570		2.1	0.30	2.13
9	O'Connor	68100	70377		0.4	-0.29	0.43
10	Perth	68250	70346		0.4	-0.07	0.38
11	Stirling	68300	68024		2.9	0.01	-2.93
12	Swan	68100	67812		3.2	-0.29	-3.23
13	Tangney	68200	71048		1.4	-0.14	1.39
	Total	887850	910997				

Quota	70077	
Abs Diff	24749	
Mean Diff	1904	
Mean Deviation	0.91	
Max Deviation	3.23	
Min Deviation	0.38	
2.1 - 3	3	23.00%
3.1 - 4	1	7.60%
4.1 - 5	0	0.00%
> 5.1	0.000	0.00%
Divs > 2.0	4	30.70%

APPENDIX 1-F
Tas Redistribution : 1984
Projected Enrolment : December 1987

No.		Projected Enrolment	Actual Enrolment	Abs Difference	Abs Deviation from Quota	Projected deviation	Actual deviation
1	Bass	60036	60636	600	0.3	-1.5	-0.3
2	Braddon	56161	60354	4193	0.8	5.0	-0.8
3	Denison	60031	61293	1262	0.8	-1.5	0.8
4	Franklin	59402	60658	1256	0.3	-0.5	-0.3
5	Lyons	59982	61199	1217	0.6	-1.5	0.6
	Total	295612	304140	8528			

Quota	60828	
Abs Diff	8528	
Mean Diff	1706	
Mean Deviation	0.55	
Max Deviation	0.78	
Min Deviation	0.3	
2.1 - 3	0	0.00%
3.1 - 4	0	0.00%
4.1 - 5	0	0.00%
> 5.1	0	0.00%
Divs > 2.0	0	0.00%

APPENDIX 1-G
ACT Redistribution : 1984
Projected Enrolment : December 1987

No.		Projected Enrolment	Actual Enrolment	Abs Difference	Abs Deviation from Quota	Projected deviation	Actual deviation
1	Canberra	80030	79463		2.9	0.10	-2.90
2	Fraser	79870	84204		2.9	-0.10	2.90
	Total	159900	163667				

Quota	81834	
Abs Diff	4901	
Mean Diff	2451	
Mean Deviation	2.90	
Max Deviation	2.9	
Min Deviation	2.9	
2.1 - 3	2	100%
3.1 - 4	0	0.00%
4.1 - 5	0	0.00%
> 5.1	0	0.00%
Divs > 2.0	0	0.00%

APPENDIX 2-A
Vic Redistribution : 1989
Projected Enrolment : September 1992

No.		Projected Enrolment	Actual Enrolment	Abs Difference	Deviation from Quota	Projected deviation	Actual deviation
1	Aston	74460	77707		2.9	0.1	2.9
2	Ballarat	73930	72768		3.6	-0.6	-3.6
3	Batman	74880	76828		1.7	0.7	1.7
4	Bendigo	73720	75359		0.2	-0.9	-0.2
5	Bruce	73750	74136		1.8	-0.8	-1.8
6	Burke	74100	74803		0.9	-0.4	-0.9
7	Calwell	74000	79350		5.1	-0.5	5.1
8	Casey	74590	76169		0.9	0.3	0.9
9	Chisholm	74850	75772		0.3	0.6	0.3
10	Coranamite	73340	74176		1.8	-1.4	-1.8
11	Corinelia	73700	80827		7.0	-0.9	7.0
12	Corio	75750	75647		0.2	1.8	0.2
13	Deakin	73200	75466		0.1	-1.6	-0.1
14	Dunkley	73450	71835		4.9	-1.2	-4.9
15	Flinders	75600	72020		4.6	1.6	-4.6
16	Gellibrand	75100	74559		1.3	1.0	-1.3
17	Gippsland	74250	75183		0.4	-0.2	-0.4
18	Goldstein	75310	76792		1.7	1.3	1.7
19	Higgins	74560	75822		0.4	0.2	0.4
20	Holt	73940	70795		6.3	-0.6	-6.3
21	Hotham	73630	75871		0.5	-1.0	0.5
22	Indi	74810	74144		1.8	0.6	-1.8
23	Issacs	75820	74215		1.7	1.9	-1.7
24	Jagajaga	73300	70659		6.4	-1.4	-6.4
25	Kooyong	74580	73001		3.3	0.3	-3.3
26	La Trobe	75140	76214		0.9	1.0	0.9
27	Lalor	75050	76700		1.6	0.9	1.6
28	Mallee	75140	76638		1.5	1.0	1.5
29	Maribyrnong	73900	76705		1.6	-0.6	1.6
30	McEwan	75100	78218		3.6	1.0	3.6
31	McMillian	74900	77772		3.0	0.7	3.0
32	Melbourne	74900	77941		3.2	0.7	3.2
33	Melbourne Ports	73500	75383		0.2	-1.2	-0.2
34	Menzies	73220	73077		3.2	-1.6	-3.2

Quota	75516	
Abs Diff	76868	
Mean Diff	2023	
Mean Deviation	2.24	
Max Deviation	7.03	
Min Deviation	0.07	
2.1 - 3	2	5.20%
3.1 - 4	5	13.10%
4.1 - 5	3	7.80%
> 5.1	4	10.50%
Divs > 2.0	14	36.80%

35	Murray	74730	76454	1.2	0.5	1.2
36	Scullin	73530	78705	4.2	-1.1	4.2
37	Wannon	75350	76190	0.9	1.3	0.9
38	Wills	73220	75707	0.3	-1.6	0.3
	Total	2826300	2869608			

APPENDIX 2-B
WA Redistribution : 1989
Projected Enrolment : September 1992

No.		Projected Enrolment	Actual Enrolment	Abs Difference	Deviation from Quota	Projected deviation	Actual deviation			
1	Brand	75240	77741		5.1	1.8	5.1	Quota	73957	
2	Canning	73340	69767		5.7	-0.8	-5.7	Abs Diff	14073	
3	Cowan	74350	74768		1.1	0.6	1.1	Mean Diff	1005	
4	Curtin	74160	74015		0.1	0.4	0.1	Mean Deviation	1.62	
5	Forrest	73700	75294		1.8	-0.3	1.8			
6	Freemantle	73935	74643		0.9	0.0	0.9			
7	Kalgoorlie	72740	73331		0.8	-1.6	-0.8			
8	Moore	75205	74875		1.2	1.8	1.2	Max Deviation	3.23	
9	O'Connor	72560	74066		0.1	-1.8	0.1	Min Deviation	0.38	
10	Pearce	72740	71523		3.3	-1.6	-3.3	2.1 - 3	0	0.00%
11	Perth	74360	74285		0.4	0.6	0.4	3.1 - 4	1	7.10%
12	Stirling	73870	73976		0.0	-0.0	0.0	4.1 - 5	0	0.00%
13	Swan	74455	74281		0.4	0.7	0.4	> 5.1	2	14.20%
14	Tangney	73965	72830		1.5	0.1	-1.5	Divs > 2.0	3	21.40%
	Total	1034620	1035395							

APPENDIX 3-A
NSW Redistribution : 1992
Projected Enrolment : March 1995

No.		Projected Enrolment	Actual Enrolment	Abs Difference	Abs Deviation from Quota	Projected deviation	Actual deviation
1	Banks	78501	78910		2.3	0.1	2.3
2	Barton	78520	78994		2.4	0.1	2.4
3	Bennelong	79405	79693		3.3	1.3	3.3
4	Berowra	78790	80667		4.6	0.5	4.6
5	Blaxland	78336	76527		0.8	-0.1	-0.8
6	Bradfield	79654	79167		2.6	1.6	2.6
7	Calare	77682	76042		1.4	-0.9	-1.4
8	Charlton	78406	80237		4.0	-0.0	4.0
9	Chifley	79826	78167		1.3	1.8	1.3
10	Cook	77965	77938		1.0	-0.6	1.0
11	Cowper	79183	75704		1.9	1.0	-1.9
12	Cunningham	77750	74816		3.0	-0.9	-3.0
13	Dobell	78483	75406		2.2	0.1	-2.2
14	Eden-Monaro	77899	74835		3.0	-0.7	-3.0
15	Farrer	78435	74499		3.4	0.0	-3.4
16	Fowler	78002	81587		5.8	-0.5	5.8
17	Gilmore	77860	73303		5.0	-0.7	-5.0
18	Grayndler	77815	79917		3.6	-0.8	3.6
19	Greenway	79261	77753		0.8	1.1	0.8
20	Gwydir	78139	74622		3.3	-0.4	-3.3
21	Hughes	77215	79210		2.7	-1.5	2.7
22	Hume	76937	75262		2.4	-1.9	-2.4
23	Hunter	77460	75168		2.6	-1.2	-2.6
24	Kingsford-Smith	78717	76829		0.4	0.4	-0.4
25	Lindsay	78358	76975		0.2	-0.1	-0.2
26	Lowe	77641	77961		1.1	-1.0	1.1
27	Lyne	79810	76757		0.5	1.8	-0.5
28	Macarthur	79925	78724		2.1	1.9	2.1
29	Mackellar	79543	78456		1.7	1.4	1.7
30	Macquarie	79111	76287		1.1	0.9	-1.1
31	Mitchell	79358	73947		4.1	1.2	-4.1
32	New England	77920	74377		3.6	-0.6	-3.6
33	Newcastle	79129	75873		1.6	0.9	-1.6

Quota	77140	
Abs Diff	103845	
Mean Diff	2077	
Mean Deviation	2.32	
Max Deviation	5.76	
Min Deviation	0.10	
2.1 - 3	14	28.00%
3.1 - 4	9	18.00%
4.1 - 5	3	6.00%
> 5.1	2	4.00%
Divs > 2.0	28	56.00%

34	North Sydney	79407	81335	5.4	1.3	5.4
35	Page	77362	78130	1.3	-1.3	1.3
36	Parkes	77702	79606	3.2	-0.9	3.2
37	Parramatta	79576	77220	0.1	1.5	0.1
38	Paterson	77427	76338	1.0	-1.3	-1.0
39	Prospect	78457	75123	2.6	0.0	-2.6
40	Reid	77557	77640	0.6	-1.1	0.6
41	Richmond	77792	78104	1.2	-0.8	1.2
42	Riverina-Darling	79018	78371	1.6	0.8	1.6
43	Robertson	78905	74330	3.6	0.6	-3.6
44	Shortland	78296	74334	3.6	-0.2	-3.6
45	Sydney	77908	79315	2.8	-0.7	2.8
46	Throsby	77533	74437	3.5	-1.1	-3.5
47	Warringah	78461	76776	0.5	0.1	-0.5
48	Watson	77929	76600	0.7	-0.6	-0.7
49	Wentworth	78465	79094	2.5	0.1	2.5
50	Werriwa	78205	75652	1.9	-0.3	-1.9
	Total	3921036	3857015			
			77140.3			

APPENDIX 3-B
SA Redistribution : 1991 January 1992
Projected Enrolment : March 1995

No.		Projected Enrolment	Actual Enrolment	Abs Difference	Abs Deviation from Quota	Projected deviation	Actual deviation
1	Adelaide	84047	80587		2.6	-1.7	-2.6
2	Barker	85129	83573		1.0	-0.4	1.0
3	Bonython	86131	74678		9.7	0.8	-9.7
4	Boothby	84591	82103		0.7	-1.0	-0.7
5	Grey	84208	84975		2.7	-1.5	2.7
6	Hindmarsh	86433	84596		2.3	1.1	2.3
7	Kingston	86598	83424		0.9	1.3	0.9
8	Makin	85906	85492		3.4	0.5	3.4
9	Mayo	84536	86092		4.1	-1.1	4.1
10	Port Adelaide	86119	83031		0.4	0.8	0.4
11	Sturt	84925	77957		5.7	-0.6	-5.7
12	Wakefield	86963	85968		3.9	1.8	3.9
		1025586	992476				

Quota	82706	
Abs Diff	37756	
Mean Diff	3146	
Mean Deviation	3.12	
Max Deviation	9.71	
Min Deviation	0.39	
2.1 - 3	3	25.00%
3.1 - 4	2	16.60%
4.1 - 5	1	8.30%
> 5.1	2	16.60%
Divs > 2.0	8	66.60%

APPENDIX 3-C
Tas Redistribution : 1992
Projected Enrolment : October 1995

No.		Projected Enrolment	Actual Enrolment	Abs Difference	Abs Deviation from Quota	Projected deviation	Actual deviation
1	Bass	65071	63810		0.6	0.4	0.6
2	Braddon	64590	61289		3.4	-0.4	-3.4
3	Denison	64867	64379		1.5	0.0	1.5
4	Franklin	63969	62595		1.3	-1.3	-1.3
5	Lyons	65718	65118		2.6	1.3	2.6
	Total	324215	317191				

Quota	63438	
Abs Diff	7024	
Mean Diff	1405	
Mean Deviation	1.89	
Max Deviation	0.78	
Min Deviation	0.28	
2.1 - 3	1	20%
3.1 - 4	1	20%
4.1 - 5	0	
> 5.1	0	
Divs > 2.0	2	40.00%

APPENDIX 4-A
Vic Redistribution : 1994
Projected Enrolment : June 1998

No.		Projected Enrolment	Actual Enrolment	Abs Difference	Abs Deviation from Quota	Projected deviation	Actual deviation
1	Aston	82164	83161		2.0	-1.56	2.04
2	Ballarat	83357	79434		2.5	-0.13	-2.53
3	Batman	83781	86528		6.2	0.38	6.17
4	Bendigo	84363	82057		0.7	1.08	0.69
5	Bruce	82418	83119		2.0	-1.25	1.99
6	Burke	85033	78065		4.2	1.88	-4.21
7	Calwell	84170	85185		4.5	0.84	4.53
8	Casey	82303	78543		3.6	-1.39	-3.62
9	Chisholm	82737	83442		2.4	-0.87	2.39
10	Coranamite	81925	77948		4.4	-1.85	-4.35
11	Corio	83124	80362		1.4	-0.41	-1.39
12	Deakin	82428	81692		0.2	-1.24	0.24
13	Dunkley	84546	79924		1.9	1.30	-1.93
14	Flinders	82649	82734		1.5	-0.98	1.52
15	Gellibrand	83764	83858		2.9	0.36	2.90
16	Gippsland	82921	79393		2.6	-0.65	-2.58
17	Goldstein	85015	86131		5.7	1.86	5.69
18	Higgins	82551	82154		0.8	-1.10	0.81
19	Holt	84955	79042		3.0	1.79	-3.01
20	Hotham	84982	86873		6.6	1.82	6.60
21	Indi	83220	80450		1.3	-0.29	-1.28
22	Issacs	84957	77201		5.3	1.79	-5.27
23	Jagajaga	85054	84672		3.9	1.90	3.90
24	Kooyong	82262	82320		1.0	-1.44	1.01
25	La Trobe	82981	77185		5.3	-0.58	-5.29
26	Lalor	85005	79473		2.5	1.85	-2.48
27	Mallee	82515	79715		2.2	-1.14	-2.19
28	Maribyrnong	83602	80976		0.6	0.16	-0.64
29	McEwan	84791	79201		2.8	1.59	-2.82
30	McMillian	83986	80305		1.5	0.62	-1.46
31	Melbourne	83973	85137		4.5	0.61	4.47
32	Melbourne Ports	82312	79200		2.8	-1.38	-2.82
33	Menzies	82344	79843		2.0	-1.34	-2.03
34	Murray	84695	83000		1.8	1.47	1.84

Quota	81497	
Abs Diff	98783	
Mean Diff	2670	
Mean Deviation	2.79	
Max Deviation	6.60	
Min Deviation	0.04	
2.1 - 3	9	24.30%
3.1 - 4	2	5.40%
4.1 - 5	5	13.50%
> 5.1	5	13.50%
Divs > 2.0	21	56.70%

35	Scullin	82362	81462		0.0	-1.32	-0.04
36	Wannon	81898	80136		1.7	-1.88	-1.67
37	Wills	83069	85484		4.9	-0.47	4.89
	Total	3088212	3015405				
				2669.8			

APPENDIX 5-A
QLD Redistribution : 1997
Projected Enrolment : June 2001

No.		Projected Enrolment	Actual Enrolment	Abs Difference	Abs Deviation from Quota	Projected deviation	Actual deviation			
1	Blair	84185	76805		10.9	-1.6	-10.9	Quota	86178	
2	Bowman	84619	86699		0.6	-1.1	0.6	Abs Diff	84769	
3	Brisbane	84862	95560		10.9	-0.8	10.9	Mean Diff	3140	
4	Capricornia	86964	81436		5.5	1.6	-5.5	Mean Deviation	3.69	
5	Dawson	87199	87788		1.9	1.9	1.9			
6	Dickson	85215	86892		0.8	-0.4	0.8			
7	Fadden	84556	85362		0.9	-1.2	-0.9			
8	Fairfax	84279	83664		2.9	-1.5	-2.9	Max Deviation	10.9	
9	Fisher	87270	84271		2.2	2.0	-2.2	Min Deviation	0.6	
10	Forde	86565	85631		0.6	1.1	-0.6	2.1 - 3	5	18.50%
11	Griffith	84833	92211		7.0	-0.9	7.0	3.1 - 4	3	11.10%
12	Groom	84434	84405		2.1	-1.3	-2.1	4.1 - 5	2	7.40%
13	Herbert	87198	90224		4.7	1.9	4.7	> 5.1	7	25.90%
14	Hinkler	84004	81357		5.6	-1.8	-5.6	Divs > 2.0	17	62.90%
15	Kennedy	87258	84783		1.6	2.0	-1.6			
16	Leichhartd	87245	84806		1.6	1.9	-1.6			
17	Lilley	85646	87924		2.0	0.1	2.0			
18	Longman	86794	82524		4.2	1.4	-4.2			
19	Maranoa	84811	84401		2.1	-0.9	-2.1			
20	McPherson	86449	93655		8.7	1.0	8.7			
21	Moncreif	85133	89406		3.7	-0.5	3.7			
22	Moreton	85416	89015		3.3	-0.2	3.3			
23	Oxley	84305	84506		1.9	-1.5	-1.9			
24	Petrie	85354	89421		3.8	-0.3	3.8			
25	Rankin	85390	84701		1.7	-0.2	-1.7			
26	Ryan	85827	88311		2.5	0.3	2.5			
27	Wide Bay	85048	81056		5.9	-0.6	-5.9			
				#VALUE!						

APPENDIX 5-B
WA Redistribution : 1997
Projected Enrolment : June 2000

No.		Projected Enrolment	Actual Enrolment	Abs Difference	Abs Deviation from Quota	Projected deviation	Actual deviation			
1	Brand	84510	81275		2.7	-0.3	-2.7	Quota	83518	
2	Canning	84580	81121		2.9	-0.2	-2.9	Abs Diff	30260	
3	Cowan	84301	78772		5.7	-0.5	-5.7	Mean Diff	2161	
4	Curtin	85812	85417		2.3	1.3	2.3	Mean Deviation	2.27	
5	Forrest	83784	86021		3.0	-1.1	3.0			
6	Freemantle	83696	85752		2.7	-1.2	2.7			
7	Kalgoorlie	83979	81717		2.2	-0.9	-2.2			
8	Moore	86231	81412		2.5	1.8	-2.5	Max Deviation	5.7	
9	O'Connor	85869	83650		0.2	1.3	0.2	Min Deviation	0.2	
10	Pearce	84846	83968		0.5	0.1	0.5	2.1 - 3	8	57.10%
11	Perth	85372	85012		1.8	0.8	1.8	3.1 - 4	0	0.00%
12	Stirling	84386	85868		2.8	-0.4	2.8	4.1 - 5	0	0.00%
13	Swan	84546	84038		0.6	-0.2	0.6	> 5.1	1	7.10%
14	Tangney	84405	85226		2.0	-0.4	2.0	Divs > 2.0	9	64.20%
	Total	1186317	1169249							

APPENDIX 5 -C
ACT Redistribution : 1997
Projected Enrolment : March 2001

No.		Projected Enrolment	Actual Enrolment	Abs Difference	Abs Deviation from Quota	Projected deviation	Actual deviation
1	Canberra	108213	106066		0.7	0.2	-0.7
2	Fraser	107804	107503		0.7	-0.2	0.7
		216017	213569				
		108008.5	106784.5				

Quota	106785	
Abs Diff	2448	
Mean Diff	1224	
Mean Deviation	0.67	
Max Deviation	0.7	
Min Deviation	0.7	
2.1 - 3	0	0.00%
3.1 - 4	0	0.00%
4.1 - 5	0	0.00%
> 5.1	0	0.00%
Divs > 2.0	0	0.00%

APPENDIX 6-A
SA Redistribution : 1999
Projected Enrolment : June 2001.

No.		Projected Enrolment	Actual Enrolment	Abs Difference	AbsDeviation from Quota	Projected deviation	Actual deviation			
1	Adelaide	87661	84914		0.5	0.48	-0.5	Quota	85341	
2	Barker	87728	86498		1.4	0.56	1.4	Abs Diff	51717	
3	Bonython	88761	84136		1.4	1.74	-1.4	Mean Diff	4310	
4	Boothby	88832	88601		3.8	1.82	3.8	Mean Deviation	1.26	
5	Grey	87834	85553		0.2	0.68	0.2			
6	Hindmarsh	85054	83588		2.1	-2.51	-2.1			
7	Kingston	85353	83819		1.8	-2.16	-1.8			
8	Makin	89689	87092		2.1	2.81	2.1	Max Deviation	3.82	
9	Mayo	85610	84437		1.1	-1.87	-1.1	Min Deviation	0.06	
10	Port Adelaide	86294	85396		0.1	-1.08	0.1	3.6 - 4.5	1	8.30%
11	Sturt	86106	85043		0.3	-1.30	-0.3	4.6 - 5.5	0	0.00%
12	Wakefield	87953	85019		0.4	0.82	-0.4	5.6 - 6.5	0	0.00%
		1046875	1024096					> 6.6	0	0.00%
								Divs > 3.5	1	8.30%

Appendix 7-A
NSW Redistribution: 1999-2000
Projected Enrolment: June 2003

No	Division	Projected Enrolment	Actual Enrolment	Abs Difference	Abs Difference from Quota	Projected Deviation	Actual Deviation
1	BANKS	86364	83408		2.34	-1.69	-2.34
2	BARTON	87167	83993		1.65	-0.77	-1.65
3	BENNELONG	88920	86207		0.94	1.22	0.94
4	BEROWRA	88868	85880		0.56	1.17	0.56
5	BLAXLAND	86347	82499		3.40	-1.70	-3.40
6	BRADFIELD	89796	89818		5.17	2.22	5.17
7	CALARE	86370	86728		1.55	-1.68	1.55
8	CHARLTON	85200	84261		1.34	-3.01	-1.34
9	CHIFLEY	89560	84011		1.63	1.95	-1.63
10	COOK	85538	82217		3.73	-2.63	-3.73
11	COWPER	85598	82550		3.34	-2.56	-3.34
12	CUNNINGHAM	86891	80884		5.29	-1.09	-5.29
13	DOBELL	85492	83960		1.69	-2.68	-1.69
14	EDEN-MONARO	87600	89307		4.57	-0.28	4.57
15	FARRER	87392	84818		0.68	-0.52	-0.68
16	FOWLER	88821	82999		2.81	1.11	-2.81
17	GILMORE	86640	85804		0.47	-1.37	0.47
18	GRAYNDLER	87070	85244		0.19	-0.88	-0.19
19	GREENWAY	86963	88047		3.10	-1.00	3.10
20	GWYDIR	85043	83896		1.76	-3.19	-1.76
21	HUGHES	89586	87037		1.91	1.98	1.91
22	HUME	88115	87935		2.97	0.31	2.97
23	HUNTER	86983	87124		2.02	-0.98	2.02
24	KINGSFORD SMITH	90237	85124		0.33	2.72	-0.33
25	LINDSAY	85492	82383		3.54	-2.68	-3.54
26	LOWE	86010	85108		0.34	-2.09	-0.34
27	LYNE	89608	89920		5.29	2.01	5.29
28	MACARTHUR	89829	82999		2.81	2.26	-2.81
29	MACKELLAR	88008	86481		1.26	0.19	1.26

Quota	85403	
Abs Difference	122096	
Mean Difference	2442	
Mean Deviation	2.54	
Max Deviation	10.31	
Min Deviation	0.19	
3.6 - 4.5	5	10.00%
4.6 - 5.5	5	10.00%
5.6 - 6.5	0	0.00%
>6.6	2	4.00%
Divs>3.5	12	24.00%

30	MACQUARIE	90777	86769		1.60	3.34	1.60
31	MITCHELL	90353	91516		7.16	2.86	7.16
32	NEWCASTLE	89466	89912		5.28	1.85	5.28
33	NEW ENGLAND	85167	85694		0.34	-3.05	0.34
34	NORTH SYDNEY	90387	88148		3.21	2.89	3.21
35	PAGE	86865	82705		3.16	-1.11	-3.16
36	PARKES	85685	82297		3.64	-2.46	-3.64
37	PARRAMATTA	90618	86075		0.79	3.16	0.79
38	PATERSON	85538	86131		0.85	-2.63	0.85
39	PROSPECT	90786	87197		2.10	3.35	2.10
40	REID	90227	76595		10.31	2.71	-10.31
41	RICHMOND	87840	82992		2.82	-0.01	-2.82
42	RIVERINA	89392	87776		2.78	1.76	2.78
43	ROBERTSON	88778	84633		0.90	1.06	-0.90
44	SHORTLAND	89364	87530		2.49	1.73	2.49
45	SYDNEY	86274	88921		4.12	-1.79	4.12
46	THROSBY	86505	86221		0.96	-1.52	0.96
47	WARRINGAH	87657	84810		0.69	-0.21	-0.69
48	WATSON	85680	81707		4.33	-2.46	-4.33
49	WENTWORTH	89784	84709		0.81	2.21	-0.81
50	WERRIWA	89572	87147		2.04	1.97	2.04
	Total	4392223	4270127	122096			
	Average	87844	85403				

Appendix 7-B
Tas Redistribution: 1999-2000
Projected Enrolment: June 2003

No	Division	Projected Enrolment	Actual Enrolment	Abs Difference	Abs Difference from Quota	Projected Deviation	Actual Deviation
1	Bass	66783	65846		0.90	-0.93	-0.90
2	Braddon	68640	67785		2.02	1.83	2.02
3	Denison	67936	67260		1.23	0.79	1.23
4	Franklin	68084	67540		1.65	1.00	1.65
5	Lyons	65591	63797		3.99	-2.69	-3.99
	Total	337034	332228	4806			
	Average	67407	66446				

Quo
Abs
Mea
Mea
Max
Min
3.6
4.6
5.6
>6.6
Divs

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