Demographic Forecast 2051

Movement and change in population and households in the Bay of Plenty

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Prepared by the Migration Research Group
The University of Waikato

Environment Bay of Plenty
Bay of Plenty Regional Council

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Richard Bedford, Dharmalingam Arunachalam and Elsie Ho carried out the analysis and drafted the text of the reports. Jacqueline Lidgard and Colin McLeay oversaw the migration survey. Muriaroha Muntz produced many of the tables containing 2001 census data and processed the results of the 2005 migration survey. This was very much a Migration Research Group team effort.

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24 July 2006

Preface

This report has been a long time in the making – too long perhaps for some of the planners in the Bay of Plenty. However, like a good wine that is expected to have a long shelf life, population projection exercises need time to mature. One of the advantages of taking some time to reflect on the results of the projection arithmetic has been the opportunity to incorporate into this report the latest information produced by Statistics New Zealand on regional population projections, household and family projections, labour force projections and the provisional results of the 2006 Census of Population and Dwellings.

It has been possible to calibrate the projections produced for the Demographic Forecast 2051 more rigorously than would have occurred if the report had been published as soon as the numbers for the TA populations through to 2051 had been produced in May 2005. Planners were given the numbers soon after they became available to the Migration Research Group through a series of Progress Reports with extensive appendices and two presentations at Environment Bay of Plenty's headquarters in Whakatane in July 2005. The interpretations of these numbers were progressively made available to planners in Environment Bay of Plenty between July and December 2005. This report contains much greater reflection on and interpretation of the numbers than is usually found in population projections produced for local authorities. Given that the time horizon for the projections is out to 2051, the projections need this sort of cellaring potential.

The Migration Research Group began working on population projections for Environment Bay of Plenty in 2001 as part of the Western Bay of Plenty SmartGrowth Project. Under the leadership of Ken Tremaine, this was an exciting and innovative project that allowed us to experiment with a different approach to deriving the net migration estimates that are incorporated into cohort component projections. The resultant projections gave higher population estimates for the western Bay of Plenty than the ones produced by Statistics New Zealand, and were used to inform the development of infrastructure and land use plans for the sub-region.

In 2004, Environment Bay of Plenty approached the Migration Research Group seeking a similar set of projections for the other Districts in the region: Rotorua, Kawerau, Whakatane and Opotiki. These were developed using the same methodology as that used for the Western Bay of Plenty SmartGrowth Project projections. It was also necessary to develop a new set of projections for the western Bay of Plenty based on more recent estimates by Statistics New Zealand of fertility, mortality and net migration for all TAs in New Zealand.

This report contains a substantive analysis of the projections for all of the Bay of Plenty TAs, including sections on demographic trends since 1981, patterns of migration between recent censuses, the age-sex composition of the TA and sub-regional populations and changes in these over the projection period, the differential contributions of natural increase and net migration to population change in the sub-regions, and the population, labour force and household projections for the period 2001-2051.

Information on the different projection variants that were prepared as background to the study, as well as the five year age-sex distributions of population for each TA in 2011, 2021, 2031, 2041 and 2051 are contained in a separate Technical Report (Bedford 2006). The results of a postal survey of recent in-migrants to and out-migrants from TAs in the Bay of Plenty region are also reported separately in Ho et al. (2006). Both of these reports are available from Environment Bay of Plenty.

Executive Summary

Context and method (Chapters 1-3)

- Environment Bay of Plenty requires a set of population and household forecasts for the region on a Territorial Local Authority (TA) basis over the 50 years 2001 to 2051. An assessment of projected population change at the TA, sub-region and regional levels is required as part of the community outcomes processes Environment Bay of Plenty is undertaking to fulfill its obligations under the Local Government Act 2002. The forecasts will also inform a range of other planning related projects.

- The revised and updated national and sub-national projections, produced by Statistics New Zealand (SNZ) in 2004 and early 2005 were used as the basis for the 50 year demographic forecasts for the six Territorial Authorities (TAs) and three sub-regions in the Bay of Plenty Region.

- The 2005 SNZ projection series used some different assumptions about the processes that are driving population change at both national and sub-national levels than those that underpinned the 1998 and 2002 sub-national projections used in the western Bay of Plenty (WBOP) SmartGrowth Project.

- The 2005 projection series produced smaller populations for the Bay of Plenty Region than the 2002 series, especially for Tauranga City. This was mainly due to a lower net migration estimate in 2005 projections for this TA. The projections discussed in this report use SNZ's 2005 assumptions about fertility, mortality and net migration but are derived using the same method that was adopted for the WBOP SmartGrowth Project's population estimates.

- SNZ uses the cohort component method to derive its national and sub-national projections. This method takes an initial age-sex structure (the "base population' or the mid-year estimate for 2001 in the case of these projections) and applies birth and death rates to this structure to produce a mid-year population for subsequent periods. In both the SNZ and the Demographic Forecast 2051 Project projections these are five year periods, commencing June 2001 and finishing June 2051. Estimates of net migration during each five year period are added into the projections for each period.

- The main difference between the SNZ sub-national projections and the projections produced for the Demographic Forecast 2051 relates to the way in which net migration is incorporated in the projection procedure. In the projections discussed in this report, SNZ's net migration profiles for each TA are used to estimate levels of net migration that are adjusted to take into account the changing age-sex composition of the national population between 2001 and 2051. This adjustment is not made in the SNZ sub-national projections.

- The labour force and household projections are derived directly from the population projections. Both the labour force and the household projections were derived using the same methodologies as those employed in the WBOP SmartGrowth Project.

Recent trends: population change and migration (Chapters 4 and 5)

- Cohort component projections usually rely heavily on a prior assessment of trends in fertility, mortality and migration. This is especially the case where national and sub-national estimates are being used for planning purposes.

- The usually resident populations of the six TAs in the Bay of Plenty region increased by around 64,200 between 1981 and 2001 from just over 178,400 to 242,600 – an increases of 36 percent. There are three quite distinctive patterns of growth within this overall positive trend, and these are:

  (a) continuous growth (Western Bay of Plenty District, Tauranga City – 70 percent increase between 1981 and 2001);

  (b) growth between 1981 and 1996, followed by small declines, 1996-2001 (Rotorua, Whakatane and Opotiki Districts);

  (c) declines at all intercensal periods between 1981, with a much sharper drop during the 1990s (Kawerau District – 20.6 percent decline between 1981 and 2001).

- Differences in patterns of population change must be kept firmly in mind when assessing prospects for future population growth and decline. The sub-regions have quite distinctive patterns of population change, as is widely recognized in the region, with Rotorua having a pattern that is closer to that for the eastern Bay of Plenty than the western Bay of Plenty.

- Between 1981 and 2001, population change in the western Bay of Plenty was driven predominantly by net migration rather than natural increase. On the basis of SNZ's estimates of total net migration (taking account of internal as well as international migrants), around 82 percent of the population change in Tauranga City over the 20 years could be accounted for by net migration gains. In the case of western Bay of Plenty District this percentage was 67, and for the Bay of Plenty TAs as a whole, 40 percent.

- In the western Bay of Plenty, persistent net gains through migration contributed over 41,000 to the resident population of the sub-region between 1981 and 2001. In the eastern Bay of Plenty only Opotiki District had net migration gains, and these were between 1981 and 1996. Both Whakatane District and Kawerau District had net migration loses throughout the 20 years, as did Rotorua District. The aggregate net migration loss for these four TAs between 1981 and 2001 was 15,600.

- In the light of these migration trends, population projections for Bay of Plenty TAs have to accommodate situations of persistent net migration gains (Western Bay of Plenty District, Tauranga City), persistent net migration losses (Rotorua, Kawerau and Whakatane Districts) and a recent shift to net losses (Opotiki District).

Assumptions and base population structures (Chapters 6 and 7)

Assumptions

- When planners in District/City Councils request projections for the populations of their TAs from Statistics New Zealand, they are provided with three standard variants: "high", "medium" and "low". The differences between the three lie in the assumptions about fertility, mortality and migration. The Project Brief for the Demographic Forecast 2051 Project specified that the assumptions underpinning the SNZ medium variant projections for each of the TAs would be used as the basis for the present analysis.

- The medium variant population at the national level is based on an assumption that international migration will add 10,000 people each year to the New Zealand population through the projection period. This is double the net gain assumed in previous medium variant projections, and reflects a pro-active immigration policy plus an expectation that higher net migration gains will become the norm as natural increase slows.

- The projections chosen for the population, labour force and household series in the Demographic Forecast 2051 Project were all derived from SNZ's medium variant based on the 10,000 annual net migration gain to the national population. In total, 8 projection variants were developed before deciding on the most appropriate ones for the current project.

- Following consultation with the Project Team it was decided to use the following variants as the basis for the population, labour force and household projections for the Bay of Plenty TAs:

  (a) Variant 3 (modified medium with a constant net migration profile (SNZ's profile for 2001-2026) and 10,000 national net migration): Western Bay of Plenty District and Tauranga City;

  (b) Variant 7 (modified medium with SNZ's variable net migration profile through to 2026 and then zero net migration (10,000 national net migration)): Rotorua District, Whakatane District, Kawerau District and Opotiki District.

- Use of these variants is consistent with the patterns of population change that have been found in different parts of the Bay of Plenty over the period 1981-2001. The constant net migration profile for the western Bay of Plenty TAs is also consistent with the approach adopted in the WBOP SmartGrowth Project.

- The application of this method to the determination of migration profiles for each five year period between 2001 and 2051 provided numbers for each age group and the total net gains or losses for each TA that are more consistent with the anticipated changes forecast for New Zealand's population structure over the next 50 years. These net migration profiles for each TA are detailed in Chapter 6.

Base population structures

- A critical component of any population projection is the population distributed by age and sex at the beginning of the projection period (the base structure). This is because the distribution of people across the age groups at the initiation of the projection has a profound influence on the pattern of change in that population over subsequent decades.

- The base population contains most of the people who will be included in the projected population, at least for the next 25 years or so. Additions are made by births and in-migrants; deletions result from deaths and out-migration. The size of the future population is very much determined by the base population and its distribution by age and sex. If the population is small at the outset, such as the base population for Kawerau, then it will remain small through the projection period unless there is a very unusual pattern of fertility or migration that promotes much more rapid change than has occurred in recent years.

- Population growth through natural increase and net migration does not change suddenly; the existing base structure ensures that there is significant inertia in the patterns of change in the size of an area's population. The structure also has a major effective on the momentum of future population change because most of the people who will be in the area in 5, 10, 15 or 20 years time are already born and living there.

- The base populations used in the projections developed for the Bay of Plenty TAs are SNZ's June 2001 estimates of the numbers of usual residents. They are the same populations that SNZ used as the base for their November 2002 and February 2005 sub-national projections. There are some basic similarities in the shapes of the population structures for the TAs in 2001, such as falling shares at younger ages reflecting declining fertility, sharp reductions in numbers around ages 15-24 years reflecting migration out of the region, and then a bulging out in numbers to accommodate the baby boom generations aged 40-60 years. There are also some important differences in structure, reflecting different ethnic mixes in the TA populations, different migration patterns in the past, and different patterns of fertility and mortality amongst Maori and non-Maori components in the population.

The population projections (Chapters 8 – 10)

- In June 2001 the six TAs that comprise the Bay of Plenty region had a combined population of 250,330. The SNZ medium variant projection for the 6 TAs indicated that this population could increase by just over 100,000 during the next 50 years to reach 350,870 by 2051. The Project’s projections for the western Bay of Plenty TAs (variant 3) Rotorua and the eastern Bay of Plenty TAs (variant 7) suggest that the population could be just over 400,000 on the basis of the different migration assumptions that we have employed.

- Between 1981 and 2001 the population of Bay of Plenty TAs increased by just over 64,100 – an increase of 36 percent on the 1981 population. Just under 60 percent of this increase was accounted for by growth in the population of Tauranga City, with a further 24 percent due to population growth in western Bay of Plenty District. Rotorua District and the eastern Bay of Plenty TAs accounted for just over 11,000 or 17 percent of the increase.

Changes in population size, 2001-2051

- The projection variants used in the Demographic Forecast 2051 Project generate an increase of 66,380 between 2001 and 2021 in the Bay of Plenty's population – a slightly higher numerical increase than that during the previous 20 years (64,173). Nearly all of this increase (62,600) is found in the western Bay of Plenty sub-region. Rotorua District's population increases by 5,100, while the eastern Bay of Plenty sub-region's population falls by 11,320 between 2001 and 2021.

- Over the thirty years 2021–2051 the population in the Bay of Plenty increases by a further 86,610, on the basis of the projection variants used in this project. This compares with an increase of 43,860 if SNZ's "medium variant" projections were pushed out to 2051. The big differences in projected growth are in the western Bay of Plenty with the population of this sub-region increasing by 83,600 (96.5 percent of the total projected growth) between 2021 and 2051.

- There are significant differences in the projected growth for the eastern Bay of Plenty, and for Rotorua District between the SNZ "medium" variant and the project's "modified medium" variants. Pushing out the SNZ "medium" variant to 2051 results in a decline in the eastern Bay of Plenty's population by 12,240 and a decline of 3,700 in Rotorua District's population. The project's projections, on the other hand, see a very small decline in the eastern Bay's population (-290) and continued growth (3,300) in Rotorua's population.

- In terms of patterns of population growth over the 50 years, the projection variants used in the project produce a very different demographic outcome for most of the TAs than the assumptions underlying the SNZ "medium" variant. In some TAs the actual population sizes may not be very different in 2051 compared with those in 2001 (e.g. Kawerau, Opotiki) but these are much more positive outcomes than those generated by SNZ's "medium" variant.

- If the relatively optimistic assumptions that underpin the projections produced by the modified medium variants were to hold, then the Bay of Plenty in 2051 would have around 225,000 more residents than it had in 1981 – it would have more than doubled from 178,428 in 1981 to 403,320 in 2051. Tauranga's population would have increased by 3 times from 53,040 in 1981 to 157,160 in 2051.

- There are two quite distinctive trajectories for population growth in the region: rapid growth in the western Bay of Plenty sub-region (especially Tauranga City) and virtually static population change in Rotorua District and eastern Bay of Plenty. The overriding demographic reality for the next 50 years is that population growth in the Bay of Plenty will be driven by changes in Tauranga's population, as well as the spill-over effects this growth has on the populations of other parts of the region.

Changes in population structure, 2001-2051

- There will be much more variability the distributions of people by age and sex in each TA than there will be in patterns of population growth. In the eastern Bay of Plenty sub-region and Rotorua District it is changes in population structure rather than population size that have major implications for social planning. In the western Bay of Plenty sub-region, changes in both the sizes and structures of TA populations are going to be critically important for planners.

- During the 50 years the population is projected to increase by 61 percent from 250,330 to 403,320. However there will be markedly different patterns of growth for the different age groups, ranging from just under 11 percent for the 0–14 year olds to 134% for the 60–79 year olds, and over 460 percent for the population aged 80 and over.

- The number of people aged 80+ in the Bay of Plenty is projected to increase from 7,770 in 2001 to almost 44,000 in 2051. In 2001 this component of the population accounted for 3.1 percent of the residents; by 2051 11 percent of the residents could be in this age group. By comparison the number of people in the youngest age group (0–14) is projected to increase by only 6,500 from 61,380 in 2001 to 67,910 in 2051, while the share of the total population aged 0–14 will fall from 24.5 percent to 16.8 percent.

- The western and eastern Bay of Plenty sub-regions experience quite different changes in the age compositions of their populations between 2001 and 2051. In the western Bay of Plenty, numbers in all of the broad age groups used in the report increase at successive decades between 2001 and 2051. The rates of change fluctuate quite considerably reflecting the passage of smaller and larger cohorts through the age structure, but the growth is all positive. Over the 50 years the youthful populations (0–14 and 15–24 years) increase by 46 percent and 89 percent respectively, while the older populations (60–79 and 80+) increase by 180 percent and 539 percent respectively.

- In the eastern Bay of Plenty, the numbers in all of the age groups, except those aged 60 and over, are projected to be smaller in 2051 than they were in 2001. There are some quite marked fluctuations in these numbers, over the period, especially those people aged 60–79 years, but the overall pattern is towards a population that remains close to 50,000 through the period, with the shares of younger people falling while the shares aged over 60 increase. However the percentage of the population aged 0–14 remains higher in eastern Bay of Plenty than in the west because of the larger share of Maori in the resident population.

- Patterns of change in Rotorua District's age structure over the 50 years fall between those of the western and eastern Bay subregions. In each of the decades the District's population increases but the increase is at a much slower rate than in the western Bay of Plenty. By 2051 two of the age groups are projected to have smaller numbers than those in 2001: 0–14 (declines by 17.5 percent) and 25–39 (down by 4.6 percent), but in both cases numbers are increasing again by 2051 under the zero net assumption.

- When the changes in age-sex structures are examined at the TA level, the variability becomes even more apparent. In the Bay of Plenty the TA level of analysis is not very useful for some parts of the region, especially Tauranga City, western Bay of Plenty District, Whakatane District and Kawerau District. This is because changes in their populations over the next 50 years will be very much influenced by the spill over of Tauranga City's population into neighbouring TAs. Sub-regional population structures, rather than those at the TA level, other than for Rotorua District and, perhaps, Opotiki District, are more meaningful for planning purposes.

Components of population change, 2001-2051

- Three processes determine changes in population size and structure: fertility, mortality and migration. These processes affect populations through natural increase (the balance of births over deaths) and net migration (the difference between in- and out-migration). The contributions made by the components of natural increase and net migration vary across the sub-regions and TAs in the Bay of Plenty as a result of differing proportions of Maori with their higher fertility and mortality, divergent base population structures, and variations in net migration assumptions.

- The critical driver of population growth over the next 50 years will be net migration. Of the projected increase in population of around 153,000 between 2001 and 2051, only 27,000 (17.6 percent) is the result of natural increase – the balance between 194,800 births and 167,800 deaths. The great bulk of the growth 126,000 (82.3 percent) is accounted for by the direct contribution of net migration.

- As has already been shown, only the western Bay of Plenty TAs have net migration gains between 2001 and 2051, so the contributions to population growth made by natural increase and net migration are quite different in the two sub-regions and Rotorua District. Natural increase remains positive through the early years of the projection period because the number of births exceeds the number of deaths in most TAs. However in the western Bay of Plenty District, negative natural increase, when deaths exceed births, begins in the 2020s, followed by Whakatane District in 2030s and Tauranga City in 2040s. In the other three TAs natural increase is projected to remain positive through the 50 year period.

- Because of the more rapid ageing of the population in the western Bay of Plenty, which is in part a function of the age of many of the migrants who reside there, this part of the region experiences the smallest overall natural increase (5,440) over the 50 year period. There is a much larger increase in Rotorua District's population as a result of natural increase (13,970) followed by just under 8,000 for the projection period in the eastern Bay TAs.

- The patterns of natural increase shown for the Bay of Plenty TAs are quite optimistic by comparison with SNZ's projections for population growth in many parts of rural and small-town N.Z. In some parts of the country negative natural increase is already the pattern, and many TAs outside of metropolitan areas or their neighbouring peripheries are scheduled to have more deaths than births occurring by the 2020s.

- The overall net migration gains and losses to different parts of the region have already been discussed. When net migration and natural increase are examined as separate components of population growth, three patterns emerge. Firstly there is the "high-growth" western sub-region, associated with significant net migration gains, and small proportional shares of growth due to natural increase. Secondly there is a pattern of overall growth at modest levels in Rotorua and Opotiki Districts due to natural increase being greater than net migration losses at all decades through the projection period. Thirdly there is a pattern of slow population decline in Whakatane and Kawerau Districts, where net migration losses more than account for the contributions made by net migration losses between 2001 and 2026. The zero net migration assumption from 2026 allows for some recovery in the latter two decades of the projection period.

- Variations in the ways the two components of growth affect both the directions of population change as well as the sizes of the populations at different times during the projection period, must be appreciated by planners – the region's demographic future is not going to be determined by the same mix of net migration and natural increase in all TAs and sub-regions. It is also iimportant to appreciate that natural increase is itself affected by migration.

- Estimating the effects migration has on natural increase requires an additional set of hypothetical populations for the Bay of Plenty TAs. These were generated using an assumption that there was no net migration gain or loss throughout the whole projection period, and then comparing the resultant populations with those produced by the modified medium projection variants developed for this report.

- The results of this analysis show that the effect of net migration on natural increase at the region level, in fact, negative at every decade for the projection period. This is because the migrants, as they age, contribute more to the number of deaths than they

contribute new births to the population. In other words, net migration, while it makes a positive direct contribution to population growth in the Bay of Plenty as a whole, and adds 126,000 people to the region's population between 2001 and 2051, also has a negative impact on natural increase at every decade by contributing 34,880 deaths between 2001 and 2051.

Labour force projections (Chapter 11)

- SNZ (2005b) released revised national labour force projections in September 2005. These have been used as the basis for the labour force participation rates for males and females by five year age group that are applied to the projected TA populations for the Demographic Forecast 2051 Project. This is a very simplistic approach because it does not make any allowance for variations in labour force participation between the TAs on the basis of the different ethnic compositions of their resident populations. This is because there are no separate national labour force projections for Maori, or any regional labour force projections produced by SNZ.

- The labour force comprises people aged 15 years and over who work for one or more hours per week for financial gain, or work without pay in a family business. It includes people who are unemployed and actively seeking part-time or full-time work (SNZ 2005b). The Bay of Plenty region's labour force in the 2001 census totalled 113,262 comprising 25,908 Maori, 86,010 non-Maori and 1,344 people who did not specify an ethnicity. Of the total labour force, 60,702 (54 per cent) were in the western Bay of Plenty, 21,453 (19 percent) in the eastern Bay of Plenty, and 311,107 (27 per cent) in Rotorua District.

- The labour force comprised 64 percent of the total population aged 15 years and over (the labour force participation rate) which was slightly lower than the national rate of 67 percent at the time of the 2001 census. Opotiki District and Kawerau District had labour force participation rates just under 60 percent, while Rotorua District had the highest rate (68 percent). The higher labour force participation in Rotorua is not due to an unusually high level of unemployment (recalling that people who are unemployed and seeking work are counted in the labour force). Indeed, this District had the second highest share of its labour force in full-time employment after western Bay of Plenty District.

- The 2001 census revealed that there was quite considerable variation across the various TAs, both in participation rates as well as in levels of full-time and part-time employment, and unemployment. There were also major differences between Maori and non-Maori in terms of participation in the labour force and work status. The projections of the labour force through to 2051 cannot take these differences into account – in essence they are more a measure of a potential labour force assuming participation rates in the region were the same as the assumed national labour force participation rates for the next 50 years.

- Between 2001 and 2021 the labour forces in all TAs get progressively older, with western Bay of Plenty and Opotiki Districts remaining the "oldest" in terms of shares aged over 40 years by 2021. Between 2021 and 2051 the pattern changes somewhat – the labour forces of the eastern Bay of Plenty TAs become "younger" as a result of the introduction of a zero net migration assumption (see Chapters 6 and 8).

- The western Bay of Plenty could see a 50 percent growth in its labour force between 2001 and 2021, with slower growth (33 percent) over the next 30 years. In the case of Rotorua District, the projections suggest there could be growth in the total labour force by around 11 percent between 2001 and 2021, with a small decline (just over –2 percent) between 2021 and 2051. In the case of the eastern Bay of Plenty sub-region, the labour force is projected to decline slightly by 2021, and then to experience a larger decline in the subsequent 30 years.

- The labour force, like the population structure generally, will fluctuate in size by age group, especially in Rotorua and the eastern Bay of Plenty TAs. The age compositions of the TA labour forces, like their total populations, will become more diverse over the next 50 years, and this makes generalisation about trends difficult. One obvious point is that the size and share of the labour force that is in the age group 60-79 years will increase dramatically, especially between 2001 and 2021. In June 2001 there were 8.700 in this age group in the Bay of Plenty region; by 2021 it is projected there could be 21,050 aged 60-79 years, almost as many as those in the 15-24 age group (22,770).

- The older labour force could be even larger than that suggested in these projections because of increases in labour force participation by those aged 60 and over. Such shifts in labour force participation rates over time have not been built into the projections for the Demographic Forecast 2051, and as a result the figures should be treated as conservative estimates of the size of the future older labour force.

Household projections (Chapter 12)

- SNZ (2005c) released their up-dated sub-national family and household projections in October 2005. These projections, like the ones produced for the Demographic Forecast 2051 Project, are for the population living in private dwellings. People in non-private dwellings (hospitals, prisons, halls of residence, for example), as well as unoccupied dwellings and second homes are excluded.

- SNZ noted that the projected increase in the number of households between 2001 and 2021 at the national level (28 percent) would be greater than the projected in crease in the number of families (24 percent) and the population (18 percent) reflecting the trend towards smaller average household sizes. The Bay of Plenty region was projected to have the third highest percentage increase in number of households (35 percent) after the Auckland (46 percent) and Tasman (40 percent) regions.

- The Project's projections give somewhat higher numbers of households for the western Bay of Plenty, and lower numbers for the eastern Bay of Plenty and Rotorua in 2021 than the SNZ medium variant household projections. For the region as a whole, the differences tend to cancel themselves out with SNZ's medium variant giving 127,400 households in 2021 for the Bay of Plenty TAs while the Project projections give 125,000 households for that year. These differences are due, in large measure, to differences in methods and assumptions used in the SNZ and Project household projections. These differences are discussed in Chapter 12.

- Between 2001 and 2051 the total number of private households in the Bay of Plenty TAs is projected to almost double from 88,200 to 166,200. Numbers of households will increase most in the western Bay of Plenty sub-region (141 percent), with much slower growth in Rotorua District (30 percent) and the eastern Bay of Plenty TAs (14 percent).

- There will be some major changes in the mix of households with and without families (six broad categories of household were identified for the projections). The category that will see the largest percentage increases is one person households – an almost 80 percent increase in the western Bay of Plenty, 42 percent in Rotorua and 34 percent in the eastern Bay of Plenty. The other major category of growth is in couples without children in the household. These increase by over 70 percent in the western Bay of Plenty sub-region, with increases of 33 percent and 26 percent in the other two sub-regions. Growth in the two categories of living arrangement with children (couples and sloe parents – is the slowest in the three sub-regions.

- For the region as a whole, the category of household that is projected to grow most slowly over the 50 years is the sole parents. This is a rather surprising finding given the significant growth in this category of household in recent years. The category that is projected to grow most rapidly, on the other hand, is one person households. These developments reflect both the changing age composition of the population as well as the nature of the assumptions that underlie the Project's household projections.

- Unlike the SNZ projections, where assumed shifts in living arrangement types over time are built into the projections, the household projections developed for the Demographic Forecast 2051 Project have held the distribution of living arrangements across the age groups in 2001 constant through the projection period. This makes it possible to isolate the impact that the changing age-sex composition of the population has on household types and composition. All of the change in household numbers and types discussed in this report are due to changes in the projected age structures of the TA populations.

- As noted earlier, SNZ's 2005 sub-national family and household projections, which do allow for changes in living arrangement type rates, generally produce higher numbers of households for most of the Bay of Plenty's TAs than the Project's projections. It is unlikely that they would have continued to do this for the eastern Bay of Plenty TAs if SNZ had pushed their household projections out to 2051. This is because their population projections for the period 2021-2051 would have been more conservative than the Project ones (see Chapter 8).

- In this regard, the Project's household projections should not be deemed unnecessarily pessimistic, especially for the eastern Bay of Plenty and Rotorua District. The zero net migration assumption used in the projections for these TAs after 2021, rather than continued net migration losses, allows the populations of the TAs to recover somewhat and for some growth in numbers of households to continue in all of the region's TAs.

Conclusion (Chapter 13)

- The provisional results of the 2006 census suggest that all of the Bay of Plenty TAs except Tauranga City have experienced larger percentage increases (or smaller percentage decreases in the cases of Kawerau and Opotiki Districts) since 2001 in their census night populations, than was the case between 1996 and 2001 (SNZ 2006). This reflects a national trend towards greater population increases across the country between 2001 and 2001 than in the previous five year period. Not too much should be read into these census night figures – they include all visitors on census night, and exclude all people temporarily absent from their usual residences. However, they do suggest that there has been more recovery in population growth in parts of the eastern Bay of Plenty than might be suggested in the Project's projections.

- The challenge for planners in the eastern Bay of Plenty and Rotorua is not so much the changes in absolute numbers of residents, but rather the trends in population growth and the changes in age-sex composition. In the western Bay of Plenty, on the other hand, it is both the numerical growth in population and households, as well as the

trends and changes in age composition that will pose challenges. The Bay of Plenty region is one of the country's "growth poles" in crude demographic terms. It is likely to remain so, especially in the western sub-region, thanks to a combination of net migration gains and natural increase in a population that has a larger than average share of Maori with their higher fertility rates.

- Another challenge for planners, and one that cannot be addressed in standard projections of the resident population, is the extensive and increasing population that uses the Bay of Plenty for recreation – the second home dwellers, the tourists, the visitors, all of whom place demands on the region's infrastructure and services. These non-residents are not captured in conventional definitions of populations, or addressed in conventional projections. Yet they are a very important component of what might be called a region's "effective" population – the population that uses places.

- The community outcomes that Environment Bay of Plenty is scoping for different parts of the region will be informed by the resident population, labour force and household projections contained in this report. But the numbers must not be taken too literally; they are only as good as the assumptions about fertility, mortality and net migration that were used to generate the population structures on which so much of the analysis in this report is based.

- They are also only part of the full story of population dynamics in the Bay of Plenty, or in any other part of New Zealand for that matter. The large numbers of visitors who come and go daily, weekly and seasonally are a very important component of a region's population on any one day of the year, especially in TAs with quite small numbers of residents. The Demographic Forecast 2051 Project has provided an important but not a complete assessment of the changing populations at TA, sub-regional and regional levels.

Contents

Chapter 1: Introduction

Environment Bay of Plenty requires a set of population and household forecasts for the region on a Territorial Local Authority (TA) basis over the 50 years 2001 to 2051. An assessment of projected population change at the TA, sub-region and regional levels is required as part of the community outcomes processes Environment Bay of Plenty is undertaking to fulfill its obligations under the Local Government Act 2002. The forecasts will also inform a range of other planning related projects.

The research carried out by the Migration Research Group (MRG) at the University of Waikato (the consultants) to provide these population and household forecasts builds on an earlier study of demographic developments in the western Bay of Plenty sub-region (Tauranga City and western Bay of Plenty District) as part of the western Bay of Plenty SmartGrowth Project (WBOP SmartGrowth Project). The same level of information on projected population numbers, age-sex structures, households and labour forces that was provided by the MRG for the WBOP SmartGrowth Project, is required for the rest of the region (Rotorua and the eastern Bay of Plenty comprising Whakatane, Opotiki and Kawerau Districts).

The objectives of the research, as specified in the Project Brief (Environment Bay of Plenty 2005: 7), are to:

- Provide information that will assist Environment Bay of Plenty to identify, implement and monitor community outcomes as required by the Local Government Act 2002;
- Obtain 50 year demographic forecasts for the eastern and Rotorua sub-regions of the Bay of Plenty;
- Identify and analyse the key drivers of positive and or negative population growth in the eastern and Rotorua sub-regions;
- Integrate the projections already obtained for the western sub-region with the projections for the eastern and Rotorua sub-regions into one document;
- Assist the Rotorua, Whakatane, Opotiki and Kawerau District Councils to plan and provide for the future well-being of their communities by providing them with detailed demographic projection information.

Soon after the commencement of research for the Demographic Forecast 2051 Project, Statistics New Zealand released a revised and up-dated set of sub-national population projections (Statistics New Zealand 2005a). It was agreed by the Environment Bay of Plenty Project Team, led by Shelley Hey (Senior Strategic Planner), that we should use these projections, along with the revised national ones released in December 2004, as the basis for the forecasting research.

This decision meant that a further set of projections for the western Bay of Plenty sub-region would be required in order to ensure consistency in the estimates of fertility, mortality, national migration and national age-sex structure that were used to generate the TA-level projections. Population and household projections were therefore generated for all TAs (including Tauranga City and the western Bay of Plenty District), and these have been used to compile the TA, sub-regional and regional population assessments requested in the Project Brief.

The projections prepared for the WBOP SmartGrowth Project were generated using fertility, mortality, national migration and national age structure estimates obtained from the 2002 projection series prepared by Statistics New Zealand (Bedford 2003). The WBOP SmartGrowth Project projections produced higher population forecasts for the western Bay of Plenty sub-region than the ones that are detailed in this report. This is because the assumptions that Statistics New Zealand made about fertility, mortality, and national and sub-national migration, that underpinned the 2002 projection series, were different from those used in the 2004/2005 series.

1.1 Structure of the Report

The differences between the two national and sub-national projection series are outlined briefly in **Chapter 2**. It is important to appreciate these differences at the outset because by using the latest national and sub-national projections as the basis for the Demographic Forecast 2051 different population outcomes for the western Bay of Plenty sub-region are produced from those used in the WBOP SmartGrowth Project. The source of these differences needs to be understood to avoid unnecessary uncertainty about the validity of the estimates done for the SmartGrowth Project.

Chapter 3 contains an outline of the methods used to derive the population and household forecasts for the six TAs comprising the western Bay of Plenty sub-region, Rotorua, and the eastern Bay of Plenty sub-region. These are the same methods that were used in the WBOP SmartGrowth Project. Three sets of population estimates through to 2051 have been produced for the six TAs, two sub-regions, and the region.

It should be noted that the totals given for the Bay of Plenty region in this report are the aggregate figures for the six TAs. They are not the outcome of population forecasts prepared at a regional level. This is an important caveat: the figures generated in this report for the Bay of Plenty region do not relate precisely to the population residing in the area administered by the Regional Council; they relate to the populations usually resident in the six TAs.

The Project Brief specified that as part of the background for the Demographic Forecast 2051 a broad examination of the net gains and losses from migration over the years from 1981 to 2001 would be undertaken. The trends in estimated total net migration gains and losses that Statistics New Zealand has established for the periods 1981-1986, 1986-1991, 1991-1996 and 1996-2001 are briefly described in **Chapter 4**.

Analysis of data on migration into and out of the six TAs, obtained from the 2001 Census of Population and Dwellings, was also requested in the Project Brief to enable Environment Bay of Plenty to understand the characteristics of the "stayer", "in-migrant" and "out-migrant" populations. This analysis is presented briefly in **Chapter 5**.

The TA-specific migration assumptions that were used in the population, labour force and household projections for the 50 years from 2001 to 2051 are discussed in **Chapter 6**. The levels of net migration that were used by Statistics New Zealand in their February 2005 projections of the Bay of Plenty TA populations formed the basis of the migration assumptions employed in this analysis.

Projections of real as opposed to hypothetical populations proceed from an existing base population structure. The base population structures used in the Demographic Forecast 2051 are the mid-year estimates of the TA populations, by age group and sex, for 2001. These structures are outlined in **Chapter 7** where there is also a brief discussion of projected changes in New Zealand's total population structure over the period 2001-2051. This completes the background information that must be assembled before the projections for the TAs are discussed.

The population projections prepared for the six TAs, the sub-regions and the region are reviewed in **Chapter 8**. A total of eight projection variants were prepared. Most of the discussion focuses on the two projection variants selected as the basis of the population, labour force and household analyses. These are: "modified medium" variant 3 for the TAs in the western Bay of Plenty sub-region, and "modified medium" variant 7 for Rotorua and the TAs in the eastern Bay of Plenty.

Chapter 9 reviews changes in the TA and sub-region population structures between 2001 and 2051 that are produced by the application of the fertility, mortality and migration assumptions to the base populations in 2001. There is much more variability in these structural transformations than is found in the patterns of population growth that are discussed in Chapter 8.

The contributions made by the two components of population growth – natural increase and net migration – are assessed in **Chapter 10**. This analysis makes use of three projection variants: the standard Statistics New Zealand "medium" variant for each TA, a zero net migration "medium" variant, and the "modified medium" variants that are discussed in Chapter 7.

In **Chapter 11** the labour force projections are presented. These are derived directly from the population projections discussed in Chapter 8. They have been prepared by Statistics New Zealand using national labour force participation rates. The methodology is described in Chapter 3.

The household projections are reviewed in **Chapter 12**. Again, these are derived directly from the population projections discussed in Chapter 8. The methodology employed to develop these projections of six major household types is described briefly in Chapter 3.

The concluding chapter to this report identifies further research and analysis that could be undertaken to complement and extend the population projections. Included in **Chapter 13** is some consideration of key drivers, other than migration, of population change in the Bay of Plenty region, and an outline of the implications of the 50 year population and household projections for the future well-being of different parts of the region.

Chapter 2: Sub-national Projections

Before outlining the approach adopted to derive projections of the TA populations in the Bay of Plenty for the Demographic Forecast 2051, it is necessary to examine briefly the sub-national projections produced by Statistics New Zealand in 2005. The assumptions that have been used in the TA population projections presented in this report come from the 2005 sub-national series.

The 2005 sub-national series used some different assumptions about the processes that are driving population change at both the national and the sub-national levels, than those that were used in the 1998 and 2002 sub-national projections that were used as the basis for the WBOP SmartGrowth Project. As noted in Chapter 1, the Project Brief specifies that projections for the eastern Bay of Plenty are to be derived using the methodology employed in the SmartGrowth Project, and the results added to those produced for the western Bay of Plenty. Given the methodology used (see Chapter 3 for details), this means that the projections for the various TAs in the region have to be derived from a common national population projection series.

The relevant national population projections were produced in December 2004, and the associated sub-national series based on these revised national projections appeared in late February 2005. It was decided to use this more recent information as the basis for the current project. This decision meant that a new set of estimates for the western Bay of Plenty also had to be obtained, especially if the figures for the various TAs were to be added together to produce a consistent estimate of population change for the region as a whole. This chapter outlines the differences between the 2002 sub-national projection series used as the basis for the WBOP SmartGrowth Project projections, and the 2005 sub-national projection series used as the basis for the Demographic Forecast Project.

2.1 The 2002 and 2005 projection series

On 28 February 2005, Statistics New Zealand (2005a) released its revised sub-national projections. The projections contain up-dated migration, fertility and mortality assumptions which have had the combined effect, at the national level, of increasing the forecast population for New Zealand by around 110,000 by 2026 over the projection series released in October and November 2002.

The main differences between the two series, as these relate to the medium variant projections (the ones used as a basis for the WBOP SmartGrowth Project and for the Demographic Forecast 2051) are described by Statistics New Zealand (2005a: 1-2) as follows:

Compared with the previous national population projections (Series 4, released on 24 October 2002), mid-range series 5 of the latest national population projections assumes:

(a) Net migration of 104,000 in the five years to 30 June 2006, 38,000 in the five years to 30 June 2011, and 50,000 in each subsequent five-year period. By comparison, the previous national population projections assumed net migration of 100,000 in the five years to 20 June 2006 and 25,000 in each subsequent five-year period. An average [national] net migration level of 10,000 rather than 5,000 a year in the long-term better reflects recent and likely future migration trends, with changes in immigration policy during the last 20 years being a key factor behind the increase in average annual net migration.

(b) A slightly older net migration profile, with lower net inflow among the student ages (around 18 years).

(c) A rise in the total fertility rate from 1.97 in 2001 to 2.01 in 2004-2005, then dropping to 2.00 in 2006, 1.92 in 2011, and 1.85 from 2016. By comparison, the previous national population projections assumed the total fertility rate dropped to 1.89 in 2006 and 1.85 from 2011.

(d) Life expectancy at birth will increase to 81.5 for males and 85.4 years for females in 2026. By comparison, the previous national population projections assumed life expectancy at birth of 80.9 years for males and 85.3 years for females in 2026.

The combined effect of these changes is that the New Zealand population is expected to reach 4.13 million in 2006, 4.45 million in 2016 and 4.73 million in 2026 (series 5, 2004-base national population projections). By comparison, under series 4 of the 2001-base national population projections, the New Zealand population was expected to reach 4.11 million in 2006, 4.38 million in 2016 and 4.62 million in 2026.

The 2005 sub-national population projections, while still derived from a 2001 base, took into consideration these revised national fertility, mortality and migration assumptions, and incorporated the latest demographic information at the TA level, such as the sub-national population estimates for June 2004, and the birth and death registrations to December 2004 (Statistics New Zealand 2005: 1-2).

2.2 The regional projection outcomes, 2002 and 2005

In the 2005 sub-national projections all of the Regional Council areas gained more people over the decade 2001 to 2011 than they had in the 2002 series, except for the Bay of Plenty (-3,400), Manawatu-Wanganui (-1,600), Auckland (-200) and Gisborne (-100). The big “loser” in this revised sub-national series was a region that had been experiencing some of the highest population growth in the country over the previous decade. This was a surprising finding, especially given that the 2005 sub-national projections were linked to a national projection that added around 110,000 more people to the country’s resident population by 2026 than the 2002 national projection series.

The differences between the 2002 and 2005 series in the regional populations forecast for 2011 are shown in Table 1. It can be seen clearly in Table 1 that Bay of Plenty’s smaller population in 2011 in the 2005 projection series is the major anomaly. The big “winners” from the projected faster national population growth are Canterbury (+14,100), Wellington (+12,800), Waikato (+4,600) Southland (+4,200), Otago (+3,900), Nelson-Tasman (+3,600) and Hawke’s Bay (+3,000).

Table 1 Projected regional populations, 2011: the SNZ 2002 and 2005 series

Regional Council	2002 series mid-yr 2011	2005 series mid-yr. 2011	Projected change 02-05 series	% change 02-05 series
Northland	152,400	152,800	400	0.3
Auckland	1,457,200	1,457,000	-200	0.0
Waikato	393,200	397,800	4,600	1.2
Bay of Plenty	**281,300**	**277,900**	**-3,400**	**-1.2**
Gisborne	44,300	44,200	-100	-0.2
Hawkes Bay	147,600	150,600	3,000	2.0
Taranaki	101,600	103,000	1,400	1.4
Manawatu-Wanganui	228,200	226,600	-1,600	-0.7
Wellington	460,800	473,600	12,800	2.8
Nelson-Tasman	95,200	98,800	3,600	3.8
Marlborough	44,200	44,500	300	0.7
West Coast	29,400	30,000	600	2.0
Canterbury	529,500	543,600	14,100	2.7
Otago	195,400	199,300	3,900	2.0
Southland	87,200	91,400	4,200	4.8
NEW ZEALAND	4,248,300	4,291,900	43,600	1.0

Note: The two projections for populations in 2011 come from the November 2002 Statistics New Zealand series and the February 2005 series. In both cases the medium variant is shown.

What happened to the Bay of Plenty's population? Why is one of the regions that includes a TA (Tauranga City) that had the largest overall net migration gain between 1996 and 2001 in the country not sustaining this growth? (Bedford et al. 2005b).

2.3 The Bay of Plenty TA outcomes, 2002 and 2005

When the TA population projections for 2011 and 2021 in February 2005 are compared with those produced in November 2002 it is immediately obvious that the major change is in estimates for Tauranga City (Table 2). Indeed, the population of this TA is expected to be 3,500 less in 2011 and 4,500 less in 2021 than was projected in the 2002 sub-national series. There are some minor changes between the two series for the other TA in the Bay, but these are insignificant by comparison with changes in Tauranga City's population (Table 2).

Table 2 Projections of population change in Bay of Plenty TAs, 2011 and 2021

	Pop. 2011			Pop. 2021		
TA	**2002 series**	**2005 series**	**Difference**	**2002 series**	**2005 series**	**Difference**
Western BOP District	46,700	46,900	200	53,600	53,800	200
Tauranga City	117,400	113,900	-3,500	135,800	131,300	-4,500
Rotorua District	70,100	69,900	-200	72,300	72,000	-300
Whakatane District	34,000	34,500	500	33,500	34,100	600
Kawerau District	6,400	6,300	-100	5,400	5,700	300
Opotiki District	10,000	9,800	-200	10,500	10,100	-400
BAY OF PLENTY TAs	284,600	281,300	-3,300	311,100	307,000	-4,100

Note: The population for Bay of Plenty TAs is slightly larger than the population for the Bay of Plenty region because part of Rotorua District lies outside of the Regional Council's boundary.

When the various components of growth (births, deaths, net migration), and the effects these have on natural increase (balance of births and deaths) and population change (balance of natural increase and net migration), are compared for the two projections for Tauranga City, it can be seen that the most important change in the assumptions made in the February 2005 series has been to reduce the estimate for net migration between 2001 and 2006 (Table 3). This has fallen from 12,000 in the November 2002 sub-national projection series to 9,000 in the February 2005 series.

The other significant change in projected population dynamics for Tauranga City has been in the estimates for fertility. The number of births in the 2005 series is lower than it was in the November 2002 series, reflecting in part some changes to the age composition of the net migration flows between the two series (Table 3). The smaller number of births is offset, in part, by a smaller number of deaths in the 2005 series as well, thus producing quite small overall differences in natural increase.

The reduction in the estimated net migration gain for Tauranga City between 2001 and 2006 in the 2005 series is not surprising. When the November 2002 sub-national projections were produced by Statistics New Zealand, the WBOP SmartGrowth Project was preparing population estimates through to 2051 for Tauranga City and western Bay of Plenty District (Bedford 2003). A lower estimate of net migration for the period 2001-2006 was used in the Project's projections (10,000 rather than 12,000) because this accorded more closely with the experience of the previous decade.

Table 3 Changes in components of population growth, Tauranga City, 2001-2021

Component	2001-2006	2006-2011	2011-2016	2016-2021	2001-2021
Births:					
2002 series	6,900	7,200	7,400	8,000	29,500
2005 series	6,600	6,800	6,800	7,100	27,300
Difference	-300	-400	-600	-900	-2,200
Deaths					
2002 series	4,300	4,800	5,200	5,700	20,000
2005 series	4,200	4,600	5,000	5,500	19,300
Difference	-100	-200	-200	-200	-700
Natural increase					
2002 series	2,600	2,500	2,200	2,200	9,500
2005 series	2,400	2,200	1,800	1,600	8,000
Difference	-200	-300	-400	-600	-1,500
Net migration					
2002 series	12,000	7,000	7,000	7,000	33,000
2005 series	9,000	7,000	7,000	7,000	30,000
Difference	-3,000	0	0	0	-3,000
Population change					
2002 series	14,600	9,500	9,200	9,200	42,500
2005 series	11,400	9,200	8,800	8,600	38,000
Difference	-3,200	-300	-400	-600	-4,500

Source: Statistics New Zealand (2005) Table 3, Projected Population Change of Territorial Local Authorities, Medium Series, 2001 (base)-2006, Subnational Population Projections: 2001(base) – 2006 Update.

2.4 A concluding comment

The estimates for TA populations, labour forces and households, contained in this report, are tied to the assumptions underpinning Statistics New Zealand's 2005 sub-national series. These estimates are not necessarily more reliable or better than the earlier ones produced for the western Bay of Plenty during the SmartGrowth Project. Both sets use the same methodology for their production; both sets are anchored in assumptions made by Statistics New Zealand about fertility, mortality and migration at the national and sub-national levels. In both projects the same approach was used to modify the way in which migration is brought into the projections.

For consistency with the 2003 WBOP SmartGrowth Projection series, a "constant" net migration variant for both western Bay of Plenty District and Tauranga City has been adopted for the population, labour force and household estimates in that sub-region. This accords with the approach used in 2003, and by Statistics New Zealand for western Bay of Plenty District in both the 2002 and 2005 sub-national projection series.

In the case of Tauranga City, Statistics New Zealand used a "variable" net migration assumption in both 2002 and 2005, whereby net migration gains were higher in the period 2001-2006 than they were in subsequent periods (see Table 4). In the projections produced for SmartGrowth and for this report the 2001-2006 net migration levels were used as the basis for the net migration estimates throughout the projection period. The differences between the "constant" and "variable" net migration variants are discussed in Chapter 7. It is sufficient to note here that it is the intention of the SmartGrowth partners that the SmartGrowth figures will be reviewed after each census when more up to date and accurate information is available.

Chapter 3: Methodology

The population and associated labour force and household projections generated for the Demographic Forecast 2051 Project adopt the methodology employed in the WBOP SmartGrowth Project. The populations have been provided by Statistics New Zealand (SNZ), and the only difference between the established methods used by SNZ for sub-national projections, and those employed in this project, relate to the way that estimates of net migration are incorporated in the projection procedure. This difference is explained in general terms in this chapter, and in greater detail with reference to estimates of net migration in Chapter 6.

The labour force and household projections are derived directly from the population projections. The labour force projections have also been produced by SNZ, and the method is described in this chapter. The household projections, on the other hand, have been produced in the Population Studies Centre at the University of Waikato. The methodology used is not the one that SNZ uses; it is one that works directly with the data from the population projections. This methodology is outlined in the third section of this chapter.

A general point that needs to be appreciated is that all the projections produced for this project are driven by the demographic processes that determine population change (fertility, mortality, migration, age-sex structure). The variable mix of peoples of different ethnicities in the six TAs is not addressed directly – the associated variations in fertility, mortality and migration are built into SNZ's overall estimates for the demographic processes for the TA populations.

No account is taken of the land or other physical resources in the different TAs, and the differential capacities of these administrative areas to absorb growing populations. In the Bay of Plenty region this caveat has particular relevance for population projections produced for Tauranga City.

It is largely for this reason that projections for all of the TAs except Rotorua District are aggregated into two sub-regions – the western Bay of Plenty and the eastern Bay of Plenty. This allows for some inevitable population spill-over into neighbouring TAs as populations change over the 50 year projection period. It also recognizes a key principle underpinning the WBOP SmartGrowth Project, which has a sub-regional focus because the infrastructural developments required to accommodate future population growth must take account of the realities of the land and other economic resources of the TA.

3.1 The population projections

3.1.1 Methodology and assumptions

Statistics New Zealand uses the cohort component method to derive its national and sub-national projections. This method takes an initial age-sex structure (the "base" population – in the case of these projections, the mid-year estimate for 2001) and applies death rates and birth rates to this structure to produce a mid-year population for subsequent periods. In the projections developed for the Demographic Forecast 2051 Project, these are five year periods, commencing June 2001 and finishing in June 2051. Estimates of net migration during each five year period are added into the projections for each period.

The fertility, mortality and national net migration assumptions that have been used in SNZ's latest national projection series have been outlined briefly in Chapter 2. The more specific information on fertility and mortality rates that have been applied when deriving the projections for each TA can be obtained on request from Statistics New Zealand.

There are three sets of rates for fertility and mortality that are used by SNZ in their sub-national projection series: "high", "medium" and "low". In the projections produced for the Bay of Plenty TAs the "medium" variants for the estimates have been used. The values for these rates have not been adjusted in any way in the Demographic Forecast 2051 Project, and they are not discussed further in the report.

The net migration estimates that SNZ has used in their "medium" variant projections for each TA are discussed further because these are used to derive an alternative set of estimates of net migration by age and sex for each five year period in each TA, taking into account the changing age structure of New Zealand's population over the 50 years. The procedure for deriving these alternative estimates is outlined in the next section, and the results are examined in Chapter 6.

These project-specific estimates of net migration for each TA are incorporated into the cohort component projection method by SNZ using their established procedures. They are the only component of the projections that differs from those used by SNZ.

3.1.2 Procedure for estimating net migration profiles

The net migration profiles used in the Demographic Forecast 2051 were obtained by applying the following procedure:

(a) Obtain from SNZ the age-sex net migration profiles used in the February 2005 "medium" variant sub-national projections for the six TAs in the Bay of Plenty.

(b) Obtain from SNZ the "medium" variant national population projections through to 2051 that were released in December 2004 (two "medium" variant projections were obtained: 5,000 annual net migration gain, and 10,000 annual net migration gain).

(c) Calculate the mid-period populations for the national population by five year age group and sex for the period 2001-2006 (i.e. add the base population for June 2001 to the projected population in June 2006 and divide this by 2 to get an estimated mid-period population).

(d) Calculate the proportion of this mid-period national population that is a net migration gain or loss to a Bay of Plenty TA, by five year age groups and sex (i.e. divide the SNZ net migration profile for a TA for a particular five year period by the mid-period national population for the appropriate five year period).

(e) Use the proportions to derive a new set of net migration profiles by applying them to the mid-period populations for the national population each five years over the 50 year projection period (i.e. multiply the mid-period national population, by age and sex, by the proportions obtained in step 4).

(f) Provide the new estimates of net migration by five year age group and sex to SNZ as replacement data for their net migration estimates in the TA projections.

(g) Obtain from SNZ three base sets of TA projections for the 50 years: their standard "medium" variant projection; a "modified medium" variant that uses the net migration profiles provided by the client; a "zero" net migration variant that allows the effect of migration on the estimated populations to be assessed.

In summary, the procedure outlined above uses the net migration profiles provided by SNZ but inputs into the projections estimates of the levels of net migration that are adjusted through the projection period for the changing age-sex composition of the national population.

In many cases the differences between the SNZ net migration estimates for the Bay of Plenty TAs, which are held constant for most of the projection period, and the ones obtained using the procedure outlined above, do not differ greatly (see Chapter 6). However, for some TA, especially those experiencing significant population growth such as Tauranga City, there are some quite significant variations between the two sets of estimates. Further discussion of these estimates can be found in Chapter 6.

3.2 The labour force projections

3.2.1 Methodology and assumptions

The labour force projections have been obtained by applying national participation rates for each five year age group, by sex, to the projected populations for each TA. The national participation rates were derived by SNZ in 2004. There are no recent sub-national labour force participation rates at the TA level; this explains why the national rates have been used.

Given the different ethnic mixes in the populations of Bay of Plenty TAs, and the fact that labour force participation is known to vary quite significantly by ethnicity, the labour force projections should be regarded as estimates of the maximum labour forces in each TA.

No adjustment has been made for changes in labour force participation over time. There are likely to be some increases in participation amongst people over the age of 65 years as numbers in the younger labour force fall with on-going structural changes in the national and sub-national populations.

3.2.2 Procedure

SNZ generated labour force projections, by five year and groups and sex, for the TA populations aged 15 years and over, on the basis of the "modified medium" variant population projections. These projections are discussed further in Chapter 11.

3.3 The household projections

3.3.1 Methodology and assumptions

The household projections have been derived using a methodology that was employed in the WBOP SmartGrowth Project whereby the projected population structures for each TA are used to estimate the numbers of households in six categories on the basis of the actual distribution of people, by age and sex, across these categories at the time of the 2001 Census of Population and Dwellings. The household categories are:

(a) Couple only households (no children)

(b) Two parent households with children

(c) Sole parent households with children

(d) One person households

(e) Households of unrelated and related people

(f) Other types of households in private dwellings.

The proportions of people in four broad age groups that encompassed young dependent children (0-9 years), older children (10-19 years), adults in the child-bearing age groups (20-64 years), and the older population (65 years and over), in the different household categories in each TA in 2001, were held constant through the projection period. In this way the methodology employed in the household projections remained consistent with that used in the population and labour force projections.

There are two important caveats associated with this method of deriving household projections based on population estimates. Firstly, we assume that the average sizes of households remain unchanged for each household category over the projection period. Secondly, we assume that the percentage distribution of people in the four broad age groups across the different household categories remain unchanged over the projection period.

What drives the changes in numbers of households of different categories is the changing size and age composition of the population. There are no changes produced in these projections by assumed trends in, say, the growth in sole parent households, or an assumed growth in one person households. The changing numbers and mix of household categories is thus driven by the population projections.

The final methodological point to note is that the population included in the household projections is the population estimated to be in private dwellings. The proportions in such dwellings at the time of the 2001 Census of Population and Dwellings were used to define the relevant populations for the household projections.

In the case of the two western Bay of Plenty TAs and the three eastern Bay of Plenty TAs, over 98 percent of the resident population in 2001 were in private dwellings. In Rotorua District the proportion was slightly lower, between 97 and 98 percent.

3.3.2 Procedure

The procedure used in deriving estimates of numbers of households in the different categories is as follows:

(a) Re-group the projected age-sex distributions for the populations for each TA in 2001 (base year), 2011, 2021, 2031, 2041 and 2051 into four broad age groups (0-9, 10-19, 20-64, 65+).

(b) Get the total number of households/families by category in each TA for 2001.

(c) Get the number of people living in a given household category.

(d) Divide (c) by (b) to get the average size of each household by category for 2001.

(e) Get the number of people living in different household categories by the four broad age groups (0-9, 10-19, 20-64, 65+).

(f) Get the percentage distribution of people in the four age groups across the different household categories. For example, the proportion of people aged 0-9 years in two parent households, sole parent households etc.

(g) Apply the percentages obtained in (f) to the projected population by age obtained in (a). This will give the number of people projected to live in each category of household.

(h) Divide (g) by (d) to get the projected number of households in each category.

The results of applying this procedure to the population projections for each TA are discussed in Chapter 12.

Chapter 4: Population change and migration, 1981-2001

Cohort component projections usually rely heavily on a prior assessment of trends in fertility, mortality and migration. The projected birth and death rates, and levels of net migration, that are used to derive age-sex structures for populations in the future can be based on quite arbitrary parameters for the demographic processes, but where national and sub-national estimates are being used for planning purposes it is more common to use evidence of past trends as a basis for estimating future patterns of change in the key demographic processes.

As noted in Chapter 3, the assumptions Statistics New Zealand have made about fertility and mortality levels in the Bay of Plenty TAs have been used without modification in the population projections prepared for the Demographic Forecast 2051. In the case of the balance of people moving into and out of the different TAs (net migration) alternatives to the SNZ estimates have been used.

In Chapters 4 and 5 some information is provided on migration trends and characteristics in recent years. In this chapter attention is focused firstly on the patterns of population change in the different TAs since 1981. This is followed by an examination of the total estimates of net migration (international as well as internal) for each TA. It is quite evident from this analysis that there are three quite distinctive trends with regard to population change, and each of these needs to be accommodated in the projections.

In Chapter 5 the most recent data on people staying in, or moving into or out of Bay of Plenty TAs, are examined. These data are all drawn from special tabulations produced by SNZ using information collected in the 2001 Census of Population and Dwellings.

4.1 Population change, 1981-2001

4.1.1 The usually resident population

The usually resident populations for the Bay of Plenty TAs at the time of the last five censuses are detailed in Table 4. The total population in the six TAs has increased by around 64,200 over the 20 years, from just over 178,400 in 1981 to 242,600 in 2001. This compares with an estimated increase of 64,400 over the 20 years between 2001 and 2021 in SNZ's "medium" variant 2005 sub-national projection series (see Table 2 for details). The percentage increases over the two 20 year periods in the aggregate population for the 6 TAs are 36 percent (1981-2001) and 26.5 percent (2001-2021). Population growth in several parts of the region has turned negative in recent years, and this contributes to the slower projected growth in the future (Table 5).

Table 4 Resident populations of the Bay of Plenty TAs, 1981-2001

	Census				
Territorial Authority	**1981**	**1986**	**1991**	**1996**	**2001**
Western BOP District	22,944	26,620	29,871	34,971	38,232
Tauranga City	53,040	59,314	66,737	77,775	90,906
Rotorua District	56,025	59,315	61,559	64,509	64,473
Whakatane District	30,528	31,254	32,093	33,125	32,814
Kawerau District	8,784	8,564	8,339	7,829	6,975
Opotiki District	7,107	7,916	8,667	9,375	9,201
BAY OF PLENTY TAs	178,428	192,983	207,266	227,584	242,601
Western Bay of Plenty	75,984	85,934	96,608	112,746	129,138
Eastern Bay of Plenty	46,419	47,734	49,099	50,329	48,990
Rotorua District	56,025	59,315	61,559	64,509	64,473

Table 5 Population change in the Bay of Plenty TAs, 1981-2001

Territorial Authority	**1981-1986**	**1986-1991**	**1991-1996**	**1996-2001**	**1981-2001**
Western BOP District	3,676	3,251	5,100	3,261	15,288
Tauranga City	6,274	7,423	11,038	13,131	37,866
Rotorua District	3,290	2,244	2,950	-36	8,448
Whakatane District	726	839	1,032	-311	2,286
Kawerau District	-220	-225	-510	-854	-1,809
Opotiki District	809	751	708	-174	2,094
BAY OF PLENTY TAs	14,555	14,283	20,318	15,017	64,173
Western Bay of Plenty	9,950	10,674	16,138	16,392	53,154
Eastern Bay of Plenty	1,315	1,365	1,230	-1,339	2,571
Rotorua District	3,290	2,244	2,950	-36	8,448

The patterns of population change in the Bay of Plenty over the 20 years fall into three categories:

(a) continuous growth (Western Bay of Plenty District, Tauranga City)

(b) growth over three of the last four intercensal periods (1981-1996) and then small declines between 1996 and 2001 (Rotorua, Whakatane and Opotiki Districts)

(c) declines in all of the intercensal periods since 1981, with a much sharper drop in numbers of usual residents during the 1990s, especially the late 1990s (Kawerau District).

These differences in patterns of population change need to be kept firmly in mind when assessing prospects for future population growth and decline.

4.1.2 Percentage changes in population

The percentage rates of population change between censuses are shown in Table 6. These reinforce the pattern evident in Table 5 of quite variable patterns of population change. Tauranga City stands out as the region's "growth pole", with progressively higher absolute growth in numbers between censuses (more than double the numerical growth between 1996 and 2001 compared with that between 1981 and 1986), as well as larger percentage increases at each census (Tables 5 and 6.). Western Bay of Plenty District has quite a variable pattern of increases (absolute and in percentage terms) over the 20 years, with the early 1990s standing out as a period of unusually high growth.

Table 6 Population change (%) in the Bay of Plenty TAs, 1981-2001

Territorial Authority	1981-1986	1986-1991	1991-1996	1996-2001	1981-2001
Western BOP District	16.02	12.21	17.07	9.32	66.6
Tauranga City	11.83	12.51	16.54	16.88	71.4
Rotorua District	5.87	3.78	4.79	-0.06	15.1
Whakatane District	2.38	2.68	3.22	-0.94	7.5
Kawerau District	-2.50	-2.63	-6.12	-10.91	-20.6
Opotiki District	11.38	9.49	8.17	-1.86	29.5
BAY OF PLENTY TAs	8.16	7.40	9.80	6.60	36.0
Western Bay of Plenty	13.09	12.42	16.70	14.54	70.0
Eastern Bay of Plenty	2.83	2.86	2.51	-2.66	5.5
Rotorua District	5.87	3.78	4.79	-0.06	15.1

The early 1990s were also the years when there were the largest numerical and percentage increases in Whakatane District's population, while for Rotorua and Opotiki Districts it was the early 1980s when numbers and percentages increased most rapidly (Tables 5 and 6). In the case of Kawerau District, both numerical and percentage decreases have been growing over time as the population base shrinks. However, when Kawerau's population is included in an aggregate for the eastern Bay of Plenty sub-region, its declines are masked by increases in the populations for Opotiki and Whakatane through until the late 1990s when all of these Districts experience an absolute decline in numbers.

The two sub-regions (western Bay of Plenty and eastern Bay of Plenty) thus have quite distinctive patterns of population change, as is widely recognized in the region, with Rotorua District having a pattern that is closer to that for the eastern Bay of Plenty than the western Bay of Plenty. This similarity needs to be borne in mind when preparing population projections.

4.2 Net migration, 1981-2001

Estimates of total net migration, covering international as well as internal movement, are prepared by SNZ after each census. These estimates are not used directly in population projections, but they do inform the total net migration profiles used in the sub-national projection series. The estimates discussed in this section were all provided by SNZ.

4.2.1 Total Net migration gains and losses

The estimated total net migration gains and losses for each TA over the four intercensal periods since 1981 are given in Table 7. For the western Bay of Plenty TAs there were persistent net gains through migration, and these contributed over 41,000 to the resident population of this sub-region during the 20 years. Three quarters of this net migration gain (31,200) was in Tauranga City with the other 25 percent in Western Bay of Plenty District (Table 7). In Tauranga City especially net migration gains increased sharply in the 1990s, and between 1996 and 2001 this TA had the largest estimated total net migration in New Zealand.

Table 7 Total net migration gains and losses, 1981-2001

Territorial Authority	1981-1986	1986-1991	1991-1996	1996-2001	1981-2001
Western BOP District	2,250	1,941	3,914	2,235	10,340
Tauranga City	5,279	5,667	9,244	11,005	31,195
Rotorua District	-131	-1,862	-1,033	-3,272	-6,298
Whakatane District	-1,247	-1,139	-967	-1,739	-5,092
Kawerau District	-921	-1,017	-1,275	-1,287	-4,500
Opotiki District	383	286	93	-545	217
BAY OF PLENTY TAs	5,613	3,876	9,976	6,397	25,862
Western Bay of Plenty	7,529	7,608	13,158	13,240	41,535
Eastern Bay of Plenty	-1,785	-1,870	-2,149	-3,571	-9,375
Rotorua District	-131	-1,862	-1,033	-3,272	-6,298

In the eastern Bay of Plenty only Opotiki District has had overall net migration gains since the early 1980s. These net gains fell through to the mid-1990s when they turned negative for the intercensal period 1996-2001 (Table 7). In the other two eastern Bay TAs, and in Rotorua District, net losses of people through international and internal migration have been found at all intercensal periods over the 20 years, with the loss from Rotorua District increasing significantly between 1996 and 2001. Between 1981 and 2001 these four TAs are estimated to have lost around 15,600 people through net migration.

Population projections for Bay of Plenty TAs are, thus, going to have to accommodate situations of persistent net migration gains (Western Bay of Plenty District, Tauranga City), persistent net migration losses (Rotorua, Kawerau and Whakatane Districts) and a recent shift to net losses (Opotiki District).

Before examining more closely the age-sex distributions in the estimated net migration gains and losses for the different TA, it can be noted that migration is obviously a major driver of population change in the Bay of Plenty. The population growth between censuses, shown in Table 5, is made up of two components: net migration and natural increase. In the case of the western Bay of Plenty TA net migration has consistently contributed at least 60 percent of the population increase recorded between censuses, rising to over 80 percent at times in Tauranga City (Table 8).

Table 8 Percentage of population change accounted for by net migration

Territorial Authority	1981-1986	1986-1991	1991-1996	1996-2001	1981-2001
Western BOP District	61.2	59.7	76.7	68.5	67.6
Tauranga City	84.1	76.3	83.7	83.8	82.4
Opotiki District	47.3	38.1	13.1	….	10.4
BAY OF PLENTY TAs	38.6	27.1	49.1	42.6	40.3

In the eastern Bay of Plenty only Opotiki has had positive net migration in most intercensal periods, and this has contributed much less to overall population growth than natural increase (only 10 percent between 1981 and 2001) (Table 8). For the region as a whole, around 40 percent of the population growth over the 20 years can be accounted for by net migration, and this is pretty well concentrated in the western Bay of Plenty sub-region.

4.2.2 Age-sex characteristics of net migration

The net migration age-sex profiles for the different TAs show some reasonably consistent patterns (Table 9). Firstly there were universal net migration losses amongst both males and females in the age group 15-24 years during the period 1981-2001. Significantly more of the region's males (-10,070) than females (-8,388) were "lost" through net migration gains amongst the 15-24 year olds (Table 9).

For all the other age groups at the regional level there were net migration gains, especially for females. Indeed, the overall net gain for women in the Bay of Plenty TAs was just under 16,000 compared with just under 10,000 men (Table 9). Sex ratios in favour of women were found in the age groups 0-14, 25-39, 40-59 and 80+. Only the 60-79 and 15-24 year age groups had more men consistently in the net gains than women (Table 9).

Table 9 Age-sex composition of net migration gains and losses, 1981-2001

	Age						
TA	**0-14**	**15-24**	**25-39**	**40-59**	**60-79**	**80+**	**Total**
Western BOP District							
Males	1,775	-1732	1,516	2,259	1,191	20	5,029
Females	1,751	-1977	2,440	2,209	733	155	5,311
Sex ratio (M/F)	1.01	0.88	0.62	1.02	1.62	0.13	0.95
Tauranga City							
Males	3,228	-648	3,905	3,649	3,986	270	14,390
Females	3,368	-322	4,936	4,546	3,870	406	16,804
Sex ratio (M/F)	0.96	2.01	0.79	0.80	1.03	0.67	0.86
Rotorua District							
Males	-824	-3151	7	-128	21	67	-4,008
Females	-564	-2039	273	-328	105	262	-2,291
Sex ratio (M/F)	1.46	1.55	0.03	0.39	0.20	0.26	1.75
Whakatane District							
Males	-126	-2,920	-59	-181	162	-16	-3,140
Females	37	-2,475	302	-12	199	-3	-1,952
Sex ratio (M/F)	….	1.18	-0.20	15.08	0.81	5.33	1.61
Kawerau District							
Males	-447	-979	-461	-520	-17	5	-2,419
Females	-392	-918	-310	-482	13	9	-2,080
Sex ratio	1.14	1.07	1.49	1.08	….	0.56	1.16
Opotiki District							
Males	111	-640	196	172	242	-15	66
Females	135	-635	284	239	103	24	150
Sex ratio (M/F)	0.82	1.01	0.69	0.72	2.35	….	0.44
Bay of Plenty TAs							
Males	3,717	10,070	5,104	5,251	5,585	331	9,918
Females	4,335	-8,366	7,925	6,172	5,023	853	15,942
Sex ratio (M/F)	0.86	1.20	0.64	0.85	1.11	0.39	0.62

The consistencies in broad age-sex characteristics for the total net migration profiles across the TAs for the period 1981-2001 conform reasonably well with the three groups of areas identified earlier in terms of patterns of population growth. These were the western Bay sub-region with its significant net gains; the Rotorua, Whakatane and Kawerau trio with their consistent net losses over most age groups, especially amongst the males; and Opotiki District with very small overall net gains for the 20 year period reflecting a shift in the last intercensal period to net losses for most age groups. These recent developments are examined more closely in the next chapter.

Chapter 5: Movers and stayers in the Bay of Plenty, 1996-2001

The net migration estimates that are used in sub-national population projections are the outcome of a complex interplay of movements into and out of each district, city or region. The movements that are captured in these estimates result from changes in usual residential address between two censuses – in this chapter these are the usual residential address in March 2001 and the usual residential address at the time of the previous census in March 1996. There are four basic types of movement that have to be taken into consideration in each TA: moves to an address in another TA in New Zealand, moves to an overseas address, moves into the TA from an address elsewhere in New Zealand, and moves into the TA from an overseas address.

The Census of Population and Dwellings collects information on three of these types of movement: migration within New Zealand into and out of TAs, and migration into TAs from overseas. One type of movement cannot be directly accounted for in the census, and that is the movements from TAs to overseas addresses. These have to be estimated, and they are included in the total net migration estimates discussed in Chapter 4.

In this chapter information on the age and sex characteristics of flows within New Zealand into and out of each TA in the Bay of Plenty (internal migration) and the flows into the TAs from other countries (overseas migration) is presented to complete the context for the population projections. The TAs in the Bay of Plenty have quite diverse total net migration estimates, and these reflect different mixes of in-migration and out-migration between the censuses.

Reference is made to four key components of the population of each TA in 2001: the "stayers", or the people whose usual addresses in March 1996 and March 2001 were within the boundaries of the TA; the "in-migrants (NZ)", those who moved into the TA from another part of New Zealand (including another TA in the Bay of Plenty); the "in-migrants (overseas)", the people who were living outside New Zealand in 1996 but who had a residential address in the TA in 2001; and the "out-migrants (NZ)", those who were living in the TA in 1996 but were resident elsewhere in New Zealand in 2001 (including in another TA in the Bay of Plenty).

Some summary information on the Maori and non-Maori populations in these four components is also provided. There are quite different mixes of Maori and non-Maori in the TA populations, and these mixes have an important impact on the projections as well. Two other components of the TA populations are also mentioned: the children aged 0-4 years who were not born in 1996, and thus could not be counted within the "stayer" or "mover" populations, and around 6 percent of the residents in the TAs who did not record their usual residence in 1996 ("not elsewhere included" or NEI). Most of the discussion focuses on the internal migrants – the "in-migrants (NZ)" and the "out-migrants (NZ)", and the net migration balance between these in and out flows.

5.1 The population components, 2001

5.1.1 The Maori and non-Maori populations

In 2001, the Maori population comprised a larger share of all of the Bay of Plenty TA populations (26.5 percent) than it did of New Zealand's total population (14.7 percent) (Table 10). Within the Bay of Plenty there was a sharp difference between the western and eastern sub-regions, with the western Bay of Plenty (15.9) having less that half the percentage Maori that was resident in the eastern Bay of Plenty (45.1). Rotorua District fell between the western and eastern sub-regions, with 33.5 percent of its population Maori in 2001 (Table 10).

Table 10 Maori and non-Maori populations, Bay of Plenty TAs, 2001

TA	Maori	%	Non-Maori	%	Total
Western BOP District	6402	16.7	30258	79.1	38232
Tauranga City	14112	15.5	73398	80.7	90906
Rotorua District	21609	33.5	39084	60.6	64473
Whakatane District	13200	40.2	18063	55.0	32814
Kawerau District	3912	56.1	2619	37.5	6975
Opotiki District	4992	54.3	3726	40.5	9201
BAY OF PLENTY TAs	64227	26.5	167148	68.9	242601
Western Bay of Plenty	20514	15.9	103656	80.3	129138
Eastern Bay of Plenty	22104	45.1	24408	49.8	48990
Rotorua District	21609	33.5	39084	60.6	64473

These differing shares of Maori and non-Maori in the population are important for two reasons. Firstly, as will be shown later in this section, there are differences in patterns of population movement between Maori and non-Maori. Secondly, their age-sex structures and fertility and mortality patterns differ, and this affects their population growth. We do not project the Maori and non-Maori populations separately in this report, but the projections for the total resident populations reflect the differing ethnic mixes of people within the TA populations.

5.1.2 Stayers and movers

Just over sixty percent of the 242,600 usual residents of the six TAs in the Bay of Plenty could be classed as "stayers" on the basis of their residence in 1996 and 2001 (Table 11). There was some variation across the TAs in the share of stayers, with Whakatane District having the highest proportion (65.9) and Western Bay of Plenty District and Tauranga City having the lowest share (58 percent).

Table 11 Mover/stayer groups in the resident population, 2001

TA	Stayers	In-migrants (NZ)	In-migrants (O'seas)	Not born	NEI	Total Resident
Population						
Western BOP District	22188	9825	1428	2616	2175	38232
Tauranga City	52692	22332	4440	6384	5058	90906
Rotorua District	42093	9396	2625	5412	4947	64473
Whakatane District	21624	5469	948	2748	2025	32814
Kawerau District	4491	1194	93	657	540	6975
Opotiki District	5913	1653	171	762	702	9201
BAY OF PLENTY TAs	149001	49869	9705	18579	15447	242601
Western Bay of Plenty	81042	25995	5868	9000	7233	129138
Eastern Bay of Plenty	33723	6621	1212	4167	3267	48990
Rotorua District	42093	9396	2625	5412	4947	64473
Percentages						
Western BOP District	58.0	25.7	3.7	6.8	5.7	100.0
Tauranga City	58.0	24.6	4.9	7.0	5.6	100.0
Rotorua District	65.3	14.6	4.1	8.4	7.7	100.0
Whakatane District	65.9	16.7	2.9	8.4	6.2	100.0
Kawerau District	64.4	17.1	1.3	9.4	7.7	100.0
Opotiki District	64.3	18.0	1.9	8.3	7.6	100.0
BAY OF PLENTY TAs	61.4	20.6	4.0	7.7	6.4	100.0
Western Bay of Plenty	62.8	20.1	4.5	7.0	5.6	100.0
Eastern Bay of Plenty	68.8	13.5	2.5	8.5	6.7	100.0
Rotorua District	65.3	14.6	4.1	8.4	7.7	100.0

The stayer populations for the two sub-regions, western Bay of Plenty and eastern Bay of Plenty, refer to the people who were usually resident within these larger areas (even though they may have moved between TAs in the sub-region) in 1996 and 2001. This explains why their populations and percentages are not the same as the sum of the individual TAs that make up the two sub-regions. The eastern Bay of Plenty had the highest percentage of stayers (68.8 percent) in 2001.

There was more variation between the percentages of "in-migrants (NZ)" than stayers in the six TAs (Table 11). Just under 50,000 people (20.6 percent of the total) had moved into Bay of Plenty TAs between 1996 and 2001, and 45 percent of these (22,332) had moved into Tauranga City. Western Bay of Plenty District and Rotorua District each attracted over 9,000 in-migrants from other parts of New Zealand, but the shares these migrants comprised of the District resident populations were quite different. Just over a quarter of Western Bay of Plenty District's population were in-migrants in 2001 (the largest share for a TA in the Bay of Plenty), while Rotorua had the lowest share with 14.6 percent of its residents having lived in another TA in 1996 (Table 11).

As far as overseas in-migrants are concerned, the situation is different again. Tauranga City had the largest number and share (4.9 percent of its residents in 2001), followed by Rotorua District (4.1 percent). Kawerau and Opotiki Districts had the lowest shares of overseas in-migrants, but higher shares of internal migrants than Whakatane and Rotorua Districts. The mix of stayers, in-migrants (NZ) and in-migrants (overseas) thus varied quite markedly between TAs in the Bay of Plenty.

The balance of the TA populations is made up of the other two groups shown in Table 11, the "not born" and the "not elsewhere included" (NEI). The largest shares of children are found in the Districts with the highest proportions of Maori: the eastern Bay of Plenty sub-region and Rotorua District. These areas also have the largest shares in the NEI category; Maori were more likely than non-Maori to leave out their residential address in 1996 when they completed the census forms in 2001.

The Maori and non-Maori mover-stayer groups that make up the TA resident populations in 2001 are summarized in Table 12. There were lower shares of stayers in the Maori (61.5 percent for the 6 TAs) than non-Maori (64.7 percent) populations in 2001. This was not the result of their resident populations comprising more migrants, however; rather it was because of much higher shares in the "not born" and the "NEI" categories than was the case for non-Maori (Table 12).

Table 12 Mover/stayer groups in the Maori and non-Maori resident populations, 2001

TA	Stayers	In-migrants (NZ)	In-migrants (Overseas)	Not born	NEI	Total Resident
Maori Population						
Western BOP District	3549	1656	84	804	309	6402
Tauranga City	7599	3624	300	1929	660	14112
Rotorua District	14022	3495	378	2799	915	21609
Whakatane District	8586	2358	162	1587	507	13200
Kawerau District	2601	642	36	483	150	3912
Opotiki District	3159	972	66	552	243	4992
BAY OF PLENTY TAs	39516	12747	1026	8154	2784	64227
Western Bay of Plenty	12126	4302	384	2733	969	20514
Eastern Bay of Plenty	15231	3087	264	2622	900	22104
Rotorua District	14022	3495	378	2799	915	21609
Percentages						
Western BOP District	55.4	25.9	1.3	12.6	4.8	100.0
Tauranga City	53.8	25.7	2.1	13.7	4.7	100.0
Rotorua District	64.9	16.2	1.7	13.0	4.2	100.0
Whakatane District	65.0	17.9	1.2	12.0	3.8	100.0
Kawerau District	66.5	16.4	0.9	12.3	3.8	100.0
Opotiki District	63.3	19.5	1.3	11.1	4.9	100.0
BAY OF PLENTY TAs	61.5	19.8	1.6	12.7	4.3	100.0
Western Bay of Plenty	59.1	21.0	1.9	13.3	4.7	100.0
Eastern Bay of Plenty	68.9	14.0	1.2	11.9	4.1	100.0
Rotorua District	64.9	16.2	1.7	13.0	4.2	100.0

TA	Stayers	In-migrants (NZ)	In-migrants (Overseas)	Not born	NEI	Total Resident
Non-Maori Population						
Western BOP District	18456	8106	1320	1701	675	30258
Tauranga City	44691	18579	4062	4233	1833	73398
Rotorua District	27735	5841	2184	2400	924	39084
Whakatane District	12783	3060	765	1050	405	18063
Kawerau District	1836	534	57	126	66	2619
Opotiki District	2682	672	102	156	114	3726
BAY OF PLENTY TAs	108183	36792	8490	9666	4017	167148
Western Bay of Plenty	68298	21534	5382	5934	2508	103656
Eastern Bay of Plenty	18090	3477	924	1332	585	24408
Rotorua District	27735	5841	2184	2400	924	39084
Percentages						
Western BOP District	61.0	26.8	4.4	5.6	2.2	100.0
Tauranga City	60.9	25.3	5.5	5.8	2.5	100.0
Rotorua District	71.0	14.9	5.6	6.1	2.4	100.0
Whakatane District	70.8	16.9	4.2	5.8	2.2	100.0
Kawerau District	70.1	20.4	2.2	4.8	2.5	100.0
Opotiki District	72.0	18.0	2.7	4.2	3.1	100.0
BAY OF PLENTY TAs	64.7	22.0	5.1	5.8	2.4	100.0
Western Bay of Plenty	65.9	20.8	5.2	5.7	2.4	100.0
Eastern Bay of Plenty	74.1	14.2	3.8	5.5	2.4	100.0
Rotorua District	71.0	14.9	5.6	6.1	2.4	100.0

In contrast, the non-Maori TA populations comprised larger shares of in-migrants from overseas than Maori, and there was a variable pattern of shares of in-migrants from other parts of New Zealand amongst Maori and non-Maori across the TAs in 2001. The largest share of in-migrants (NZ) was found in Western BOP District's (26.8 percent) non–Maori residents, with the lowest percentage share being found in Rotorua District (14.9) amongst the non–Maori (Table 12). Rotorua District also had the lowest shares of Maori in-migrants from other parts of New Zealand (16.2 percent), just behind Kawerau District (16.4 percent) (Table 12). However, just to keep the picture complex, Rotorua District had the highest share of non-Maori overseas in-migrants of any TA in the Bay of Plenty; an indication of the importance of its tourism industry which attracts immigrant entrepreneurs and service industry employees.

5.2 Internal migration

The other component of the populations of each of the TAs that can be identified in the 2001 census is the people who left to live in other parts of New Zealand after the 1996 census. These people had addresses in one of the 6 TAs in the Bay of Plenty in 1996, but had moved to another TA (in the Bay of Plenty or in other parts of New Zealand) between 1996 and 2001. These "out-migrants (NZ)" are shown alongside the "in-migrants (NZ)" in Table 13.

Table 13 In-out- and net migration, Bay of Plenty TAs, 1996-2001

TA	In-migrants (NZ)	Out-migrants (NZ)	Net migrants (NZ)	Gross Migration	MEI (%)
Western BOP District	9825	7239	2586	17064	15.2
Tauranga City	22332	12651	9681	34983	27.7
Rotorua District	9396	11106	-1710	20502	-8.3
Whakatane District	5469	5751	-282	11220	-2.5
Kawerau District	1194	2019	-825	3213	-25.7
Opotiki District	1653	1830	-177	3483	-5.1
BAY OF PLENTY TAs	49869	40596	9273	90465	10.3
Western Bay of Plenty	25995	13728	12267	39723	30.9
Eastern Bay of Plenty	6621	7905	-1284	14526	-8.8
Rotorua District	9396	11106	-1710	20502	-8.3

Also shown in this table are the net migrants in each TA (the balance between the in- and out-migrants (NZ)), gross migration (the sum of the in- and out-migrants), and the "Migration Effectiveness Index" (MEI), which gives an indication of the extent to which migration is resulting in a redistribution of population away from, or into particular TA.

The larger the MEI (which is simply the ratio of net migrants to gross migrants, expressed as a percentage), the greater the effectiveness of migration in redistributing people. Thus, in the case of Tauranga City, with an MEI of 27.7 percent, internal migration was much more "efficient" in producing a shift in the redistribution of people into this TA than it was in Whakatane (MEI of –2.5 percent) where the number of in-migrants was only slightly smaller than the number of out-migrants (Table 13). In Tauranga City's case, the high MEI was due to in-migration, while in the case of Kawerau, with a similar MEI, it was due to migration out of the District (-25.7 percent) (Table 13).

The only TAs with net migration gains were the two in the western Bay of Plenty. Between them they accounted for a net migration gain of 12,267 with the bulk of this (9,681) in Tauranga City. The eastern Bay of Plenty TAs and Rotorua District all had net migration losses, which were very small in the cases of Whakatane District and Opotiki District. Indeed, in Whakatane District, the ratio of net migrants to gross migration produced an MEI of only –2.5, by far the lowest of the MEI shown in Table 13.

5.2.1 Maori and non-Maori internal migration, 1996-2001

The Maori and non-Maori in-, out-, net and gross migration for the Bay of Plenty TAs between 1996 and 2001 are shown in Table 14. It can be seen clearly here that non-Maori migration is much more efficient than Maori migration in achieving some redistribution of population into (western sub-region) or out of (eastern sub-region and Rotorua District) different parts of the Bay of Plenty. Maori migration into and out of the six TAs is much more balanced in most parts of the region. Tauranga City (1,191 net gain) and Kawerau District (-402 net loss) are the two exceptions amongst the Maori population (Table 14).

Table 14 In-out- and net migration, Maori and non-Maori residents, 1996-2001

TA	In migrants (NZ)	Out migrants (NZ)	Net migrants (NZ)	Gross Migration	MEI (%)
Maori					
Western BOP District	1656	1362	294	3018	9.7
Tauranga City	3624	2433	1191	6057	19.7
Rotorua District	3495	3687	-192	7182	-2.7
Whakatane District	2358	2316	42	4674	0.9
Kawerau District	642	1044	-402	1686	-23.8
Opotiki District	972	1017	-45	1989	-2.3
BAY OF PLENTY TAs	12747	11859	888	24606	3.6
Western Bay of Plenty	4302	2817	1485	7119	20.9
Eastern Bay of Plenty	3087	3492	-405	6579	-6.2
Rotorua District	3495	3687	-192	7182	-2.7
Non-Maori					
Western BOP District	8106	5823	2283	13929	16.4
Tauranga City	18579	10143	8436	28722	29.4
Rotorua District	5841	7323	-1482	13164	-11.3
Whakatane District	3060	3390	-330	6450	-5.1
Kawerau District	534	927	-393	1461	-26.9
Opotiki District	672	825	-153	1497	-10.2
BAY OF PLENTY TAs	36792	28431	8361	65223	12.8
Western Bay of Plenty	21534	10815	10719	32349	33.1
Eastern Bay of Plenty	3477	4371	-894	7848	-11.4
Rotorua District	5841	7323	-1482	13164	-11.3

5.3 Age-sex composition of mover/stayer groups

5.3.1 Age structure

There is considerable variation in the age composition of the stayers and the three major mover groups in the Bay of Plenty TAs, and these variations reflect, in part, the differing mixes of Maori and non-Maori in the TA populations (Table 15). The "youngest" stayer and mover populations are in the eastern Bay of Plenty and Rotorua District, while TAs in the western Bay of Plenty sub-region have "older" stayer and migrant profiles.

Table 15 Age composition of mover/stayer groups, Bay of Plenty TAs, 2001

	Age						
Migrant status/TA	**5-14**	**15-24**	**25-39**	**40-59**	**60-79**	**80+**	**Total**
Stayers							
Western BOP District	17.7	10.1	14.3	32.0	22.2	3.6	22191
Tauranga City	15.0	10.7	17.2	28.7	22.5	5.9	52695
Rotorua District	19.0	13.3	20.2	29.3	15.1	2.9	42090
Whakatane District	19.8	12.4	18.1	29.6	17.0	3.1	21627
Kawerau District	23.6	13.2	20.4	27.3	14.4	1.1	4491
Opotiki District	21.8	11.1	17.5	28.3	18.0	3.4	5910
BAY OF PLENTY TAs	17.8	11.7	17.9	29.5	19.1	4.1	149004
Western Bay of Plenty	16.0	10.9	17.0	29.5	21.6	5.0	81048
Eastern Bay of Plenty	20.9	12.5	18.7	28.8	16.4	2.8	33711
Rotorua District	19.0	13.3	20.2	29.3	15.1	2.9	42090
In-migrants (NZ)							
Western BOP District	20.6	10.8	25.3	28.4	13.1	1.9	9819
Tauranga City	17.3	15.2	26.9	23.4	14.9	2.3	22338
Rotorua District	19.5	19.4	31.7	20.4	7.2	1.7	9384
Whakatane District	23.0	16.3	30.0	22.3	7.3	1.1	5454
Kawerau District	25.3	14.3	27.5	20.8	11.0	1.3	1200
Opotiki District	22.2	15.0	24.2	25.7	12.1	0.7	1659
BAY OF PLENTY TAs	19.3	15.2	27.8	23.7	12.1	1.9	49854
Western Bay of Plenty	18.3	13.5	26.7	24.4	14.8	2.2	25995
Eastern Bay of Plenty	22.8	15.5	29.2	22.4	9.0	1.1	6630
Rotorua District	19.5	19.4	31.7	20.4	7.2	1.7	9384
Out-migrants (NZ)							
Western BOP District	15.8	25.3	21.9	21.3	13.5	2.2	7242
Tauranga City	16.9	22.5	27.7	22.0	8.7	2.3	12663
Rotorua District	18.8	23.5	28.8	20.5	7.2	1.2	11175
Whakatane District	20.7	26.7	25.9	19.1	6.4	1.3	5742
Kawerau District	22.8	25.9	24.0	21.2	5.1	1.0	2013
Opotiki District	23.8	28.5	21.2	18.4	7.1	1.0	1812
BAY OF PLENTY TAs	18.4	24.3	26.2	20.9	8.5	1.7	40647
Western Bay of Plenty	15.8	27.2	25.8	19.4	9.6	2.3	13743
Eastern Bay of Plenty	21.1	29.1	24.4	18.4	5.9	1.2	7884
Rotorua District	18.8	23.5	28.8	20.5	7.2	1.2	11175
In-migrants (Overseas)							
Western BOP District	20.0	8.8	37.8	24.4	8.2	0.8	1428
Tauranga City	16.5	13.0	40.3	23.3	6.2	0.7	4443
Rotorua District	17.9	17.8	37.3	20.7	5.7	0.6	2619
Whakatane District	19.0	10.8	38.6	25.0	6.0	0.6	948
Kawerau District	16.1	9.7	41.9	25.8	6.5	0.0	93

Opotiki District	13.8	13.8	32.8	27.6	10.3	1.7	174
BAY OF PLENTY TAs	17.6	13.4	38.9	23.0	6.4	0.7	9705
Western Bay of Plenty	17.3	12.0	39.7	23.6	6.7	0.8	5871
Eastern Bay of Plenty	18.0	11.1	38.0	25.4	6.7	0.7	1215
Rotorua District	17.9	17.8	37.3	20.7	5.7	0.6	2619

These varying age compositions mean that it is necessary to derive different net migration profiles for use in the projections of the TA populations. It is not appropriate to use a single age distribution for net migrant gains and losses in the projections. The age composition of the net migration gains and losses in each TA that result from internal migration (the balance of in-migrants (NZ) and out-migrants (NZ)) is shown in Table 16.

Table 16 Net migration gains and losses, Bay of Plenty TAs, 1996-2001

TA	5-14	15-24	25-39	40-59	60-79	80+	Total
Western BOP District	876	-777	897	1239	315	27	2577
Tauranga City	1728	555	2508	2430	2226	228	9675
Rotorua District	-276	-801	-237	-381	-123	27	-1791
Whakatane District	66	-645	150	123	30	-12	-288
Kawerau District	-156	-351	-153	-177	30	-6	-813
Opotiki District	-63	-267	18	93	72	-6	-153
BAY OF PLENTY TAs	2175	-2286	3183	3327	2550	258	9207
Western Bay of Plenty	2604	-222	3405	3669	2541	255	12252
Eastern Bay of Plenty	-153	-1263	15	39	132	-24	-1254
Rotorua District	-276	-801	-237	-381	-123	27	-1791

While there is some overall consistency in the fact that the western Bay of Plenty TAs had net migration gains, and the eastern Bay of Plenty and Rotorua District had net losses through internal migration between 1996 and 2001, the distribution of net gains and losses across the age groups is quite variable. These differences need to be taken into consideration when deriving the net migration profiles for the population projections.

5.3.2 Sex Ratios

The gender balance in the migration flows into and out of the Bay of Plenty TAs mirror a trend that has been commented on quite extensively in the media in recent months: the feminisation of New Zealand's working age population (Table 17). The sex ratio, conventionally defined, is the ratio of men to women in the population. A ratio of 1.0 means that there is one male per woman in the population. A ratio of above 1.0 means there are more men than women; while a ratio under 1.0 means that women outnumber men in the particular group.

Table 17 Sex ratios (males per female) in migrant groups, Bay of Plenty TAs, 1996-2001

Migrant status/TA	5-14	15-24	25-39	40-59	60-79	80+	Total
In-migrants (NZ)							
Western BOP District	1.02	1.01	0.84	0.96	1.09	0.55	0.95
Tauranga City	1.02	0.91	0.83	0.86	0.92	0.55	0.89
Rotorua District	1.10	0.91	0.90	0.96	1.04	0.47	0.95
Whakatane District	1.11	0.83	0.84	1.06	0.91	0.82	0.95
Kawerau District	0.94	0.97	0.72	0.98	1.00	4.00	0.90
Opotiki District	1.28	0.89	0.89	1.00	1.09	3.00	1.03
BAY OF PLENTY TAs	1.05	0.91	0.85	0.93	0.97	0.58	0.92
Western Bay of Plenty	1.00	0.91	0.82	0.89	0.95	0.53	0.89
Eastern Bay of Plenty	1.10	0.85	0.82	1.00	0.98	1.18	0.94
Rotorua District	1.10	0.91	0.90	0.96	1.04	0.47	0.95
Out-migrants (NZ)							
Western BOP District	0.92	0.85	0.87	0.89	0.97	0.66	0.88
Tauranga City	1.06	0.85	0.85	0.94	0.93	0.56	0.90
Rotorua District	1.07	0.87	0.89	0.88	0.89	0.38	0.91
Whakatane District	1.11	0.87	0.80	1.03	0.82	0.41	0.91
Kawerau District	1.04	0.89	1.01	0.95	1.27	0.75	0.98
Opotiki District	1.25	0.85	0.75	1.09	1.05	1.00	0.97
BAY OF PLENTY TAs	1.06	0.86	0.86	0.93	0.93	0.54	0.91
Western Bay of Plenty	0.96	0.81	0.85	0.92	0.88	0.57	0.86
Eastern Bay of Plenty	1.11	0.87	0.82	0.98	0.93	0.45	0.92
Rotorua District	1.07	0.87	0.89	0.88	0.89	0.38	0.91
Net migrants (NZ)							
Western BOP District	1.18	0.66	0.79	1.05	1.56	0.13	1.17
Tauranga City	0.97	1.26	0.80	0.78	0.92	0.55	0.87
Rotorua District	0.92	0.79	0.76	0.55	0.37	1.25	0.71
Whakatane District	1.20	0.94	1.50	1.41	4.00	-0.33	0.41
Kawerau District	1.26	0.86	2.19	0.90	0.43	-0.33	1.10
Opotiki District	1.10	0.82	-4.00	0.72	1.18	0.00	0.50
BAY OF PLENTY TAs	1.04	0.71	0.80	0.92	1.03	0.72	0.99
Western Bay of Plenty	1.04	0.00	0.80	0.87	0.98	0.49	0.92
Eastern Bay of Plenty	1.22	0.89	1.50	2.25	1.20	-0.27	0.81
Rotorua District	0.92	0.79	0.76	0.55	0.37	1.25	0.71

In the younger age groups there is nearly always a higher number of boys than girls in the population because there is a higher probability of a male birth than a female one. The age-sex profiles for the in-migrants (NZ), out-migrants (NZ) and the net migrants (NZ) all show a tendency for there to be more males than females in the age group 5-14. The pattern begins to change in the age group 15-24 years where sex ratios below 1.0 become common, indicating that there are more young women in the migrant flows than young men.

This pattern continues through the age groups 25-39 and 40-59 years except for some isolated cases, mainly in the net migrant sex ratios where males out-number females in the gains/losses. It is only in the older age group, 60-79 years that sex ratios of 1.0 or higher are found in more than half of the TAs for in-migrant flows. Kawerau District and Opotiki District have more situations where sex ratios for particular age groups show a surplus of men over women in the migrant flows, reflecting the nature of the job markets in these TAs. For the TAs with main urban areas – Rotorua and Tauranga –sex ratios rarely exceed 1.0 and in some age groups there are significantly more women than men in the flows.

The gender patterns reflected in the sex ratios are pretty consistent across the in-migrant and out-migrant flows in each TA, except in the older age groups where there is more variability related especially to retirement migration and the fact that there are more women in the older population because of the higher incidence of deaths amongst males at all ages from birth. This greater consistency in sex ratios means that the gender balance in the net migration profiles for the projections is not something that has to be adjusted as much for each TA.

5.4 Age profiles for the major migration flows

The final dimension of migration into and out of the Bay of Plenty TAs between 1996 and 2001 that is analysed in this chapter is the age profiles for four of the major flows. These are the flows into and out of: 1) other TAs in the Bay of Plenty (the intra-regional migration), 2) the Waikato region, 3) the Auckland region, and 4) the rest of the North Island. There is a small flow to and from the South Island but this is not examined separately here – it does not have a major impact on the age structure of the overall in, out and net migration flows. The reason for this disaggregated analysis of the migration flows is to provide another illustration of the variability between migration streams that combine to make up the net migration profiles that are used in population projections.

5.4.1 The migrant flows into Bay of Plenty TAs

The age compositions of the four main flows of migrants into Bay of Plenty TAs are summed up in Table 18. The largest of the flows was the intra-regional migration of people between TAs in the Bay of Plenty. A total of 13,893 people were involved in these movements, with the two western Bay of Plenty TAs being the destinations for just over 9,000 of the movers. However, most of the movement into the western Bay TAs involved an exchange of population between Western Bay of Plenty District and Tauranga City. Just under 3,000 people moved into the western Bay of Plenty from Rotorua District and the eastern Bay of Plenty (Table 18). These were older people, on average, than those who moved from the western Bay of Plenty into Rotorua District and the eastern Bay of Plenty (Table 18).

Table 18 The age composition of migrant flows into Bay of Plenty TAs, 1996-2001

Migrant source/TA	5-14	15-24	25-39	40-59	60-79	80+	Total
Intra-regional							
Western BOP District	21.5	11.3	26.8	29.1	9.4	2.0	4125
Tauranga City	15.8	18.8	23.8	24.5	14.9	2.2	4950
Rotorua District	21.4	23.5	26.4	19.4	7.9	1.4	1713
Whakatane District	24.8	16.5	28.3	22.4	7.0	0.9	1980
Kawerau District	25.0	14.4	27.2	20.0	11.7	1.7	540
Opotiki District	22.1	13.8	24.6	26.2	12.3	1.0	585
BAY OF PLENTY TAs	20.1	16.5	25.8	24.9	11.0	1.8	13893
Western Bay of Plenty	18.8	15.7	25.1	25.6	12.6	2.2	2913
Eastern Bay of Plenty	23.8	14.6	29.5	21.1	9.7	1.3	1422
Rotorua District	21.4	23.5	26.4	19.4	7.9	1.4	1713
Waikato							
Western BOP District	19.0	11.8	23.7	27.9	16.3	1.4	1863
Tauranga City	16.9	17.5	25.5	23.3	14.7	2.0	5169
Rotorua District	20.9	19.0	30.9	20.5	7.6	1.1	4569
Whakatane District	23.2	14.4	33.3	21.1	7.0	1.1	855
Kawerau District	20.4	14.3	26.5	18.4	16.3	4.1	147
Opotiki District	20.0	17.5	26.3	22.5	13.8	0.0	240
BAY OF PLENTY TAs	19.2	17.0	27.7	22.7	11.9	1.5	12843
Western Bay of Plenty	17.5	16.0	25.0	24.5	15.1	1.9	7032
Eastern Bay of Plenty	22.2	15.0	31.2	21.0	9.4	1.2	1242
Rotorua District	20.9	19.0	30.9	20.5	7.6	1.1	4569
Auckland							
Western BOP District	18.9	6.2	23.5	28.0	20.9	2.5	1683
Tauranga City	16.2	9.1	29.0	20.8	21.7	3.1	5097
Rotorua District	19.5	12.4	33.3	22.7	10.4	1.7	2079
Whakatane District	21.7	12.8	32.7	22.8	8.2	1.8	843
Kawerau District	31.0	9.9	26.8	22.5	9.9	0.0	213
Opotiki District	23.0	13.0	23.0	28.0	13.0	0.0	300
BAY OF PLENTY TAs	18.3	9.8	29.1	22.8	17.6	2.5	10215
Western Bay of Plenty	16.9	8.4	27.7	22.6	21.5	3.0	6780
Eastern Bay of Plenty	23.5	12.4	29.6	23.9	9.5	1.1	1356
Rotorua District	19.5	12.4	33.3	22.7	10.4	1.7	2079
Other North Island							
Western BOP District	21.5	11.3	25.1	27.9	12.3	1.9	1755
Tauranga City	20.0	15.3	27.0	25.1	10.7	2.0	5841
Rotorua District	19.2	21.2	30.3	20.6	6.9	1.8	2712
Whakatane District	22.2	17.7	28.5	22.8	7.8	1.0	1461
Kawerau District	25.3	15.7	30.1	21.7	7.2	0.0	249
Opotiki District	24.2	16.1	22.1	25.5	10.7	1.3	447

Migrant source/TA	5-14	15-24	25-39	40-59	60-79	80+	Total
BAY OF PLENTY TAs	20.6	16.3	27.5	24.2	9.7	1.8	12465
Western Bay of Plenty	20.3	14.3	26.5	25.7	11.1	2.0	7596
Eastern Bay of Plenty	22.9	17.1	27.4	23.2	8.3	1.0	2157
Rotorua District	19.2	21.2	30.3	20.6	6.9	1.8	2712

Migrants moving into the Bay of Plenty from the Waikato region (12,843), and from Auckland (10,215), also tended to have higher shares in the older age groups, especially the 60-79 and 80+ age groups, than the intra-regional migrants. This was not just in the western Bay of Plenty TAs, but also in Opotiki District and Rotorua District. The in-migrants from Auckland were less well represented in the age group 15-24 years than for any of the other inwards flows. The Waikato region and other parts of the North Island provided higher shares of immigrants in the age group that spans the final years of secondary education, tertiary training, and entry into the labour force.

The eastern Bay of Plenty TAs consistently had the largest shares of in-migrants in the youngest age group – 5-14 years. This reflects, in part, the importance of Maori migration into this part of the Bay of Plenty, both return migration as well as some new residents seeking work in Kawerau, Whakatane and Opotiki Districts (Table 18). The western Bay of Plenty TAs, by contrast, consistently had the highest shares of older migrants, with just over a fifth of the immigrant flows into Western Bay of Plenty District and Tauranga City aged between 60 and 79 years in 2001.

5.4.2 The migrant flows out of Bay of Plenty TAs

The age compositions of the flows of migrants out of the Bay of Plenty TAs are summarized in Table 19. The 13,893 out-migrants to other TAs in the region are the same people who were the intra-regional in-migrants in Table 18. Across the TAs, the age distributions of the in-migrants differed from those for out-migrant flows, even though the total number of people involved in these population exchanges within the region was the same. For example, in the case of Opotiki District, which had 585 in-migrants from other TAs in the Bay, and 771 out-migrants to other parts of the region, the out-migrants were "younger" (48.6 percent aged 5-24) than the in-migrants (33.9 percent). Intra-regional migration thus has a differential effect on the age composition of the TA populations.

Table 19 The age composition of migrant flows out of the Bay of Plenty TAs

Migrant destination/TA	5-14	15-24	25-39	40-59	60-79	80+	Total
Intra-regional							
Western BOP District	15.7	19.0	23.1	24.1	15.9	2.2	3453
Tauranga City	21.1	12.0	28.0	28.1	8.8	2.1	4077
Rotorua District	20.5	13.8	27.6	24.7	12.0	1.3	2499
Whakatane District	21.5	19.3	26.3	21.8	9.2	1.8	2019
Kawerau District	22.6	20.7	25.1	24.0	6.4	1.1	1074
Opotiki District	24.9	23.7	20.2	20.6	9.3	1.2	771
BAY OF PLENTY TAs	20.1	16.5	25.8	24.9	11.0	1.8	13893
Western Bay of Plenty	21.1	14.9	28.5	22.6	10.7	2.2	1368
Eastern Bay of Plenty	20.8	23.7	24.1	20.8	8.8	1.9	2181
Rotorua District	20.5	13.8	27.6	24.7	12.0	1.3	2499

Migrant destination/TA	5-14	15-24	25-39	40-59	60-79	80+	Total
Waikato							
Western BOP District	16.4	26.6	22.2	20.1	12.4	2.3	1431
Tauranga City	14.9	27.4	26.7	18.0	9.9	3.1	2496
Rotorua District	18.6	26.6	29.6	18.0	5.7	1.5	2463
Whakatane District	20.4	30.3	28.0	15.6	5.4	0.3	1059
Kawerau District	22.4	34.2	22.4	18.4	2.6	0.0	228
Opotiki District	19.8	32.6	20.9	19.8	5.8	1.2	258
BAY OF PLENTY TAs	17.4	27.8	26.7	18.1	8.1	1.9	7935
Western Bay of Plenty	15.4	27.1	25.1	18.8	10.8	2.8	3927
Eastern Bay of Plenty	20.6	31.3	26.0	16.7	5.0	0.4	1545
Rotorua District	18.6	26.6	29.6	18.0	5.7	1.5	2463
Auckland							
Western BOP District	14.8	38.4	21.0	15.4	7.9	2.6	915
Tauranga City	13.1	29.1	30.7	19.5	5.6	1.9	2658
Rotorua District	17.4	25.7	31.2	19.8	4.8	1.1	2442
Whakatane District	19.3	32.0	24.3	19.9	2.8	1.7	1086
Kawerau District	21.6	33.3	24.3	15.3	4.5	0.9	333
Opotiki District	20.8	36.5	21.9	15.6	5.2	0.0	288
BAY OF PLENTY TAs	16.2	30.0	28.2	18.8	5.2	1.6	7722
Western Bay of Plenty	13.5	31.5	28.2	18.5	6.2	2.1	3573
Eastern Bay of Plenty	20.0	33.0	23.9	18.3	3.5	1.2	1707
Rotorua District	17.4	25.7	31.2	19.8	4.8	1.1	2442
Other North Island							
Western BOP District	17.0	27.8	19.9	21.1	12.3	1.9	951
Tauranga City	16.8	23.9	26.8	19.8	10.4	2.3	2337
Rotorua District	20.6	24.4	28.2	18.5	7.4	0.9	2595
Whakatane District	23.0	26.8	26.6	17.1	5.4	1.1	1107
Kawerau District	27.9	27.9	21.2	19.2	2.9	1.0	312
Opotiki District	26.1	29.9	20.9	17.2	4.5	1.5	402
BAY OF PLENTY TAs	19.9	25.4	25.9	19.0	8.3	1.5	7704
Western Bay of Plenty	16.9	25.0	24.8	20.2	10.9	2.2	3288
Eastern Bay of Plenty	24.5	27.7	24.4	17.5	4.8	1.2	1821
Rotorua District	17.4	25.7	31.2	19.8	4.8	1.1	2442

The flows of migrants out to the Waikato, Auckland and other parts of the North Island were more heavily concentrated in the age group 15-24 years than was the case with the in-flows from these areas (Tables 18 and 19). This is hardly surprising: universities in Hamilton, Auckland, Palmerston North and Wellington all attracted students from the Bay of Plenty, as well as these cities being destinations for young adults seeking work. There were correspondingly smaller shares of out-migrants aged 60 and over to areas outside the Bay of Plenty than there were in-migrants.

5.4.3 Age composition of the net migration gains and losses

The balance between the in-flows and the out-flows is the net migration gain or loss, and this is summarized, by major age group for the Bay of Plenty TAs, in Table 20. It is in this table that the major variations in the impact of migration on the TA populations become most obvious and evident.

Table 20 The age composition of the net migration gains and losses, 1996-2001

Migrant flow/TA	5-14	15-24	25-39	40-59	60-79	80+	Total
Intra-regional							
Western BOP District	342	-189	306	369	-162	6	672
Tauranga City	-81	441	36	69	381	27	873
Rotorua District	-147	57	-237	-285	-165	-9	-786
Whakatane District	57	-63	30	3	-48	-18	-39
Kawerau District	-108	-144	-123	-150	-6	-3	-534
Opotiki District	-63	-102	-12	-6	0	-3	-186
BAY OF PLENTY TAs	0	0	0	0	0	0	0
Western Bay of Plenty	261	252	342	438	219	33	1545
Eastern Bay of Plenty	-114	-309	-105	-153	-54	-24	-759
Rotorua District	-147	57	-237	-285	-165	-9	-786
Waikato							
Western BOP District	120	-162	123	231	126	-6	432
Tauranga City	504	222	654	753	513	27	2673
Rotorua District	498	216	681	492	204	15	2106
Whakatane District	-18	-198	-12	15	3	6	-204
Kawerau District	-21	-57	-12	-15	18	6	-81
Opotiki District	-3	-42	9	3	18	-3	-18
BAY OF PLENTY TAs	1080	-21	1443	1479	882	45	4908
Western Bay of Plenty	624	60	777	984	639	21	3105
Eastern Bay of Plenty	-42	-297	-15	3	39	9	-303
Rotorua District	498	216	681	492	204	15	2106
Auckland							
Western BOP District	183	-246	204	330	279	18	768
Tauranga City	480	-309	663	543	954	108	2439
Rotorua District	-21	-369	-69	-12	99	9	-363
Whakatane District	-27	-240	12	-24	39	-3	-243
Kawerau District	-6	-90	-24	-3	6	-3	-120
Opotiki District	9	-66	6	39	24	0	12
BAY OF PLENTY TAs	618	-1320	792	873	1401	129	2493
Western Bay of Plenty	663	-555	867	873	1233	126	3207
Eastern Bay of Plenty	-24	-396	-6	12	69	-6	-351
Rotorua District	-21	-369	-69	-12	99	9	-363

Other North Island							
Western BOP District	216	-66	252	288	99	15	804
Tauranga City	774	333	948	1002	384	63	3504
Rotorua District	-12	-57	90	78	-6	24	117
Whakatane District	69	-39	123	144	54	3	354
Kawerau District	-24	-48	9	-6	9	-3	-63
Opotiki District	3	-48	15	45	30	0	45
BAY OF PLENTY TAs	1026	75	1437	1551	570	102	4761
Western Bay of Plenty	990	267	1200	1290	483	78	4308
Eastern Bay of Plenty	48	-135	147	183	93	0	336
Rotorua District	-21	-369	-69	-12	99	9	-363

There was very little consistency in patterns of net gains and losses either by major flow (intra-regional, Waikato, Auckland, other North Island) or by age group. Tauranga City and Western Bay of Plenty District were the big gainers from intra-regional migration, while Rotorua District was the big loser. On the other hand, Rotorua District and Tauranga City were the big gainers from migration exchanges with the Waikato, while Tauranga City clearly dominated as far as net migration gains from Auckland and other parts of the North Island were concerned (Table 20).

In the case of most of the flows, the western Bay of Plenty sub-region had net gains in all age groups except the 15-24 year olds in the population exchanges with Auckland. In this case there was a net loss of 555 (Table 20). In the eastern Bay of Plenty sub-region there was much less consistency in the pattern of net gains and losses by age. In general there were net losses in the younger age groups and smaller net gains at older ages. A similar situation existed in Rotorua District except for the exchanges with the Waikato region where Rotorua gained people in all of the age groups (Table 20).

These variable patterns of net migration gains and losses by age for the major flows illustrate the complexity of the impact of internal migration on populations at the TA level in the Bay of Plenty. This variability is very difficult to capture in the sorts of migration assumptions that are used in population projections where only one net migration age-sex profile is used to capture the contribution which migration makes to population change in any five year period.

In the next chapter the migration assumptions that are used in the February 2005 Statistics New Zealand sub-national projections are examined. When assessing these it is important to appreciate that they are the sum of many different internal migration flows, as well as international migration to and from each of the TAs. They are a composite measure for each TA population of a very complex and dynamic mobility system.

It is hardly surprising, therefore, that the migration assumptions used in sub-national projections tend to be held constant for much of the projection period – it is difficult to find clear, consistent trends in the net gains and losses by age, such as those that are apparent in the measures of fertility and mortality used in projections, that can be used to adjust the migration assumptions in a logical, consistent way. The analysis of estimates of total net migration gains and losses between 1981 and 2001 in Chapter 4, and the review of patterns of movement between 1996 and 2001 in this chapter, lend support to this conservative approach towards making changes to SNZ's migration assumptions in sub-national projections.

Chapter 6: The net migration assumptions

The assumptions that SNZ have made about net migration in the projections for TA populations in the Bay of Plenty are based on several sources of information. One of these is the Census of Population and Dwellings – the direct measures of internal and international migration that have been discussed in Chapter 5, and the indirect estimates of total net migration that were reviewed in Chapter 4. Another important source is information provided by local authorities on proposed developments in their districts/cities that are likely to have an impact on population movement and change. A third source is the data from arrival and departure cards on people entering or leaving the country for 12 months or more. A range of sources, therefore, inform the age-sex profiles for net migration that are used in projections produced using the cohort component method (see Chapter 3).

In this chapter we discuss the net migration profiles that have been used by SNZ in their medium variant projections for the Bay of Plenty TAs in the 2005 sub-national series. These profiles are rather different from the census-based estimates discussed in Chapters 4 and 5 – they have been "smoothed" and adjusted to reflect what Statistics New Zealand's demographers consider to be an estimate of possible trends in migration over the next 20 years. These trends are reflected in net migration profiles that are either held constant through the projection period, or adjusted upwards or downwards depending on whether it is assumed that net migration will either increase or decrease in future.

In the Bay of Plenty two general patterns can be identified in the migration assumptions used by SNZ in their medium variant projections. These are "constant" and the "variable" net migration profiles. In the Western Bay of Plenty District and Whakatane District, the same net migration profile is used for all of the five year intervals in the projection period. In these Districts it is assumed that the level of net migration, by five year age groups and sex, will remain constant over time. This pattern is referred to as the "constant" net migration profile.

In three TAs, Tauranga City, Rotorua District and Opotiki District, the net migration profile is adjusted after the first five year interval, and then this revised profile is held constant through the remainder of the projection period. This is termed a "variable" net migration profile. Another type of "variable" net migration profile is used in the case of Kawerau. Here a second adjustment to the profile has been made after 10 years, and then this profile is held constant for the remainder of the projection period.

As has already noted in Chapter 4, there have been three broad patterns of population change in the Bay of Plenty over the past 20 years:

(a) continuous growth (Western Bay of Plenty District, Tauranga City)

(b) growth over three of the last four intercensal periods (1981-1996) and then small declines between 1996 and 2001 (Rotorua, Whakatane and Opotiki Districts)

(c) declines in all of the intercensal periods since 1981, with a much sharper drop in numbers of usual residents during the 1990s, especially the late 1990s (Kawerau District).

The "constant" and "variable" net migration profiles used in the projections reflect these three patterns of population change. Because of the quite complex demography of the Bay of Plenty's populations at the TA level, it was considered necessary to explore a range of options for the migration assumptions used in the population projections. These are discussed after a brief review of net migration profiles used in the SNZ medium variant projections for the Bay of Plenty TAs.

6.1 The SNZ net migration profiles

If planners in District/City Councils requested projections for the populations of their TAs from SNZ, they would be provided with three standard variants: "high", "medium" and "low". The differences between the three lie in the assumptions about fertility, mortality and migration. The Project Brief for the Demographic Forecast 2051 Project specified that the assumptions underpinning the SNZ medium variant projections for each of the TAs would be used as the basis for the present analysis.

The medium variant projection at the national level is based on an assumption that international migration will add 10,000 people each year to the New Zealand population through the projection period (see Chapter 2). This 10,000 annual net migration gain is double the net gain used in previous medium variant projection services. The medium variant projections since the 1970s have always had an assumed net migration gain to the national population of 5,000 per annum. A pro-active immigration policy since the mid-1980s, plus the fact that New Zealand's future workforce is going to have to be augmented more by immigration because of slowing natural increase in the population, has encouraged SNZ to assume that higher net migration gains will become the norm rather than the exception.

In the range of projections produced for this report, we explored versions of the medium variant based on both the 10,000 annual net gain and the 5,000 annual net gain assumptions. The projections finally chosen for the population, labour force and household series were all derived from SNZ's medium variant based on the 10,000 annual net migration gain to the national population.

6.1.1 The medium variant migration assumptions for Bay of Plenty TAs

The medium variant migration assumptions for the Bay of Plenty TAs are summed up in terms of an overall net migration gain or loss during each five year period between 2001 and 2016 in Table 21. For comparison, the SNZ estimates of total net migration between 1996 and 2001 are also provided in column 1 of the table. After 2016 the net gains and losses are held constant at the 2011-2016 levels for the rest of the projection period. The constant (Western Bay of Plenty District, Whakatane District), and variable (the other districts) net migration assumptions are clearly evident in the levels for the different TAs (Table 21).

Table 21 Medium variant net migration levels, Bay of Plenty TAs, 1996-2021

TA	1996-2001	2001-2006	2006-2011	2011-2016	2016-2021
Western BOP District	2,230	3,000	3,000	3,000	3,000
Tauranga City	11,000	9,000	7,000	7,000	7,000
Rotorua District	-3,270	-1,500	-1,000	-1,000	-1,000
Whakatane District	-1,740	-1,000	-1,000	-1,000	-1,000
Kawerau District	-1,290	-1,000	-700	-500	-500
Opotiki District	-550	-300	-100	-100	-100
BAY OF PLENTY TAs	6,380	8,200	7,200	7,400	7,400

It can be seen from Table 21 that Western Bay of Plenty District is assumed to have constant net migration gains of 3,000 during each of the successive five year periods in the projection period. This compares with an estimated total net gain of 2,230 between 1996 and 2001 – a net gain that is obtained by subtracting the estimated natural increase between June 1996 and June 2001 from the total estimated population change during this period. In Western Bay of Plenty District it is assumed net migration will increase and remain reasonably high (for this District), largely because of spill-over of the projected growth of Tauranga City's population.

In the case of Tauranga City, the projected net migration gain of 9,000 between 2001 and 2006 is lower than the estimated net gain between 1996 and 2001 (11,000). As noted in Chapter 2, this is the major change that SNZ made to their projections for this TA: in the 2002 series the net gain assumed for 2001-2006 was 12,000, higher than the estimated net gain of the preceding five year period. The adjustment downward in the 2005 sub-national series is due to an assumption that net migration gains have been falling – an assumption that cannot really be tested until the 2006 census. SNZ also assumes that Tauranga City's net migration gain will fall back to 7,000 between 2006 and 2011, and it is this level that is then held constant for the rest of the projection period.

In Rotorua District there was an estimated total net migration loss of –3,270 between 1996 and 2001, but SNZ assumes this will ease significantly between 2001 and 2006 (down to –1,500) and then fall again to around –1,000 per five year period from 2006. Similar sorts of assumptions are made for the eastern Bay of Plenty TAs where the assumed net migration losses from 2001 are all less than the estimated ones for 1996 and 2001.

In the case of Kawerau District, as noted earlier, two downward adjustments in the net losses are made in the 2005 sub-national medium variant projections, bringing the net migration loss per five year period down from –1,290 (1996-2001) to –500 (2011-2016). These reductions in net losses reflect assumptions made about the nature of population growth amongst the Maori and non-Maori populations, with the Maori population growing more rapidly, as well as assumptions about future economic and social development in the TA.

6.1.2 The net migration profiles for the period 2001-2006

The age distributions for the male and female net migration profiles for the period 2001-2006 are shown in Table 22. For the most part, these are consistent with patterns discussed in Chapters 4 and 5, although it should be noted that Tauranga City is assumed to have a net gain rather than a net loss in the male population aged 15-24 between 2001 and 2006. This departs from the pattern for 1996-2001 where there were net losses for both males and females in this age group in all TAs in the region.

Table 22 Net migration profiles, SNZ medium variant projections, 2001-2006

	Age						
Territorial Authority	**0-14**	**15-24**	**25-39**	**40-59**	**60-79**	**80+**	**Total**
Western BOP District							
Males	580	-596	432	763	350	21	1,551
Females	538	-691	661	710	197	33	1,449
Sex ratio (M/F)	1.08	0.86	0.65	1.07	1.78	0.64	1.07
Tauranga City							
Males	855	125	1383	1112	910	80	4,463
Females	829	-77	1656	1148	857	123	4,537
Sex ratio (M/F)	1.03	-1.62	0.83	0.97	1.06	0.65	0.98
Rotorua District							
Males	-91	-582	-133	45	-24	15	-771
Females	-95	-530	-65	-51	-23	34	-729
Sex ratio (M/F)	0.96	1.10	2.06	…..	1.02	0.44	1.06
Whakatane District							
Males	46	-548	-52	37	14	5	-499
Females	42	-569	9	14	8	-5	-501
Sex ratio (M/F)	1.10	0.96	….	2.68	1.84	…..	0.99
Kawerau District							
Males	-90	-176	-105	-105	-16	-3	-496
Females	-96	-182	-88	-107	-29	-1	-504
Sex ratio	0.93	0.97	1.19	0.98	0.56	2.82	0.98
Opotiki District							
Males	20	-198	-19	43	28	-11	-137
Females	3	-209	10	47	-10	-3	-163
Sex ratio (M/F)	7.02	0.95	…..	0.92	…..	3.64	0.84
Bay of Plenty TAs							
Males	1,321	-1,976	1,505	1,894	1,262	107	4,113
Females	1,221	-2,259	2,184	1,760	999	182	4,087
Sex ratio (M/F)	1.08	0.87	0.69	1.08	1.26	0.59	1.01

There are some rather unusual differences in net gains/losses for males and females in some of the age groups, especially where there are very small numbers. For example, it is not usual to find significant differences in numbers of males and females aged 0-14 in the net flows, as is suggested for Opotiki District (Table 22). This also applied to the differences between net losses and gains of males and females aged 25-39 in Whakatane District and Opotiki District.

The sex ratios for the net migration gains and losses by broad age group for the 2001-2006 period are compared with those estimated for 1996-2001 in Table 23. As has already been noted in Table 20, the estimated and assumed levels of net migration in each TA during these two periods differ, but it is useful to see if there is some consistency in the ratios of males to females in the age groups.

Table 23 Sex ratios in net migration profiles, 1996-2001 and 2001-2006

	Age						
Territorial Authority	**0-14**	**15-24**	**25-39**	**40-59**	**60-79**	**80+**	**Total**
Western BOP District							
1996-2001	1.32	0.82	0.51	1.04	1.76	0.54	1.06
2001-2006	1.08	0.86	0.65	1.07	1.78	0.64	1.07
Tauranga City							
1996-2001	0.96	0.62	0.59	0.78	0.92	0.44	0.78
2001-2006	1.03	-1.62	0.83	0.97	1.06	0.65	0.98
Rotorua District							
1996-2001	1.09	1.43	1.28	1.18	-1.95	-0.16	1.25
2001-2006	0.96	1.10	2.06	-0.87	1.02	0.44	1.06
Whakatane District							
1996-2001	-10.24	1.32	3.01	7.25	-0.95	0.48	1.73
2001-2006	1.10	0.96	-5.68	2.68	1.84	-0.92	0.99
Kawerau District							
1996-2001	1.97	0.90	1.23	1.10	1.61	0.40	1.18
2001-2006	0.93	0.97	1.19	0.98	0.56	2.82	0.98
Opotiki District							
1996-2001	1.17	1.05	2.05	0.19	1.16	3.16	1.43
2001-2006	7.02	0.95	-1.83	0.92	-2.77	3.64	0.84
Bay of Plenty TAs							
1996-2001	0.88	1.14	0.34	0.73	1.01	0.31	0.47
2001-2006	1.08	0.87	0.69	1.08	1.26	0.59	1.01

The only TA that shows reasonable consistency in sex ratios by broad age group between the estimated (1996-2001) and the assumed (2001-2006) net migration profiles is Western Bay of Plenty District. In all age groups the ratios have the same sex biases in the flows, and the sex ratios for the total net gains (1.06 and 1.07) are very similar. In all of the other TAs there are some significant differences between sex ratios in some of the age groups, reflecting the quite variable numbers of males and females in the net gains (Tauranga City) and losses (Rotorua District and the eastern Bay of Plenty TAs).

The impact of these differences becomes clearly apparent in the sex ratios for the aggregate net gains and losses for the bay of Plenty TAs where the sex ratios for the total estimated and assumed net gains are 0.47 and 1.01 respectively. In preparing net migration profiles for the 2005 sub-national projection series, SNZ have smoothed out some of the major irregularities in the balance between males and females in the net gains and losses.

6.2 Migration assumptions and profiles for the project projections

All the migration assumptions, and associated net migration profiles used in the Demographic Forecast 2051 Project are derived from the SNZ medium variant projections New Zealand and for the Bay of Plenty TAs. In total eight projection variants were developed before deciding on the most appropriate ones for the current project. These 8 variants are summarized briefly below before the migration profiles used in the variants selected for the project are discussed.

6.2.1 The eight projection variants

The migration assumptions that underpin the eight projection variants that were obtained for this project are:

(a) SNZ's "medium" variant projection with a national net migration gain of 10,000 per annum;

(b) a "zero" net migration medium variant for each TA;

(c) a "modified medium" variant with a constant net migration profile (SNZ's profile for 2001-2006) for each TA (10,000 national net migration);

(d) a "modified medium" variant with a constant net migration profile (SNZ's profile for 2001-2006) for each TA (5,000 national net migration);

(e) a "modified medium" variant with SNZ's variable net migration profile for each TA (10,000 national net migration);

(f) a "modified medium" variant with SNZ's variable net migration profile for each TA (5,000 national net migration);

(g) a "modified medium" variant with SNZ's variable net migration through to 2026 and then zero net migration for each TA (10,000 national net migration);

(h) a "modified medium" variant with SNZ's variable net migration profile through to 2026 and then zero net migration for each TA (5,000 national net migration).

The SNZ medium variant projections have been described above; some features of the zero net migration and the constant and variable net migration variants will be outlined briefly in this section.

A "zero" net migration variant

In order to establish the effect that migration has on the populations of particular areas it is necessary to create a hypothetical population where there is no change caused by population movement in and out of the area. This is the "zero" net migration variant (variant 2)– it has the same fertility and mortality assumptions as the standard "medium" variant, but for each TA the net migration estimates are held at zero. The impact of migration on the populations of the TAs as these are projected through to 2051 is discussed in Chapter 8 with reference to comparisons with the populations obtained by applying a zero net migration assumption.

In the case of some of the Bay of Plenty TAs it was deemed appropriate to use a zero net migration assumption for the projection period beyond 2026. SNZ's 2005 sub-national projection series covers the period 2001-2026 but to continue to project net migration losses for some of the TAs beyond this date eventually results in their complete depopulation. This is not realistic, and for this reason projection variants 7 and 8, which include a zero net migration assumption between 2026 and 2051 were developed. These are discussed further below.

Two "modified medium" variants with a constant net migration profile

The projections we did for the WBOP SmartGrowth Project were based on an assumption that the SNZ medium variant net migration profiles for 1996-2001 (Tauranga City) and 2001-2006 (Western Bay of Plenty District) would apply throughout the 50 year projection period. The method we used to apply this assumption in the projections was different from that used by SNZ (this is described Chapter 3) but the actual net migration profiles used were the ones used by SNZ. Because our method for calculating the migration profiles was different we termed this a "modified medium" variant.

A similar approach has been used in two of the sets of projections prepared for the Demographic Forecast Project 2051 for all of the Bay of Plenty TAs. In the "constant migration profile" variants (3 and 4), the SNZ net migration profiles for the period 2001-2006 for each TA that are outlined earlier in this Chapter have been used. One set refers to the 10,000 net migration scenario for New Zealand, the other to the 5,000 net migration scenario. These have been applied, using the method we adopted in the SmartGrowth project, to produce population projections for each TA through to 2051. The "constant migration profile" approach runs into major problems, however, when you have persistent net migration losses. It does not produce meaningful population estimates for the future, for example, for TAs like Kawerau, Whakatane and Rotorua Districts especially

Two "modified medium" variants using variable net migration profiles

As has already been noted, SNZ only has a constant net migration assumption through the projection period for two TAs: Western Bay of Plenty District (3,000 net gain per five year period) and Whakatane District (-1,000 net migration loss per five year period) (Table 21). For the other TAs the net migration gains (Tauranga City) and losses (Rotorua and the eastern Bay TAs) are assumed to change between 2006 and 2011, with a further change between 2011 and 2016 in Kawerau District (Table 21).

These variable net migration profiles have been used to derive two further "modified medium" projection variants for the Bay of Plenty TAs (variants 5 and 6). They provide a more meaningful basis for the population projections for the TAs that are experiencing net losses than the constant net migration profile projection variants. However, when the projections are extended out to 2051 using persistent net migration losses some of the demographic outcomes do not look feasible, especially for Kawerau. This prompted the production of additional projection variants that used a combination of variable net migration profiles through to 2026 and then a zero net migration assumption from 2026 through to 2051 (variants 7 and 8).

The application of variable net migration profiles through to 2026, followed by zero net migration to 2051, produces populations for Rotorua and the eastern Bay of Plenty TAs beyond 2026 that look more realistic than the ones produced using the other projection variants. There are only small differences between the projections based on national net migration gains of 5,000 and 10,000, especially in the TAs with net migration losses. Given that SNZ has chosen the 10,000 net gain as the basis of their national and sub-national medium variant projections it was decided to use this migration assumption for the Demographic Forecast 2051 Project.

Summary

Following consultation with the Project Team it was decided to use the following variants as the basis for the population, labour force and household projections for the Bay of Plenty TAs:

(a) Variant 3 (modified medium with a constant net migration profile (SNZ's profile for 2001-2006) and 10,000 national net migration): Western Bay of Plenty District and Tauranga City;

(b) Variant 7 (modified medium with SNZ's variable net migration profile through to 2026 and then zero net migration (10,000 national net migration)): Rotorua District, Whakatane District, Kawerau District and Opotiki District.

Use of these variants is consistent with the patterns of population change that have been found in different parts of the Bay of Plenty over the period 1981-2001. The constant net migration profile for the western Bay of Plenty TAs is also consistent with the approach adopted in the WBOP SmartGrowth Project.

The specific net migration profiles used for the two western Bay of Plenty TAs in this analysis are those produced by SNZ for the 2005 sub-national series. They are not the ones that were used in the WBOP SmartGrowth Project which were based on earlier sub-national projection series. This means that there are some variations between the projections for the western Bay of Plenty TAs in this report and those prepared for SmartGrowth. These are discussed further in Chapter 7. In the next section the age-sex structures of the net migration profiles that have been used in the TA projections are reviewed with reference to the particular method used to take account of changes in New Zealand's population size and structure between 2001 and 2051. This method was outlined in Chapter 3.

6.2.2 The net migration profiles, 2001-2051

If the national population is undergoing a lot of change in terms of its age structure, as the New Zealand one has been for some time now and will continue to experience over the next 50 years, then it is logical to try and reflect this structural change in the net migration profiles for different parts of the country. The method we adopted for the WBOP SmartGrowth project for incorporating migration into the projections did this, and this is the method we have used in the modified medium projection variants used in the Demographic Forecast 2051 Project.

The method for achieving this has been outlined in Chapter 3. It will be recalled that it uses the SNZ migration profiles summarized in Table 22 to obtain estimates of net migration for successive five year periods taking into account the changing size and age-sex structure of the projected national population. The national projection used for this purpose is the medium variant one that has an annual net gain from international migration of 10,000.

The results of the application of this method to the derivation of migration profiles for each five year period between 2001 and 2051 for each TA are summarized below. It will be evident from these profiles that the numbers for each age group and for the total net gain or loss for the TA change through time as the national population structure (and size) changes. These migration profiles give us a more consistent base on which to build TA projections than using SNZ's constant net migration estimates for each age group and five year period through most of the projection period.

Western Bay of Plenty district

The net migration profile for the Western Bay of Plenty is summarized in Table 24. The profile for the period 2001-2006 is the one provided by SNZ. The profiles for the subsequent five year periods were obtained using the method outlined in Chapter 3. They show increases in the overall net migration gain to the Western Bay of Plenty as New Zealand's population grows and changes in structure over the next 50 years. Even though the rate of net migration, as expressed in the 3,000 net gain between 2001 and 2006 was held constant as a share of the total New Zealand population in the specified age-sex groups through the projection period, the actual levels of net migration change as the total population changes.

The sizes of the net gains and losses by age group and the gender balance in these, as expressed in the sex ratio, change as the projected national population changes. The levels of net migration for particular age groups fluctuate through time, rather than remaining constant, because of the momentum caused by irregularities in New Zealand's age-sex structure – the "disordered cohort" effect that Ian Pool (1999, 2005) has discussed at length in the context of public policy and regional population change.

Table 24 Net migration profiles, 2001-2051: Western Bay of Plenty District

Year	0-14	15-24	25-39	40-59	60-79	80+	Total
Male + Female							
2001-06	1118	-1287	1093	1474	546	55	3000
2006-11	1109	-1393	1045	1614	644	68	3087
2011-16	1088	-1428	1005	1696	758	82	3202
2016-21	1061	-1419	1022	1718	864	96	3342
2021-26	1040	-1406	1068	1690	968	114	3474
2026-31	1039	-1380	1088	1669	1037	140	3593
2031-36	1045	-1337	1081	1677	1051	174	3691
2036-41	1041	-1321	1066	1707	1022	213	3728
2041-46	1028	-1332	1041	1742	995	251	3725
2046-51	1011	-1338	1015	1751	1012	287	3738
Sex ratios							
2001-06	1.08	0.86	0.65	1.07	1.78	0.64	1.07
2006-11	1.08	0.88	0.65	1.06	1.78	0.70	1.08
2011-16	1.08	0.89	0.65	1.05	1.78	0.78	1.10
2016-21	1.08	0.90	0.66	1.04	1.77	0.84	1.11
2021-26	1.08	0.89	0.68	1.04	1.76	0.88	1.13
2026-31	1.08	0.89	0.70	1.06	1.75	0.92	1.15
2031-36	1.08	0.90	0.70	1.09	1.74	0.95	1.16
2036-41	1.08	0.89	0.70	1.11	1.75	0.97	1.17
2041-46	1.08	0.89	0.70	1.11	1.79	0.98	1.18
2046-51	1.08	0.90	0.70	1.12	1.84	0.98	1.19

An interesting trend in the national population projections is the rising sex ratio in favour of males. This is reflected in the net migration profiles for the Western Bay of Plenty, as well as other TAs, even for the older age group (80+) where there are more women than men in the population. This projected increase in masculinity in the population at both the national and the sub-national levels needs further examination, especially given the opposite trend in recent years towards the feminisation of new Zealand's adult and older population (Callister, Bedford, and Didham 2006).

A more detailed version of the net migration profiles summarized above for the Western Bay of Plenty, by five year age groups and sex separately, were supplied to SNZ for incorporation into the medium variant projections for this TA. They represent the migration assumptions used in the medium variant 3 projections for the Western Bay of Plenty District that are discussed in Chapter 7.

Tauranga City

The net migration profiles for Tauranga City have been derived by using the 2001-06 SNZ profile (the net gain of 9,000) to derive profiles for subsequent five year periods that take into account changes in New Zealand's population over the 50 years. The magnitude of net migration gains increases over time, reaching over 11,000 per five year period by 2026-31 (Table 25).

Table 25 Net migration profiles, 2001-2051:Tauranga City

Year	0-14	15-24	25-39	40-59	60-79	80+	Total
Male plus Female							
2001-06	1684	48	3039	2260	1767	203	9000
2006-11	1671	45	2940	2456	2010	242	9364
2011-16	1644	32	2920	2553	2348	278	9776
2016-21	1603	30	3014	2558	2733	319	10258
2021-26	1566	29	3100	2510	3127	379	10712
2026-31	1561	21	3122	2497	3445	467	11114
2031-36	1572	26	3093	2526	3636	569	11422
2036-41	1569	34	3028	2566	3677	675	11549
2041-46	1551	34	2953	2605	3617	782	11542
2046-51	1526	30	2913	2610	3584	867	11530
Sex ratios							
2001-06	1.03	1.62	0.83	0.97	1.06	0.65	0.98
2006-11	1.03	1.53	0.85	0.95	1.07	0.71	0.99
2011-16	1.03	1.35	0.86	0.94	1.08	0.75	1.00
2016-21	1.03	1.34	0.88	0.93	1.08	0.79	1.00
2021-26	1.03	1.32	0.90	0.93	1.07	0.82	1.01
2026-31	1.03	1.23	0.90	0.95	1.07	0.85	1.01
2031-36	1.03	1.29	0.90	0.98	1.06	0.86	1.02
2036-41	1.03	1.41	0.90	0.99	1.06	0.86	1.02
2041-46	1.03	1.41	0.91	1.00	1.07	0.86	1.02
2046-51	1.03	1.35	0.90	1.00	1.09	0.85	1.03

Because there was a small net gain in the age group 15-24 in the 2001-06 net migration profile, this net gain continues through the projection period. This is possibly rather optimistic given that the general trend has been for there to be net losses to all Bay of Plenty TAs in this age group in recent years. However, there is a move to enhance tertiary provision in Tauranga, and over time this, along with increasing employment opportunities in the city may mean that turn-around in net losses in the 15-24 year age group can be sustained. SNZ's medium variant projections for Tauranga City allow for a return to net losses in this age group after 2006.

In Tauranga City, as in other Bay of Plenty TAs, and the national population as a whole, the numbers of children aged 0-14 years fall through the projection period reflecting the low fertility levels amongst the non-Maori population and the continuing declines in fertility amongst Maori and Pacific Island peoples. There are fluctuations over time in the numbers in the net migration profile aged 25-39 and 40-59 reflecting the disordered cohort effect mentioned earlier. In the older age groups (60-79, 80+) the numbers of net migrants increase as the New Zealand population ages. The changes in net migration at these older ages are the most noticeable deviations from the SNZ net migration profile which holds these numbers constant from 2011 in the case of Tauranga City. Changing age compositions for the net migration profiles are more realistic in the light of the trend nationally and internationally towards higher proportions of older people in the population.

Rotorua District

SNZ's net migration profiles are used directly for two periods in the projections for Rotorua District – 2001-06 (-1,500) and 2006-2011 (-1,000). SNZ had a variable net migration profile for this District in the 2005 sub-national series. From 2011 the net migration profiles and associated levels of the net gains and losses for particular age groups, are obtained by using the SNZ profile for 2006-2011 to derive estimates for each five year period that take account of the changing size and structure of the national population (Table 26).

Table 26 Net migration profiles, 2001-2051: Rotorua District

Year	0-14	15-24	25-39	40-59	60-79	80+	Total
Male+Female							
2001-06	-186	-1112	-198	-7	-47	49	-1500
2006-11	-73	-1037	-102	125	27	61	-1000
2011-16	-70	-1058	-118	121	31	71	-1024
2016-21	-69	-1052	-130	109	36	82	-1023
2021-26	-71	-1041	-125	101	42	97	-996
2026-31	-71	-1019	-119	105	48	119	-937
2031-36	-70	-990	-117	116	51	147	-862
2036-41	-69	-981	-110	122	54	177	-807
2041-46	-67	-989	-107	119	55	206	-783
2046-51	-66	-992	-111	115	55	232	-767
Sex ratios							
2001-06	1.08	0.86	0.65	1.07	1.78	0.64	1.07
2006-11	1.08	0.88	0.65	1.06	1.78	0.70	1.08
2011-16	1.08	0.89	0.65	1.05	1.78	0.78	1.10
2016-21	1.08	0.90	0.66	1.04	1.77	0.84	1.11
2021-26	1.08	0.89	0.68	1.04	1.76	0.88	1.13
2026-31	1.08	0.89	0.70	1.06	1.75	0.92	1.15
2031-36	1.08	0.90	0.70	1.09	1.74	0.95	1.16
2036-41	1.08	0.89	0.70	1.11	1.75	0.97	1.17
2041-46	1.08	0.89	0.70	1.11	1.79	0.98	1.18
2046-51	1.08	0.90	0.70	1.12	1.84	0.98	1.19

The net migration profiles shown in Table 26 for five year intervals after 2026 are the ones that are obtained when the variable migration assumption is applied right through the projection period. The net losses in the age groups 0-14, 15-24 and 25-39 gradually fall with the changing age structure of New Zealand's population, while the net gains for those 40 years and older gradually increase for the same reason (Table 26).

In the projections for Rotorua District it was decided to use a variant that had zero net migration in each of the five year periods after 2026, not the continuing, but slowly declining, net losses shown in Table 26. The data provided to SNZ for projection variant 7 had zeros in all of the columns for the age groups after 2026. The assumption is a crude one – rarely is there zero net migration for any age group. But it has the effect of allowing for some recovery in population growth on the assumption that Rotorua District will, in fact, experience a shift from net losses to

net gains as the New Zealand population becomes more concentrated in the northern half of the North Island.

Whakatane district

SNZ uses a constant net migration profile (-1,000) for Whakatane, and this has been applied through the projection period in Table 27. The overall net loss rises slightly above 1,000 because of the changing age composition of New Zealand's population.

Table 27 Net migration profiles, 2001-2051: Whakatane district

Year	0-14	15-24	25-39	40-59	60-79	80+	Total
Male+Female							
2001-06	89	-1118	-43	50	22	0	-999
2006-11	88	-1204	-48	54	26	0	-1084
2011-16	85	-1223	-58	56	30	0	-1111
2016-21	83	-1215	-63	56	34	0	-1106
2021-26	83	-1202	-59	55	38	0	-1084
2026-31	83	-1174	-56	56	41	1	-1050
2031-36	83	-1142	-55	56	42	0	-1015
2036-41	82	-1135	-51	57	42	-1	-1006
2041-46	81	-1145	-50	58	41	-2	-1016
2046-51	80	-1146	-53	58	42	-4	-1024
Sex ratios							
2001-06	1.08	0.86	0.65	1.07	1.78	0.64	1.07
2006-11	1.08	0.88	0.65	1.06	1.78	0.70	1.08
2011-16	1.08	0.89	0.65	1.05	1.78	0.78	1.10
2016-21	1.08	0.90	0.66	1.04	1.77	0.84	1.11
2021-26	1.08	0.89	0.68	1.04	1.76	0.88	1.13
2026-31	1.08	0.89	0.70	1.06	1.75	0.92	1.15
2031-36	1.08	0.90	0.70	1.09	1.74	0.95	1.16
2036-41	1.08	0.89	0.70	1.11	1.75	0.97	1.17
2041-46	1.08	0.89	0.70	1.11	1.79	0.98	1.18
2046-51	1.08	0.90	0.70	1.12	1.84	0.98	1.19

Whakatane's big net losses are in the age group 15-24 years, and these increase slowly through to 2016 before falling back, equally slowly to 2041 and then starting to rise again (Table 27). In the projections for Whakatane's population that are discussed in subsequent chapters, a zero net migration assumption was applied from 2026, rather than maintaining the net migration profiles summarized in Table 27. It is assumed that Whakatane District, like Rotorua District, will experience economic and social changes over the next 25 years that will result in a shift away from the migration net losses that are currently common. An assumption of continuing net losses over the entire 50 year period does not seem realistic.

Kawerau district

SNZ's net migration profiles for Kawerau District show a declining net loss from 2001-06 (-1,000) to 2011-2016 (-500) (Table 28). These profiles have been used in the projections for Kawerau's population. For the periods beyond 2016, the 2011-16 profile was used to generate estimates of net migration that take account of the changing age structure of New Zealand's population. If the 2011-16 profile was applied through to 2051, the net migration profiles would be as indicated in Table 28.

Table 28 Net migration profiles, 2001-2051: Kawerau District

Year	0-14	15-24	25-39	40-59	60-79	80+	Total
Male+Female							
2001-06	-186	-358	-193	-213	-46	-4	-1000
2006-11	-112	-301	-130	-134	-25	2	-700
2011-16	-65	-266	-89	-81	-4	5	-500
2016-21	-64	-264	-92	-82	-3	6	-501
2021-26	-61	-262	-95	-81	-3	7	-495
2026-31	-60	-255	-96	-80	-1	9	-483
2031-36	-61	-248	-95	-80	1	11	-472
2036-41	-61	-247	-93	-81	3	13	-466
2041-46	-61	-249	-91	-83	4	15	-465
2046-51	-60	-249	-89	-83	3	17	-462
Sex ratios							
2001-06	1.08	0.86	0.65	1.07	1.78	0.64	1.07
2006-11	1.08	0.88	0.65	1.06	1.78	0.70	1.08
2011-16	1.08	0.89	0.65	1.05	1.78	0.78	1.10
2016-21	1.08	0.90	0.66	1.04	1.77	0.84	1.11
2021-26	1.08	0.89	0.68	1.04	1.76	0.88	1.13
2026-31	1.08	0.89	0.70	1.06	1.75	0.92	1.15
2031-36	1.08	0.90	0.70	1.09	1.74	0.95	1.16
2036-41	1.08	0.89	0.70	1.11	1.75	0.97	1.17
2041-46	1.08	0.89	0.70	1.11	1.79	0.98	1.18
2046-51	1.08	0.90	0.70	1.12	1.84	0.98	1.19

It is interesting to note in Table 28 that net losses for the older population (60 years and over) shift to net gains as the national population ages. The biggest net losses remain in the 15-24 year age group, in common with the situation in Rotorua District and Whakatane District. In the 30-49 year age group the net migration loss is biased towards females; the sex ratios do not rise above 0.70. For the overall net migration loss, however, there is gradual increase in the male surplus over the period.

In the population projections for Kawerau a zero net migration assumption was applied after 2026, rather than retaining the continuing net losses shown in Table 28. This allows for some gradual stabilisation and recovery in the population after over 40 years of decline. Such an assumption will only become a reality, though, if the present net losses are turned around by 2026.

Opotiki district

The SNZ net migration profiles for Opotiki are adjusted downwards once after the initial net loss of –300 (Table 29). The net loss of –100 for 2006-11 is applied through the rest of the projection period, and there are declining net losses from 2011 onwards except in the oldest age group (80+). These actually increase rather than decrease, as a result of having a net loss in the profile used to generate the estimates for subsequent periods.

Table 29 Net migration profiles, 2001-2051: Opotiki district

Year	0-14	15-24	25-39	40-59	60-79	80+	Total
Male+Female							
2001-06	22	-407	-8	89	18	-14	-300
2006-11	57	-371	30	147	45	-7	-100
2011-16	55	-377	27	156	53	-8	-94
2016-21	53	-374	26	160	59	-10	-85
2021-26	53	-370	28	158	65	-12	-78
2026-31	53	-362	30	155	67	-15	-72
2031-36	54	-352	30	154	65	-18	-68
2036-41	53	-350	30	157	60	-21	-71
2041-46	52	-353	29	161	58	-25	-77
2046-51	51	-353	28	162	61	-27	-77
Sex ratios							
2001-06	1.08	0.86	0.65	1.07	1.78	0.64	1.07
2006-11	1.08	0.88	0.65	1.06	1.78	0.70	1.08
2011-16	1.08	0.89	0.65	1.05	1.78	0.78	1.10
2016-21	1.08	0.90	0.66	1.04	1.77	0.84	1.11
2021-26	1.08	0.89	0.68	1.04	1.76	0.88	1.13
2026-31	1.08	0.89	0.70	1.06	1.75	0.92	1.15
2031-36	1.08	0.90	0.70	1.09	1.74	0.95	1.16
2036-41	1.08	0.89	0.70	1.11	1.75	0.97	1.17
2041-46	1.08	0.89	0.70	1.11	1.79	0.98	1.18
2046-51	1.08	0.90	0.70	1.12	1.84	0.98	1.19

In fact, this anomalous situation does not apply in the projection variant 7 for Opotiki that was used to generate the populations used as the basis for the labour force and household projections. The zero net migration assumption was applied to Opotiki as well as the other eastern Bay TAs and Rotorua District from 2026. This seems a more realistic assumption to adopt for the second 25 years of the projection period, especially given the likelihood that the Opotiki coastal strip is likely to experience considerable residential development over the next 50 years.

Summary

The migration assumptions have been outlined in some detail because these are the only assumptions that have been changed from the ones used by SNZ in their medium variant sub-national projections in the 2005 series. The net migration profiles have been calculated using a procedure that allows the changing age-sex structure and size of the national population over the 50 year projection period to be taken into consideration in the migration estimates.

The impact of this different approach to deriving net migration profiles on the projected populations is not large in those TAs which have small net gains or net losses due to migration. It has most impact on the sizes of the projected populations of TAs where there are sizeable net gains, such as Tauranga City. The projected populations and the impact of migration on population change in the Bay of Plenty TAs is discussed in Chapters 7 and 8.

Chapter 7: Population structures in the Bay of Plenty

As noted in Chapter 3, population projections, derived using the cohort component method, require four sets of information:

(i) a base population structure (the population distributed by age and sex);

(ii) a schedule of fertility rates for females aged between 15 and 49 years;

(iii) a schedule of mortality rates for males and females (all ages);

(iv) a schedule of net migration levels for males and females (all ages).

The base populations and the schedules of rates/levels for fertility, mortality and migration rates can be either "real", in the sense that they relate to actual populations, or they may be hypothetical. In the case of the projections derived for the Bay of Plenty TAs, all four sets of information are based on estimates that are rooted in real populations.

The base populations used in the projections developed for the Demographic Forecast 2051 Project are SNZ's June 2001 estimates of the usually resident population in each TA. These estimates are based on the census populations for March 2001, adjusted to take account of under-enumeration, temporary absence of residents overseas, and change in the population between March and June 2001. They are the populations that SNZ used as the base for both their November 2002 and February 2005 sub-national projection series.

It is necessary to have some appreciation of the age-sex structure of a population that is to be projected into the future because the distribution of people across the age groups at the beginning of the projection period has a profound influence on the pattern of change in that population over subsequent decades. The population structure defines the "stock" of people in the TA, sub-region or region, that will age during the projection period.

The base population contains most of the people who will be included in the projected population, at least for the next 25 years or so. Additions to the base population are the births and in-migrants; deletions result from deaths and out-migration. The contributions made by deaths and migration (in and out) to the changing structure of the population are much less noticeable than the changes made by births. This is because deaths and migration occur at all ages and are spread across the age groups, while births enter the population structure in one place only – at age 0.

The *structure* of the population is much more profoundly affected by changes in birth rates, than it is by death rates or by net migration. However, the *size* of the population in future years is very much determined by the base population, and its distribution by age and sex. If the population is small at the beginning of the projection period, such as the base population in June 2001 for Kawerau, then it will remain small through the projection period unless there is a very unusual pattern of fertility or migration that promotes much more rapid change than that which has occurred in recent years.

Population growth through natural increase and net migration does not change suddenly; the existing base population structure ensures there is significant inertia in the pattern of change in the size of an area's population. This structure also has a major effect on the momentum of future population change because most of the people who will be in the area in 5, 10, 15, 20 years time are already born and living there.

In the first section of this chapter we review the base populations of the Bay of Plenty region, the two sub-regions, and the six TAs using the standard convention of population pyramids. While there are some common features to the age-sex pyramids, it is clear that there are some quite important differences between the base population structures in the region. These reflect different mixes of Maori and non-Maori in the population, as well as different experiences with net migration.

The second section contains a brief outline of the major changes in age-sex structure that are projected for New Zealand's total population over the period 2001-2051. The pyramids presented in this section give an indication of the changing shape of New Zealand's population, as this is projected by SNZ's medium variant assumptions. It will be apparent from inspection of the pyramids that the "shape" of the base population has a lot to do with the shape, and size, of future populations.

7.1 Population Pyramids, 2001

7.1.1 Regional and sub-regional Patterns

The population pyramids for the Bay of Plenty and its two major sub-regions are shown in Figure 1 (the pyramid for Rotorua District is examined in the next section with the other TAs). Males and females are shown separately by five year age group. The bars in the pyramids refer to the *percentages* of the total population in each five year age group separately by sex. Thus in the Bay of Plenty Region population for 2001, just under 4 percent of the males were aged 0-4 years, while there was a slightly smaller proportion of females in this age group. Percentages rather than raw numbers are used so that the shapes of pyramids can be directly compared both across different regional/TA populations, and through time (see section 7.2)

There are usually slightly more males than females in the child population because there is a higher probability of a male birth than a female one. However, by the late 30s, females tend to outnumber males, partly as a result of lower death rates for women, and partly because the male population is affected more by migration. At older ages (70 years and over) there are invariably higher percentages of females than males in the population – again a feature of the three population pyramids shown in Figure 1. Women have a higher life expectancy at all ages than males do.

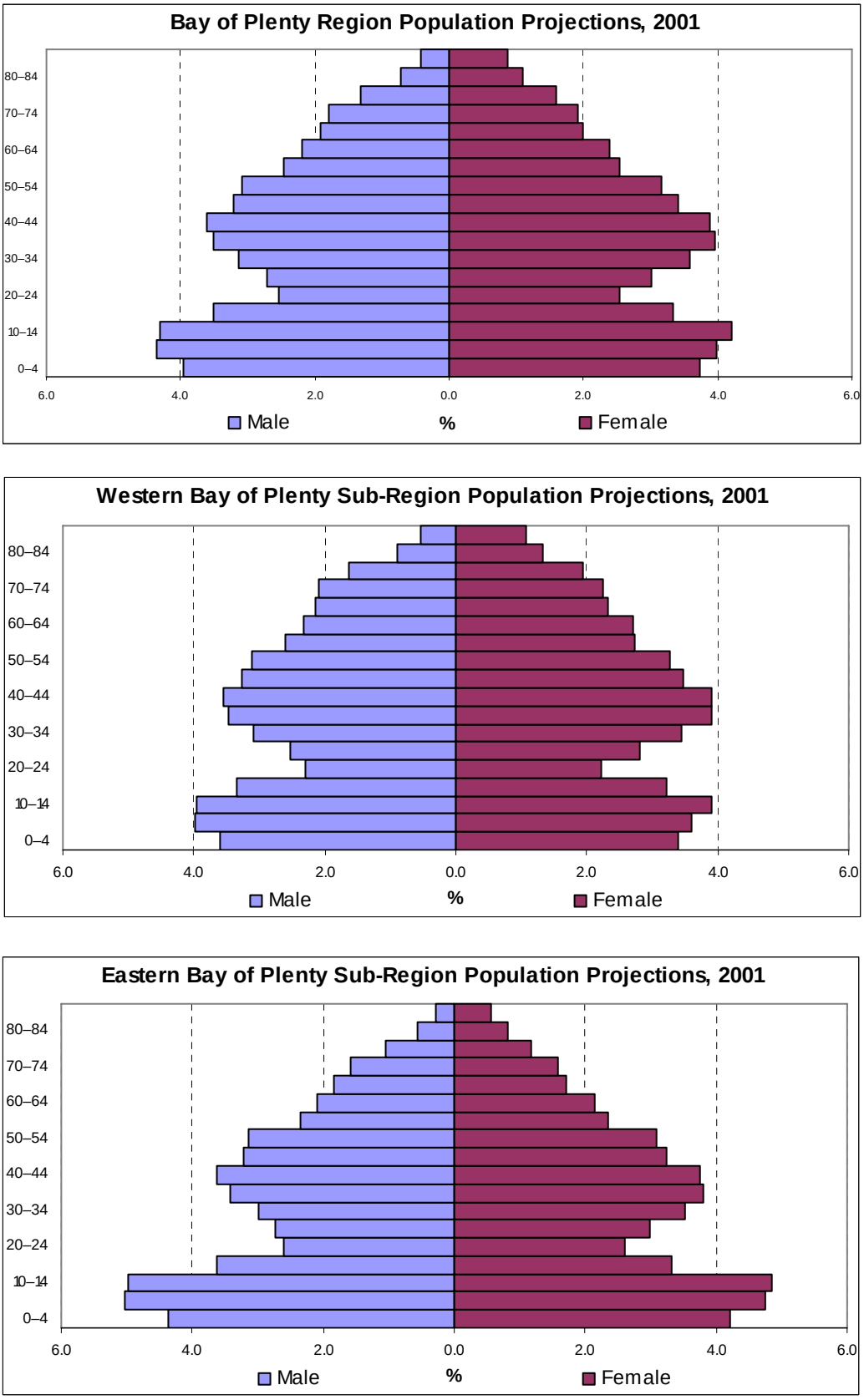


Figure 1 Population pyramids, Bay of Plenty region and major sub-regions, 2001.

The 2001 population pyramids for the Bay of Plenty and the two sub-regions have some common features. At the base of the pyramid, the bars are getting narrower, and this reflects declining numbers of births in recent years following a short-lived "baby blip" in the early 1990s associated with changes in patterns of childbearing. The base of the pyramid for the eastern Bay of Plenty sub-region is quite a bit wider than that for the western Bay of Plenty sub-region (Figure 1). This is because there are higher percentages of children in the population of the eastern Bay of Plenty, thanks to the greater proportion of Maori in the resident population. As noted earlier, Maori have higher fertility than non-Maori.

There is a sharp "nip" in the structures of all pyramids commencing with ages 15-19 and being most evident at ages 20-24 years. This reflects the migration out of the region of older teenagers and people in their early 20s seeking tertiary education and work. This is as much a feature of the pyramid of the western Bay of Plenty as it is of the pyramid for the eastern Bay of Plenty sub-region (Figure 1).

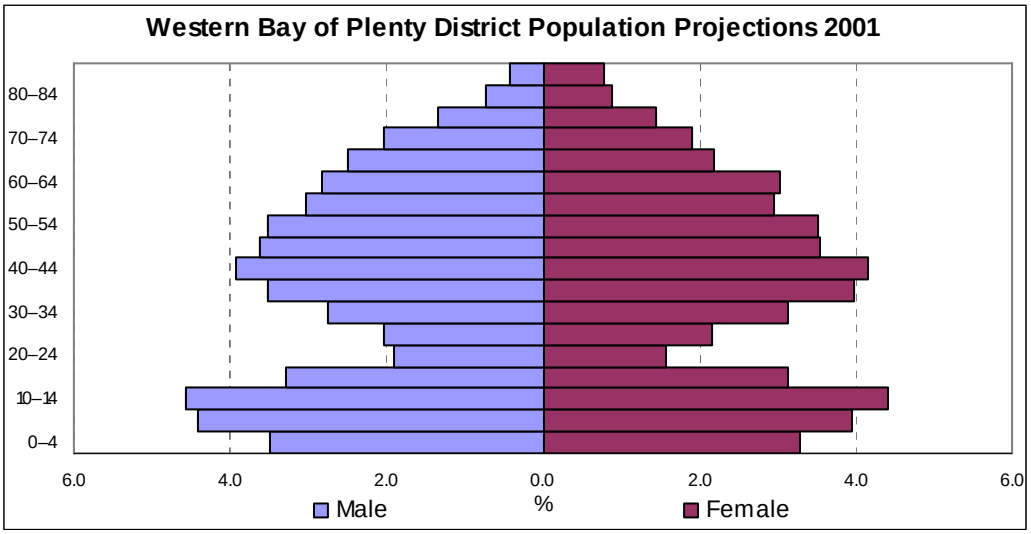
From age 25-29 the pyramid starts to broaden out again until the late 30s and early 40s. People at these latter ages were born towards the end of the baby boom that transformed growth in New Zealand's population from the late 1930s through to the early 1960s. The baby boom generations mainly comprise the population aged 40-60 in 2001 – this is the population that will contribute significantly to the 'ageing' of the region's and New Zealand's population over the next 40 years.

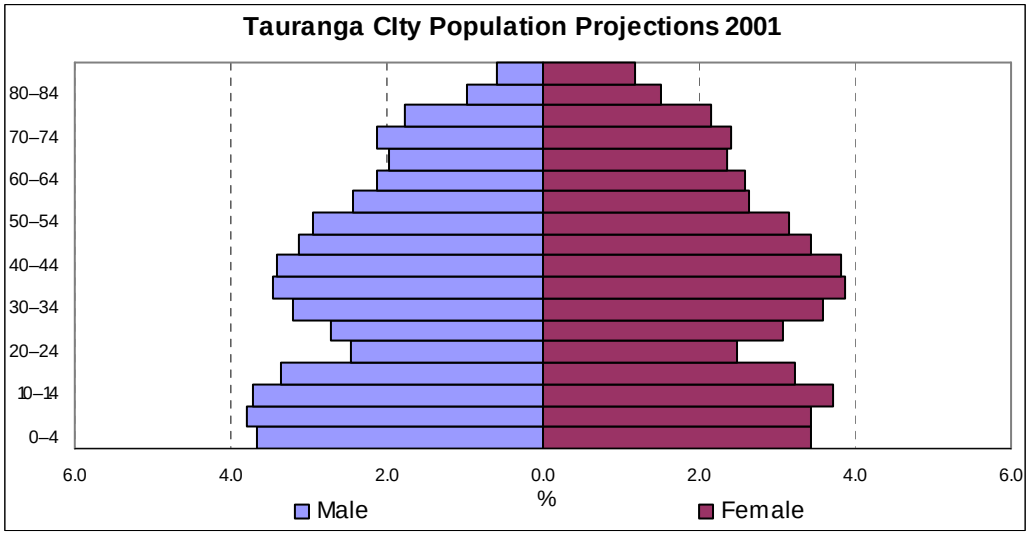
The pyramid for the western Bay of Plenty sub-region's population is wider in the age groups 40 and over than is the case in the population for the eastern Bay of Plenty. This reflects both the higher share of young children in the eastern Bay of Plenty's population than in the western Bay of Plenty, as well as the contributions made by net migration gains of people aged 40 and over in the western Bay of Plenty (see Chapters 5 and 6).

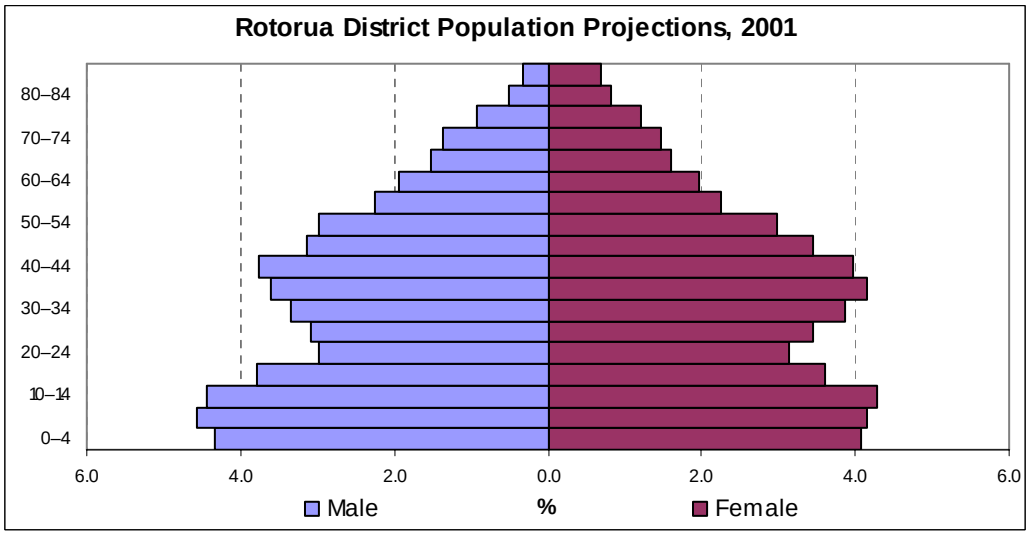
In summary, there are similarities in the basic shapes of the pyramids for the region and two sub-regions, but some important differences in the proportions of people at different ages. The latter reflect differences in the ethnic compositions of the sub-regional populations, with the eastern Bay of Plenty's population being more profoundly affected by the fertility and mortality patterns amongst Maori. In addition, net migration gains in the western Bay of Plenty contribute to the higher proportions in the age groups above 40 years, by comparison with the eastern Bay of Plenty's pyramid. This, in turn, results in the western Bay of Plenty having an "older" population than the eastern Bay of Plenty – something that will continue into the future.

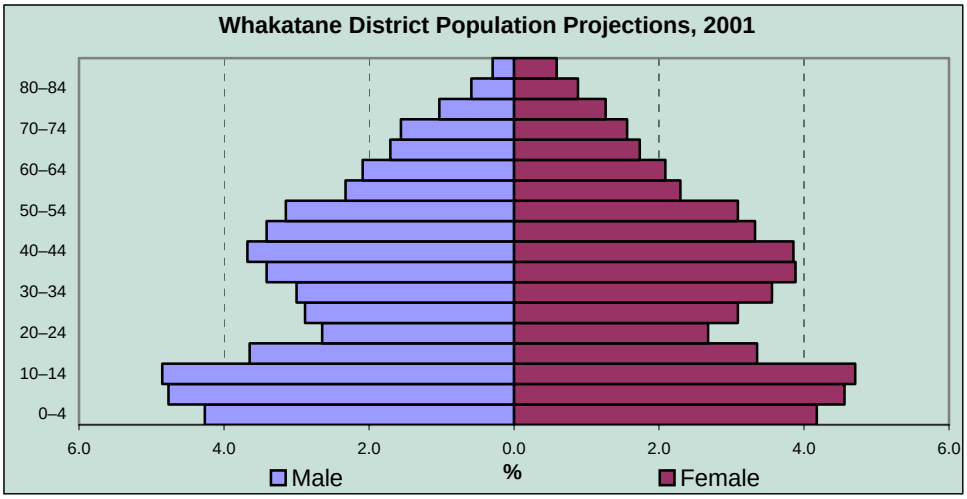
7.2 Population pyramids for the TAs in 2001

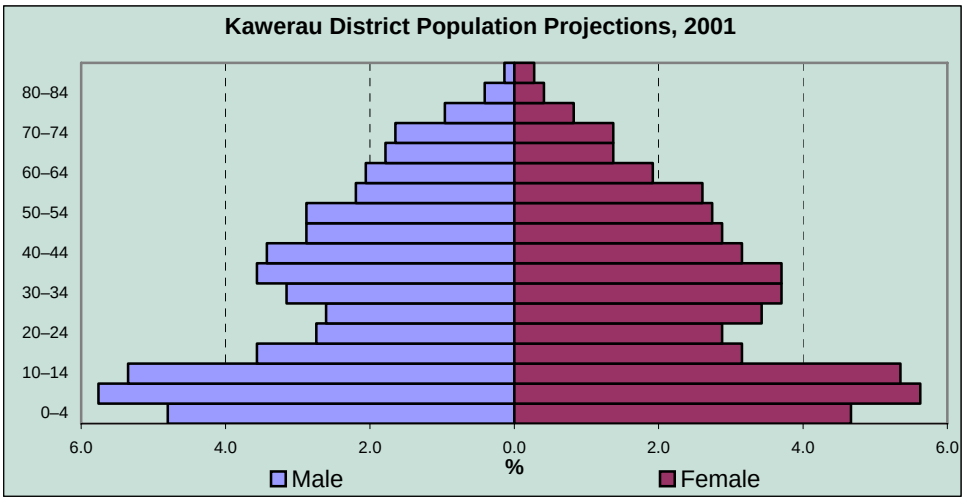
The population pyramids for the six TAs are shown in Figure 2. There are some quite marked variations in age-sex structure across the TAs, and these will be reflected in the projected populations for each area over the coming decades.


Western Bay of Plenty District Population Projections 2001
80–84
70–74
60–64
50–54
40–44
30–34
20–24
10–14
0–4
6.0
4.0
2.0
0.0
2.0
4.0
6.0
%
Male
Female


Tauranga CIty Population Projections 2001
80–84
70–74
60–64
50–54
40–44
30–34
20–24
10–14
0–4
6.0
4.0
2.0
0.0
2.0
4.0
6.0
%
Male
Female


Rotorua District Population Projections, 2001
80–84
70–74
60–64
50–54
40–44
30–34
20–24
10–14
0–4
6.0
4.0
2.0
0.0
2.0
4.0
6.0
%
Male
Female





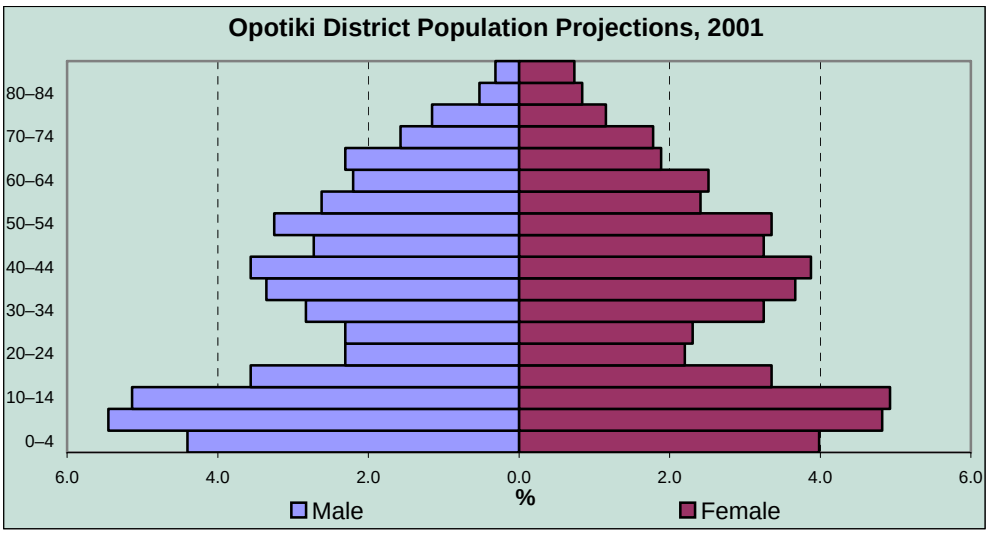


Figure 2 Population pyramids for Bay of Plenty TAs, 2001

This report is not the place for a detailed discussion of the differences in TA population pyramids in 2001. A combination of factors associated with the demographic, social and economic histories of the TAs contributed to these differences in structure. There are some general observations that can be made about the pyramids for the Bay of Plenty TAs however, and these will be outlined briefly here.

The first is that the bases for the pyramids for Rotorua District and the eastern Bay of Plenty TAs are broader than those for the western Bay of Plenty TAs, and this is due, in large measure, to the higher proportions of Maori in the former. The base of the pyramid for Kawerau is particularly wide, and this reflects the higher proportion of children relative to adults in this District's population by comparison with other TAs in the region.

The second point that is clear from the pyramids is that Tauranga City and Rotorua District have been less strongly impacted by net out-migration in the age groups 15-19 and 20-24 than is the case in the other TAs, especially Western Bay of Plenty District and Opotiki District (Figure 2). The latter two TAs have a more exaggerated "nip" in the waist of the pyramid at ages 20-24 years especially.

Thirdly, the percentages of people aged 50 and over in the pyramids for Tauranga City and Western Bay of Plenty District tend to be higher than those found in other TAs, reflecting the contribution that consistent net migration gains have been making to the age structure of the population in this sub-region. The pyramids for the other four TAs "taper off" more rapidly with age.

Finally, there is a much larger proportion of people in the oldest age groups shown (80-84 years and 85 years and over) in Tauranga City than in any other TA in the region. The TA with the smallest percentages of old people in its population is Kawerau. Kawerau is also the only TA that has more men than women in its older population; in all the others females have higher percentages than males (Figure 2).

In concluding this very brief overview of the region's population structures in 2001 – the base populations for the projections discussed in the next chapter – it is sufficient to note that it is extremely difficult to throw off the legacies of past demographic development that is reflected in the structures. The population structure that a TA has in 2001 will have a profound influence on patterns of population growth and age-sex structure in the future.

7.3 New Zealand's changing population structure, 2001-2051

The easiest way to illustrate the impact of an existing population structure on the projected population is to use the example of New Zealand's changing population pyramid between 2001 and 2051. The only three processes that affect this structure are the base population (2001) and the impact of fertility, mortality and net international migration over the subsequent years. Using SNZ's medium variant projection for this population (annual net migration gain, 10,000), the population structures summarized in the pyramids in Figure 3 were obtained.

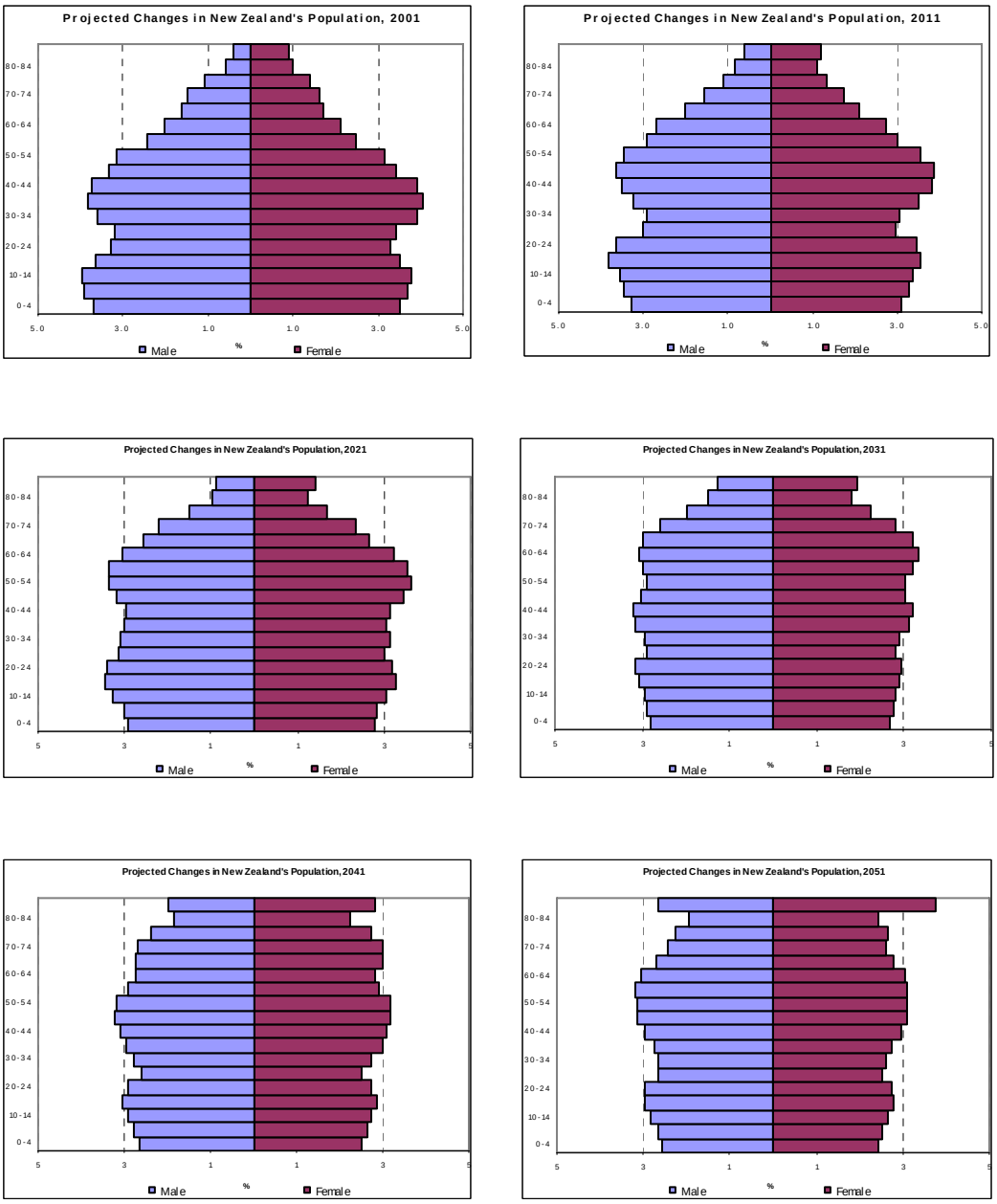


Figure 3 Projected changes in New Zealand's population structure, 2001-2051

If one compares the population pyramid for 2011 with that for 2001 some obvious similarities stand out. The base of the pyramid has continued to shrink, as progressively smaller numbers of births have been added through time. The "nip" in the pyramid at ages 20-24 and 25-29 years (due to net migration losses overseas in the national population, not mainly to internal migration as in the Bay of Plenty TAs) has "aged" as it moves up the pyramid with advancing years. The bulge in the pyramid around 30-45 years has moved up to be 40-50 years by 2011.

By 2021 the nip has become less obvious and is now aged 35-44 years, while the bulge associated with the ageing baby boom generations moved into the older age groups where it continues to grow in terms of percentage of the total population through to 2051 (Figure 3). By 2031 it is becoming difficult to identify the shape of the original base population structure – the nips and bulges have virtually disappeared and the structure is becoming much more regular with roughly similar proportions at each age group up to the 60s. This is because of the impact of a consistent net migration contribution every year, and very gradual changes in fertility and mortality.

The pyramids for the projected populations tend to become smoother over time, as can be seen in Figure 3 for New Zealand's total population. This also happens in the case of the population structures for the Bay of Plenty TAs, although there are some variations in the shapes of these pyramids right through to 2051. These developments are reviewed in the final section of Chapter 8 following a review of the projection variants selected for the different TAs

Chapter 8: Projected Total Populations

The 2005 series of sub-national population projections, released by SNZ in February, cover the period June 2001 to June 2026. For the Demographic Forecast 2051 Project we have extended the population projections out to 2051 by simply applying the same fertility and mortality assumptions that SNZ used for the period 2021-2026. There are no new assumptions about fertility and mortality that are made for the additional 25 years. The migration assumptions that underpin the SNZ medium variant projections for the Bay of Plenty TAs have been discussed at some length in Chapter 6 and will not be reviewed further in this chapter.

In June 2001 the six TAs that comprise the Bay of Plenty region as it is defined for this report had a combined population of 250,330. The SNZ medium variant projection for the six TAs indicates that this population could increase by just over 100,000 over the next 50 years to reach 350,870 by 2051. The projections we have prepared for the western Bay of Plenty TAs (variant 3), Rotorua District and the eastern Bay of Plenty TAs (variant 7) suggest that the population could be just over 400,000 (403,320) on the basis of the different migration assumptions we have employed.

In this chapter we review the regional, sub-regional and TA populations generated by the SNZ medium variant and the "modified medium" variant that we have selected for the TA. In the case of the western Bay of Plenty TAs, this is the "constant net migration profile" variant (10,000 national net migration), or variant 3; for the other TAs it is the "variable net migration profile to 2026 and then zero net migration" variant (10,000 national net migration), or variant 7. Attention is paid to the changing sizes of the populations. The profound transformations in population structure are discussed in chapter 9.

8.1 Projected Populations, 2001-2051: a Regional Perspective

8.1.1 Population change 1981-2001 revisited

To set the scene for a discussion of projected population change in the Bay of Plenty TAs it is worth recalling how the populations of different parts of the region have changed over the past 20 years. The populations at each census since 1981 are summarized in Table 29, which also includes the June 2001 estimates for each TA that are used as the base for the 2005 sub-national projection series.

Table 29 Populations of the Bay of Plenty TAs, 1981-2001

Territorial Authority	Census 1981	1986	1991	1996	2001	Increase 1981-01	Mid-year 2001
Western BOP District	22,944	26,620	29,871	34,971	38,232	15,288	39,300
Tauranga City	53,040	59,314	66,737	77,775	90,906	37,866	93,300
Rotorua District	56,025	59,315	61,559	64,509	64,473	8,448	66,900
Whakatane District	30,528	31,254	32,093	33,125	32,814	2,286	34,000
Kawerau District	8,784	8,564	8,339	7,829	6,975	-1,809	7,290
Opotiki District	7,107	7,916	8,667	9,375	9,201	2,094	9,540
BAY OF PLENTY TAs	178,428	192,983	207,266	227,584	242,601	64,173	250,330
Western Bay of Plenty	75,984	85,934	96,608	112,746	129,138	53,154	132,600
Eastern Bay of Plenty	46,419	47,734	49,099	50,329	48,990	2,571	50,830
Rotorua District	56,025	59,315	61,559	64,509	64,473	8,448	66,900

Over the 20 years between the 1981 and 2001 censuses, the population of the Bay of Plenty TAs increased by just over 64,100 – an increase of 36 percent on the 1981 population. Just under 60 percent of this increase was accounted for by growth in the population of Tauranga City, with a further 24 percent due to population growth in Western Bay of Plenty District. Rotorua District and the eastern Bay of Plenty TAs accounted for just over 11,000 or 17 percent of the increase.

8.1.2 Projected population change, 2001-2021

Looking ahead to 2021, the SNZ medium variant projections for the 6 Bay of Plenty TAs produces a population of 307,010 for the region – 56,680 more than the June 2001 estimate, and just under 7,500 fewer than the increase between the censuses in 1981 and 2001 (Table 30).

The projected increase in the population of the western Bay of Plenty sub-region (52,500) to 2021 is only marginally below that recorded between 1981 and 2001 (53,154). The main changes over the next 20 years are, firstly, the shift to an overall decline in the populations for the eastern Bay of Plenty sub-region (-920) after a small increase between 1981 and 2001 (2,571), and secondly a fall in the growth of Rotorua District's population to 5,100 over the 20 years, by comparison with just under 8,500 between the censuses (Tables 29 and 30). The reason for the slower projected growth through to 2021 is because of the impact that persistent net migration losses have on the overall population change in all TAs except the two in the western Bay of Plenty where there are persistent net migration gains.

Table 30 Populations of the Bay of Plenty TAs, 2001-2021: SNZ medium variant

Territorial Authority	Projected Population 2001	2006	2011	2016	2021	Increase 2001-21	Percentage increase
Western BOP District	39,300	43,200	46,900	50,400	53,800	14,500	36.9
Tauranga City	93,300	104,700	113,900	122,700	131,300	38,000	40.7
Rotorua District	66,900	68,400	69,900	71,100	72,000	5,100	7.6
Whakatane District	34,000	34,400	34,500	34,400	34,100	100	0.3
Kawerau District	7,290	6,720	6,320	6,040	5,710	-1,580	-21.7
Opotiki District	9,540	9,610	9,810	9,970	10,100	560	5.9
BAY OF PLENTY TAs	250,330	267,030	281,330	294,610	307,010	56,680	22.6
Western Bay of Plenty	132,600	147,900	160,800	173,100	185,100	52,500	39.6
Eastern Bay of Plenty	50,830	50,730	50,630	50,410	49,910	-920	-1.8
Rotorua District	66,900	68,400	69,900	71,100	72,000	5,100	7.6

The modified medium projection variants that are being used in the Demographic Forecast 2051 Project produce a slightly larger overall increase in the region's population between 2001 and 2021 (Table 31). The aggregate population for the 6 TAs under the variant 3 (western Bay of Plenty) and variant 7 (eastern Bay of Plenty and Rotorua District) projections rises to 316,710 in 2021 – an increase of 66,380 on the June 2001 population. This is a slightly higher numerical increase than that between the 1981 and 2001 censuses (64, 173).

Table 31 Populations of the Bay of Plenty TAs, 2001-2021: modified medium variant

Territorial Authority	Projected Population 2001	2006	2011	2016	2021	Increase 2001-21	Percentage increase
Western BOP District	39,300	43,200	46,900	50,500	54,100	14,800	37.7
Tauranga City	93,300	104,700	116,400	128,500	141,100	47,800	51.2
Rotorua District	66,900	68,400	70,000	71,100	72,000	5,100	7.6
Whakatane District	34,000	34,400	34,400	34,200	33,700	-300	-0.9
Kawerau District	7,290	6,720	6,320	6,040	5,710	-1,580	-21.7
Opotiki District	9,540	9,610	9,810	9,980	10,100	560	5.9
BAY OF PLENTY TAs	250,330	267,030	283,830	300,320	316,710	66,380	26.5
Western Bay of Plenty	132,600	147,900	163,300	179,000	195,200	62,600	47.2
Eastern Bay of Plenty	50,830	50,730	50,530	50,220	49,510	-1,320	-2.6
Rotorua District	66,900	68,400	70,000	71,100	72,000	5,100	7.6

All of the additional 9,700 people in the modified medium projection are found in the population of the western Bay of Plenty TAs, and nearly all of this extra growth is in Tauranga City (Table 31). The population of Rotorua District is the same in 2021 under the modified medium variant as it was under the SNZ medium variant, while the numbers in the eastern Bay of Plenty TAs end up being marginally smaller than those projected by SNZ. This is due to a shift from a very small increase (100) in Whakatane District's population between 2001 and 2021 under SNZ's medium variant projection to a decrease (-300) in the modified medium variant while the projections for Kawerau and Opotiki Districts' populations do not change. The changing age structure of New Zealand's population contributes to higher net migration losses under the modified medium variant.

8.1.3 Projected population change, 2021-2051

Over the 30 years between 2021 and 2051, the differences between the SNZ medium variant and the modified medium variant become more marked, especially for Tauranga City, Rotorua District and the eastern Bay of Plenty TAs. SNZ does not take its sub-national projections out beyond 2026. To obtain projections through to 2051 for the SNZ medium variant, the fertility, mortality and net migration assumptions that applied to the period 2021-2026 have been held constant for the next 25 years.

While these are termed "SNZ medium variant" projections, it should be kept in mind that SNZ's demographers did not produce these projections as part of their official series in February 2005. Their Customer Services section extended the SNZ medium variant projections for the 6 Bay of Plenty TAs, using the 2021-2026 fertility, mortality and net migration assumptions, at the request of the client (the Migration Research Group). It is important to appreciate that these are not "official" projections.

Application of the SNZ medium variant projection assumptions for a further 30 years to the populations of Bay of Plenty TAs results in an increase by almost 60,000 in the western Bay of Plenty's population, and a decline by 16,000 in the rest of the region (-12,240 in the population of the eastern Bay TAs, and –3,700 in Rotorua District's population) (Table 32).

Table 32 Populations of the Bay of Plenty TAs, 2021-2051: SNZ medium variant

Territorial Authority	Projected Population 2021	2026	2031	2041	2051	Increase 2021-51	Percentage increase
Western BOP District	53,800	57,000	60,000	65,000	68,800	15,000	27.9
Tauranga City	131,300	139,800	148,100	163,400	176,100	44,800	34.1
Rotorua District	72,000	72,800	73,000	71,700	68,300	-3,700	-5.1
Whakatane District	34,100	33,600	32,800	30,100	26,200	-7,900	-23.2
Kawerau District	5,710	5,340	4,910	3,810	2,480	-3,230	-56.6
Opotiki District	10,100	10,150	10,100	9,700	8,990	-1,110	-11.0
BAY OF PLENTY TAs	307,010	318,690	328,910	343,710	350,870	43,860	14.3
Western Bay of Plenty	185,100	196,800	208,100	228,400	244,900	59,800	32.3
Eastern Bay of Plenty	49,910	49,090	47,810	43,610	37,670	-12,240	-24.5
Rotorua District	72,000	72,800	73,000	71,700	68,300	-3,700	-5.1

Under these assumptions, the population of Rotorua ends up being smaller than that in the Western Bay of Plenty District, and only marginally greater than it was in 2001. The populations of Whakatane, Kawerau and Opotiki Districts all fall to below their 2001 levels by 2051 (Tables 30 and 32). Indeed, the aggregate population of these three TAs in 2051 (37,670) is less than the June 2001 population for Western Bay of Plenty District (39,300) and 13,160 less than their combined population of 50,830 in June 2001. This is not a particularly realistic forecast for the eastern Bay of Plenty and Rotorua TAs especially.

The modified medium variants produce larger populations than application of the SNZ medium variant assumptions for all TAs except Western Bay of Plenty District in 2051 (Table 33). In the case of Western Bay of Plenty, the net migration profile for this TA that is used in the modified medium variant results in an older migrant population as New Zealand's population ages. While there is a larger net migration gain under the modified medium variant than the SNZ medium variant, its age composition changes and does not result in quite as much natural increase as SNZ's constant age structure for the net migration profile. The smaller population for the Western Bay of Plenty District should not be taken too seriously, though – this TA especially is likely to have a much larger population in 2051 because of spill-over of some of Tauranga City's population growth.

Table 33 Populations of the Bay of Plenty TAs, 2021-2051: modified medium variant

Territorial Authority	Projected Population 2021	2026	2031	2041	2051	Increase 2021-51	Percentage increase
Western BOP District	54,100	57,600	60,700	65,600	68,600	14,500	26.8
Tauranga City	141,100	154,100	166,900	190,400	210,200	69,100	49.0
Rotorua District	72,000	72,700	73,900	75,000	75,300	3,300	4.6
Whakatane District	33,700	33,100	33,200	33,000	32,800	-900	-2.7
Kawerau District	5,710	5,340	5,410	5,600	5,970	260	4.6
Opotiki District	10,100	10,200	10,250	10,250	10,450	350	3.5
BAY OF PLENTY TAs	316,710	333,040	350,360	379,850	403,320	86,610	27.3
Western Bay of Plenty	195,200	211,700	227,600	256,000	278,800	83,600	42.8
Eastern Bay of Plenty	49,510	48,640	48,860	48,850	49,220	-290	-0.6
Rotorua District	72,000	72,700	73,900	75,000	75,300	3,300	4.6

Tauranga City's population increases by 69,100 between 2021 and 2051 under the modified medium variant - an additional 24,300 over the increase produced when the SNZ medium variant assumptions are used. Indeed, 96.5 percent of the projected growth in the Bay of Plenty's population between 2021 and 2051 (86,610) will be in the western Bay of Plenty, if the assumptions that underpin the modified medium variants 3 and 7 come to play out in the future (Table 33).

The balance of the increase is in Rotorua District's population which reaches 75,300 in 2051 under the modified medium variant 7, with its zero net migration assumption from 2026 (see Chapter 6). In this projection variant the eastern Bay of Plenty TAs effectively have the same population in 2051 that they had in 2021 – the zero net migration assumption that applies from 2026 allows Kawerau and Opotiki Districts to move to small overall gains, while the decline in Whakatane District's population, that was gaining pace before 2026, slackens off (Table 30).

If the relatively optimistic assumptions about migration that underpin the projections produced by modified medium variants 3 (western Bay of Plenty TAs) and 7 (Rotorua District and eastern Bay of Plenty TAs) play out, then the population of the Bay of Plenty would increase by just over 86,600 during the 30 years between 2021 and 2051. This is a larger increase than that which occurred between the censuses in 1981 and 2001 (64,173), and in the modified medium variant projections for the 20 years 2001-2021 (66,380). As already noted, nearly all of this increase would be in the western Bay of Plenty TAs. However, spill-over of this growth into Whakatane District as well as some multiplier effects on Rotorua and possibly Kawerau and

Opotiki would see the growth spread more across the region than the TA projections suggest.

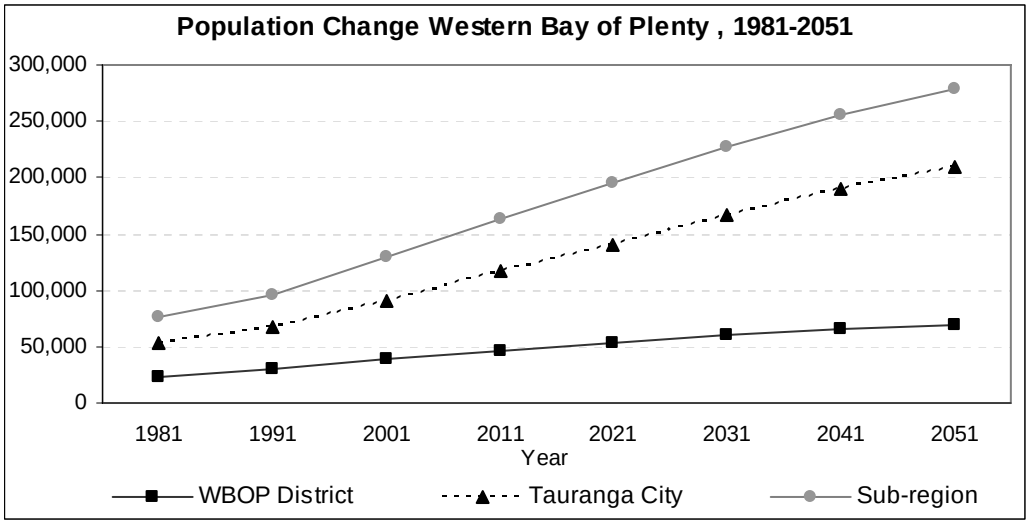
8.1.4 Population trends, 1981-2051 reviewed

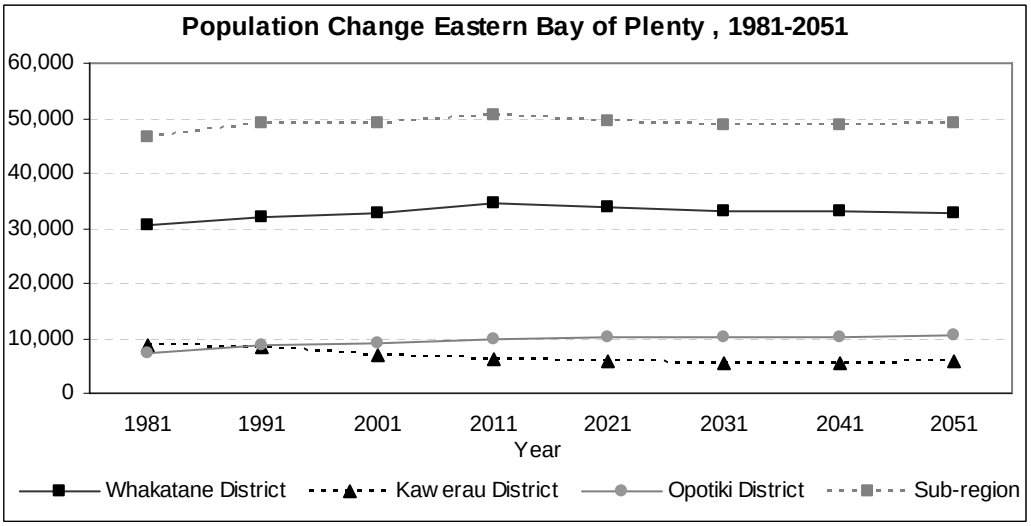
Actual and projected population trends (modified medium variant) between 1981 and 2051 are summed up in Table 34. If the projected population eventuated in 2051, the region would have around 225,000 more residents than it had in 1981 – the population of the region would have more than doubled. Tauranga City's population would have have increased by three times its size (53,000) in 1981.

Table 34 Populations of the Bay of Plenty TAs, 1981-2051: a summary

	Population				Increase	Increase 2001-2051	
Territorial Authority	**1981**	**2001**	**2021**	**2051**	**1981-2051**	**Number**	**Percent**
Western BOP District	22,944	39,300	54,100	68,600	45,656	29,300	127.7
Tauranga City	53,040	93,300	141,100	210,200	157,160	116,900	220.4
Rotorua District	56,025	66,900	72,000	75,300	19,275	8,400	15.0
Whakatane District	30,528	34,000	33,700	32,800	2,272	-1,200	-3.9
Kawerau District	8,784	7,290	5,710	5,970	-2,814	-1,320	-15.0
Opotiki District	7,107	9,540	10,100	10,450	3,343	910	12.8
BAY OF PLENTY TAs	178,428	250,330	316,710	403,320	224,892	152,990	85.7
Western Bay of Plenty	75,984	132,600	195,200	278,800	202,816	146,200	192.4
Eastern Bay of Plenty	46,419	50,830	49,510	49,220	2,801	-1,610	-3.5
Rotorua District	56,025	66,900	72,000	75,300	19,275	8,400	15.0

Over the 50 years of the projection period, the region's population would increase by around 86 percent under the modified medium projection variant used in this analysis. However, there are marked variations in the patterns of growth across the region. These patterns are summed up Figure 4 which traces population change from 1981 to 2051.





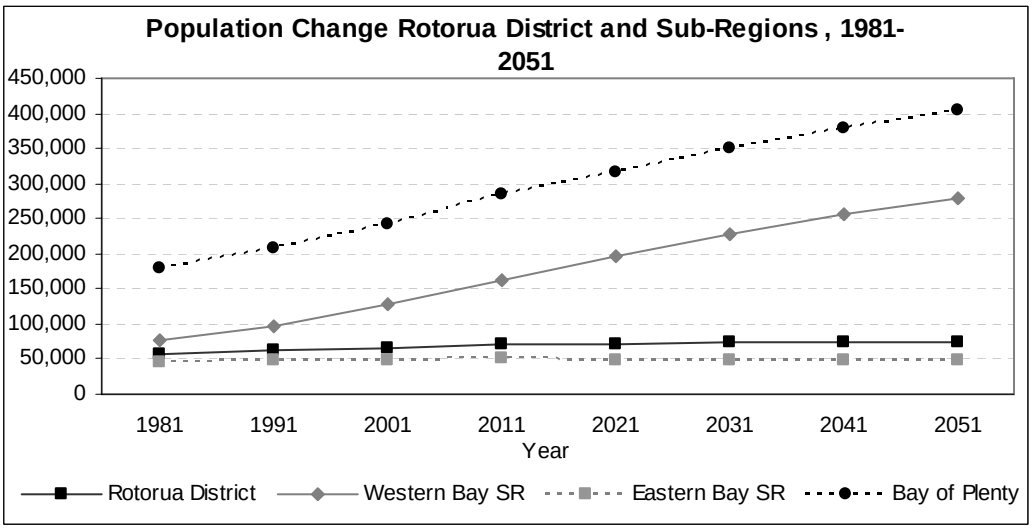


Figure 4 Population change in Bay of Plenty TAs and sub-regions, 1981-2051.

There are clearly two quite distinctive trajectories for population change in the Bay of Plenty: rapid growth in the western Bay of Plenty sub-region (especially Tauranga City), and virtually static population change in Rotorua District and the eastern Bay of Plenty sub-region (Figure 4). Within the western and eastern Bay of Plenty sub-regions there are differences in the growth patterns for specific TAs, but the over-riding demographic reality is that population growth in the Bay of Plenty will be driven by changes in Tauranga City's population, and the spill-over effects this has on the Western Bay of Plenty and Whakatane Districts especially.

The different growth trajectories produce some quite marked variations in age composition in the TA and sub-regional populations over the 50 years. These are reviewed in Chapter 9 with reference to the broad age groups that were used in Chapter 6, and the pyramids that were introduced in Chapter 7. While the numerical changes in the sizes of the populations in some TAs are small, the changes in age composition are much more profound and it is these changes that have the most significant implications for planning for community development in the future.

Chapter 9: Projected population structures

The populations of the Bay of Plenty's TAs and sub-regions will be transformed between 2001 and 2051 as a result of the ageing of highly irregular population structures. In Chapter 7 the evolution of the contemporary population structures in the Bay of Plenty was outlined briefly. In this chapter we summarise the main changes that will occur over the next 50 years under the modified medium variant projections discussed in Chapter 8.

The most important message that emerges from the analysis of changing age structures is that there will be much more variability in the distributions of people by age and sex in each TA than there will be in patterns of population growth. In the eastern Bay of Plenty sub-region and Rotorua District it is changes in population structure rather than population size that have major implications for social planning. In the western Bay of Plenty sub-region, changes in both the sizes and the structures of TA populations are going to be critically important for planners.

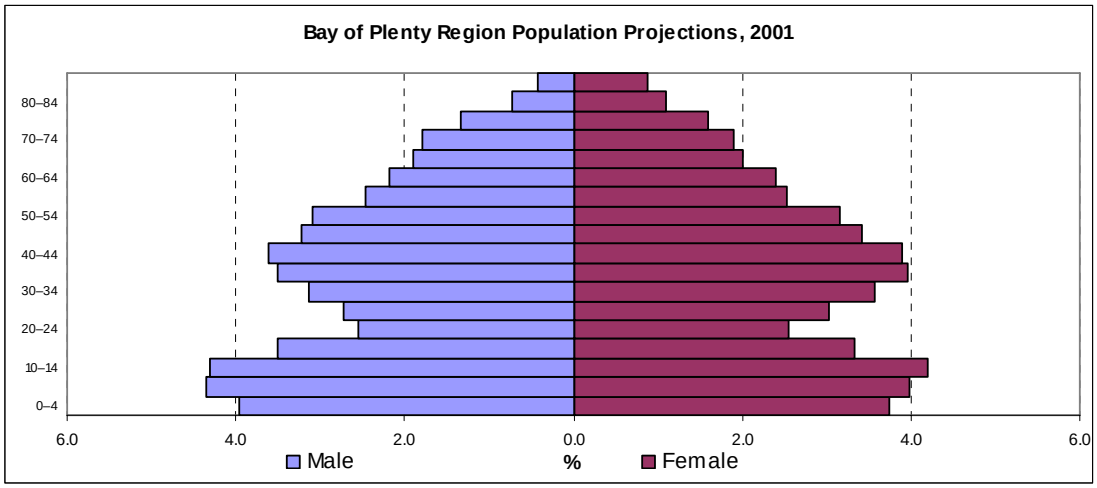
The discussion of projected population structures is presented in two parts. The first part focuses on the regional and sub-regional levels, with reference to both population pyramids as well as some tables summarizing changes in age-sex composition between 2001 and 2051. In the second part, pyramids are used to illustrate the diversity in evolving population structures at the TA level with reference to three years: 2001, 2026 and 2051. More detailed information on the actual numbers at each five year age group, by sex, between 2001 and 2051 can be found in Technical Report.

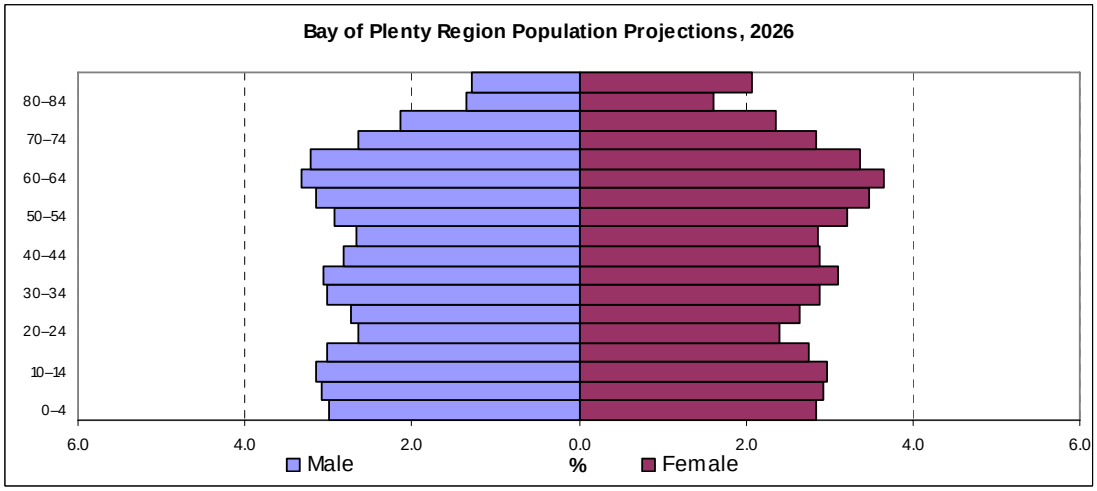
9.1 Regional and sub-regional perspectives

9.1.1 The Bay of Plenty region

Changes in the age composition of the Bay of Plenty's population are presented for three years in Figure 5 and by decade from 2001 through to 2051 in Table 35. During the 50 years the population is projected to increase by 61 percent from 250,330 to 403,320. There will be markedly different patterns of growth for the different age groups, however, ranging from just under 11 percent for the 0-14 year olds, to 134 percent for the 60-79 year olds, and over 460 percent for the population aged 80 and over (Table 35).

The number of people aged 80+ is projected to increase from 7,770 in 2001 to almost 44,000 in 2051. In 2001 this component in the population accounted for 3.1 percent of the residents; by 2051 11 percent of the region's population could be in this age group. This transformation in the older population is reflected in the extensive "cap" on the population pyramid for 2051 by comparison with the narrow apex of the pyramid for the region's population in 2001 (Figure 5).





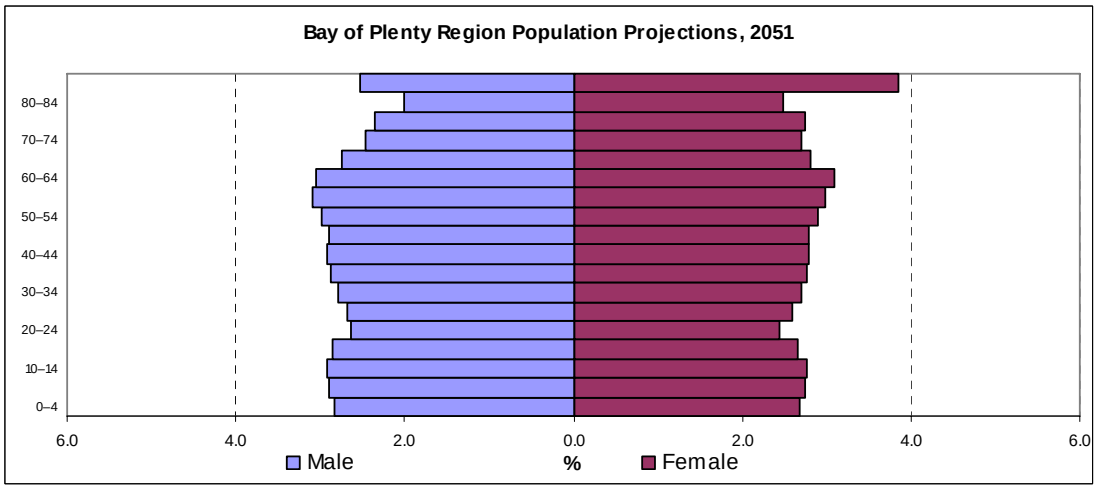


Figure 5 Projected population structure, Bay of Plenty region

The ageing of the population is reflected in the declining percentage aged 0-14 years (down from almost 25 percent of residents in 2001 to just under 17 percent in 2051), the fluctuations and then declines in shares aged 15-24, 25-39 and 40-59, and the increases (with some fluctuations) in the shares of those aged 60-79 and 80+ (Table 35).

Table 35 Bay of Plenty region: changes in age structure, 2001-2051

	Age Group						
Year	**0-14**	**15-24**	**25-39**	**40-59**	**60-79**	**80+**	**Total**
Population							
2001	61,380	29,860	49,860	63,520	37,830	7,770	250,330
2011	60,060	37,110	47,180	78,190	48,800	12,570	283,830
2021	59,020	36,770	55,040	80,580	67,850	17,460	316,710
2031	61,290	38,270	58,380	81,760	84,850	25,810	350,360
2041	63,990	41,080	61,590	89,580	87,520	36,110	379,850
2051	67,910	42,640	66,210	94,210	88,480	43,870	403,320
% population							
2001	24.5	11.9	19.9	25.4	15.1	3.1	100.0
2011	21.2	13.1	16.6	27.5	17.2	4.4	100.0
2021	18.6	11.6	17.4	25.4	21.4	5.5	100.0
2031	17.5	10.9	16.7	23.3	24.2	7.4	100.0
2041	16.8	10.8	16.2	23.6	23.0	9.5	100.0
2051	16.8	10.6	16.4	23.4	21.9	10.9	100.0
% pop. change							
2001-11	-2.2	24.3	-5.4	23.1	29.0	61.8	13.4
2011-21	-1.7	-0.9	16.7	3.1	39.0	38.9	11.6
2021-31	3.8	4.1	6.1	1.5	25.1	47.8	10.6
2031-41	4.4	7.3	5.5	9.6	3.1	39.9	8.4
2041-51	6.1	3.8	7.5	5.2	1.1	21.5	6.2
2001-51	10.6	42.8	32.8	48.3	133.9	464.6	61.1

The actual numbers in the three age groups between 15 and 59 tend to increase through the projection period, with overall increases between 2001 and 2051 being 43 percent (15-24), 33 percent (25-39) and 48 percent (40-59). The Bay of Plenty will not experience an absolute decline in the prime working age groups, although there will be some fluctuations in numbers over the different five year periods as a result of the disordered cohort effect mentioned in Chapter 7.

During the projection period the young working population (15-24 years) ranges mainly between 11 and 12 percent of the total while the 25-39 year olds range between 16 and 20 percent, and the older workforce (40-59) years, between 23 and 28 percent of the total. The biggest changes are in the youngest and the oldest age groups (Table 35).

9.2 Sub-regional Perspectives

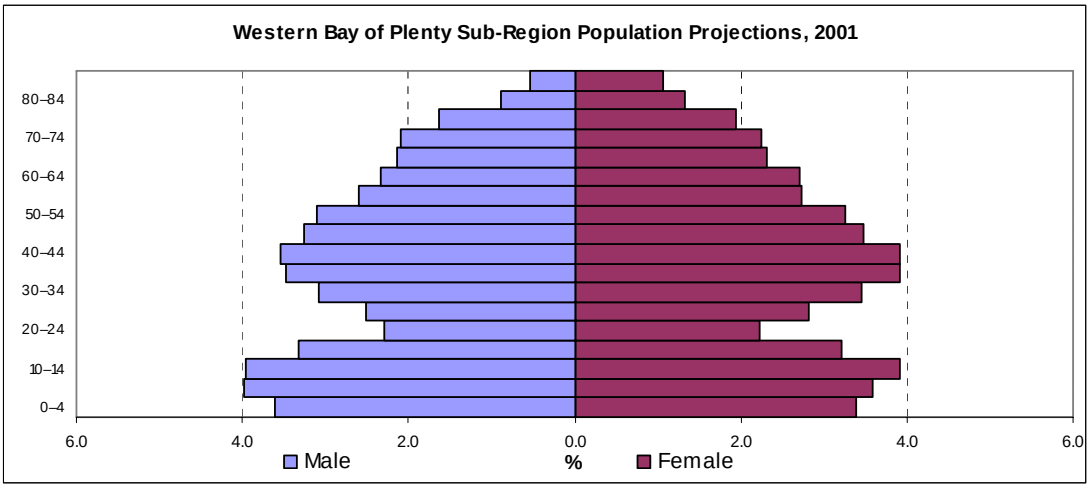
9.2.1 Western Bay of Plenty sub-region

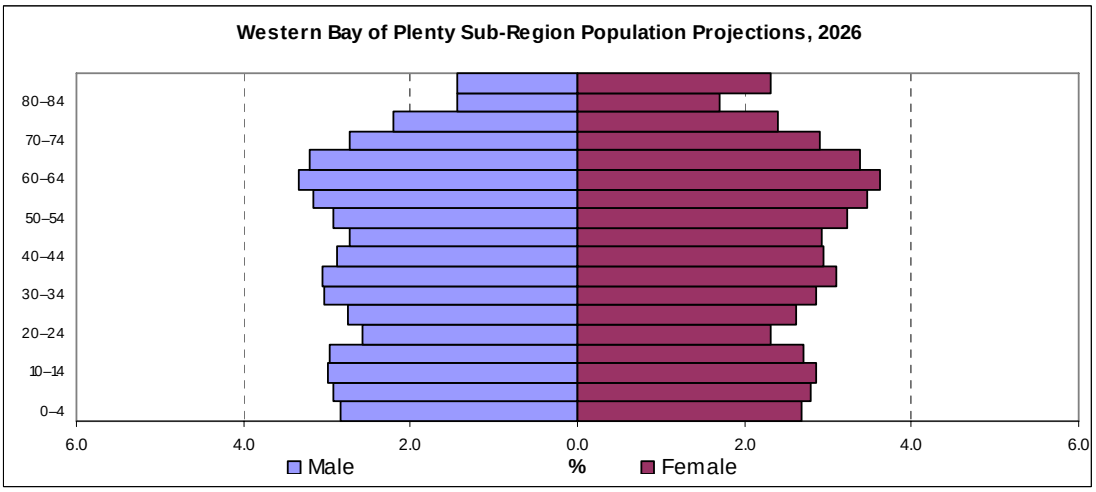
In the western Bay of Plenty sub-region, the more rapid population growth outlined in Chapter 8 is reflected in greater percentage changes in the numbers of residents in the different age groups (Table 36). The sub-region's population is projected to more than double, reaching close to 280,000 in 2051 from a base of just over 132,000 in 2001.

Table 36 Western Bay of Plenty sub-region: changes in age structure, 2001-2051

	Age Group						
Year	**0-14**	**15-24**	**25-39**	**40-59**	**60-79**	**80+**	**Total**
Population							
2001	29,770	14,650	25,530	34,340	23,120	5,090	132,600
2011	32,170	20,080	27,100	45,080	30,270	8,650	163,300
2021	34,440	21,840	33,860	50,010	42,960	12,100	195,200
2031	38,140	23,000	38,290	54,060	56,150	17,990	227,600
2041	41,160	25,480	40,040	62,300	61,390	25,630	256,000
2051	43,490	27,700	42,810	67,560	64,750	32,530	278,800
% population							
2001	22.5	11.0	19.3	25.9	17.4	3.8	100.0
2011	19.7	12.3	16.6	27.6	18.5	5.3	100.0
2021	17.6	11.2	17.3	25.6	22.0	6.2	100.0
2031	16.8	10.1	16.8	23.8	24.7	7.9	100.0
2041	16.1	10.0	15.6	24.3	24.0	10.0	100.0
2051	15.6	9.9	15.4	24.2	23.2	11.7	100.0
% pop. change							
2001-11	8.1	37.1	6.1	31.3	30.9	69.9	23.2
2011-21	7.1	8.8	24.9	10.9	41.9	39.9	19.5
2021-31	10.7	5.3	13.1	8.1	30.7	48.7	16.6
2031-41	7.9	10.8	4.6	15.2	9.3	42.5	12.5
2041-51	5.7	8.7	6.9	8.4	5.5	26.9	8.9
2001-51	46.1	89.1	67.7	96.7	180.1	539.1	110.3

The largest percentage increases over the 50 years will be in the older population groups (180 percent for the 60-79 year olds, and just under 540 percent for the 80+ population). This is clearly reflected in the widening "cap" on the pyramids shown in Figure 6. The youthful and adult populations will also show quite significant growth, with the 0-14 year olds increasing by 46 percent, those aged 15-24 years by 89 percent, and the 25-39 and 40-59 year age groups increasing by 68 and 97 percent respectively (Table 36).





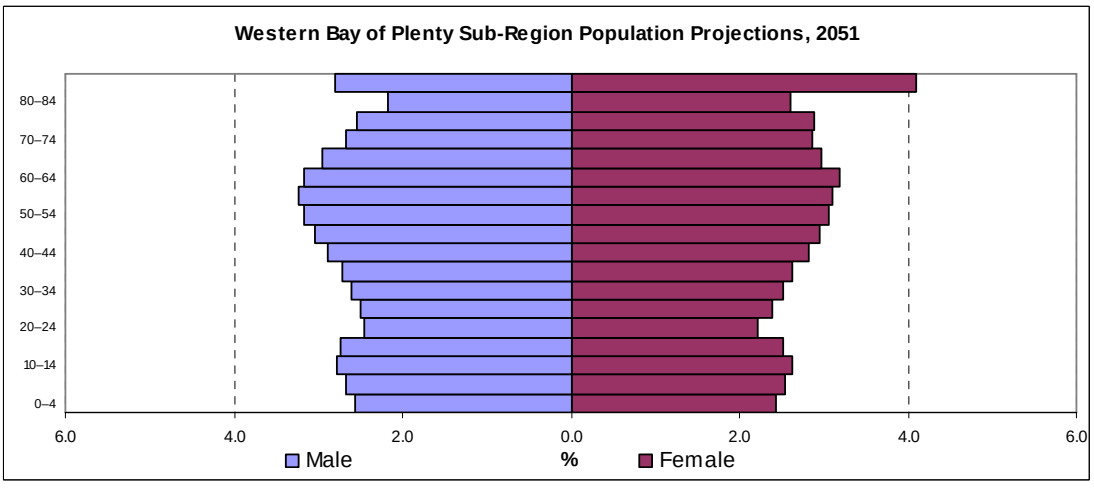


Figure 6 Projected population structure, western Bay of Plenty sub-region

There are some quite marked fluctuations in the percentage increases by decade in the different age groups, reflecting the passage through the age structure of cohorts of varying sizes due mainly to fluctuations in fertility. The ageing of the baby boom generations has a major impact on the changing shares of the older population, while the "baby blip" on the late 1980s/early 1990s has a ripple effect on numbers at successively older ages through the projection period (Table 36 and Figure 6).

The western Bay of Plenty's population is "older" than the population for the region as a whole, with just over 21 percent aged 60 and over in 2001 rising to just under 35 percent in 2051 (Table 36 and Figure 6). This compares with 18.2 and 32.8 percent respectively in the Bay of Plenty's population (Table 35 and Figure 5). The increases in both size and proportion of older people in the Western Bay of Plenty sub-region by 2051 are also greater in the modified medium projection variant used this project, than those found in Statistics New Zealand's modified medium variant projections. These higher forecasts for the older population can be attributed to the way estimates of net migration have been incorporated into the projections produced for the Demographic Forecast 2051 Project (Chapter 6)

9.2.2 Eastern Bay of Plenty sub-region

The eastern Bay of Plenty sub-region experiences quite different changes in the age composition of its population between 2001 and 2051. The numbers in the age groups under 60 years are projected to be smaller in 2051 than they are were in 2001, although the 15-24 year and 25-29 year age groups will increase in size at times during the 50 years (Table 37). The percentage increases in the older population (37 percent for those aged 60-79 years, and 334 percent for those aged 80 and over) are also quite a bit lower than those for the same age groups in the western Bay of Plenty. This is largely because of the much higher proportion of Maori, with their younger age-sex structures, in the eastern Bay of Plenty and Rotorua populations than is found in the western Bay of Plenty TAs (Chapter 5).

Between 2031 and 2041 the majority of the post-war baby boom cohorts who are still alive will move out of the 60-69 year age group into the 80+ age group. This will result in a shift from growth (2001-2031) to decline (2031-2041) in numbers in the 60-79 year age group in the eastern Bay of Plenty, and a fall to much slower growth in the population in this older age group than is found in the western Bay of Plenty (Tables 36 and 37).

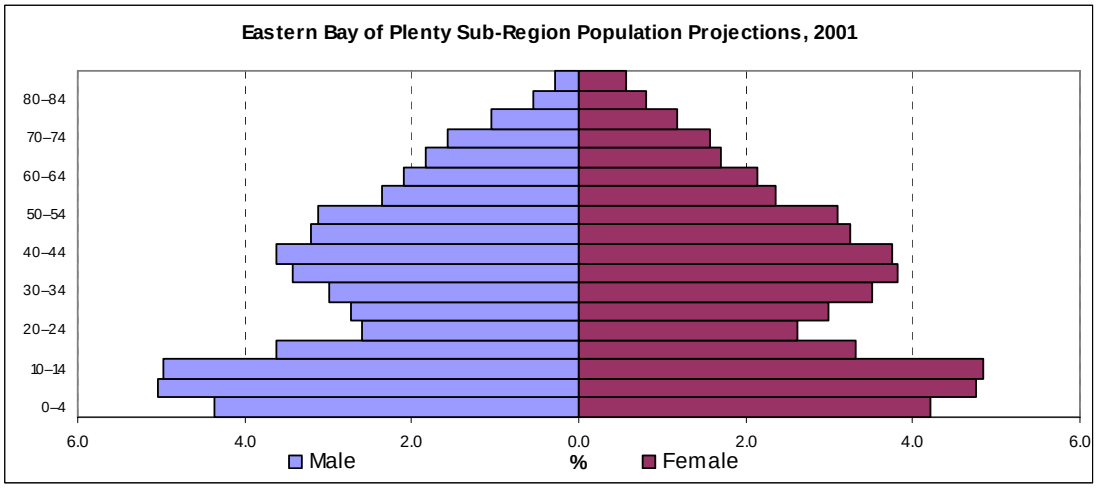
Despite this contraction in numbers aged 60-79 in the latter years of the projection period, it is clear from Table 37 that the population of the eastern Bay of Plenty is projected to begin increasing again, especially in the age groups 0-14 and 25-30 years, under the modified medium variant with zero net migration from 2026. This growth is not found in Statistics New Zealand's official modified medium variant for the eastern Bay of Plenty TAs (Chapters 7 and 8). It is entirely due to the different net migration assumptions used in the projections for the 2051 Demographic Forecast 2051 Project.

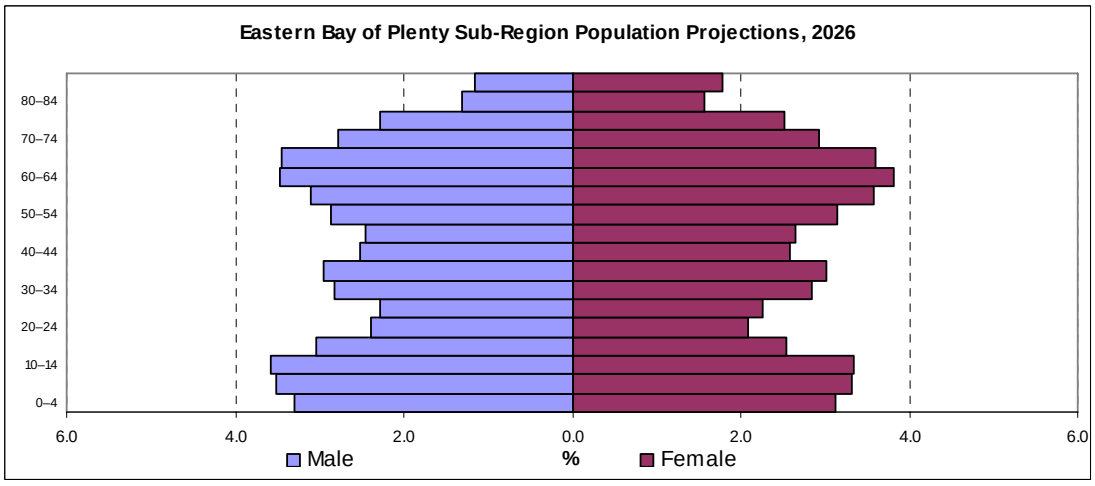
Table 37 Eastern Bay of Plenty sub-region: changes in age structure, 2001-2051

	Age Group						
Year	**0-14**	**15-24**	**25-39**	**40-59**	**60-79**	**80+**	**Total**
Population							
2001	14,320	6,170	9,950	12,590	6,690	1,120	50,830
2011	12,020	6,940	7,770	13,750	8,380	1,740	50,530
2021	10,370	5,480	8,090	12,250	10,920	2,420	49,510
2031	9,300	6,080	7,110	10,700	12,150	3,530	48,860
2041	8,870	6,420	8,220	10,130	10,550	4,650	48,850
2051	10,160	5,710	9,680	9,580	9,190	4,860	49,220
% population							
2001	28.2	12.1	19.6	24.8	13.2	2.2	100.0
2011	23.8	13.7	15.4	27.2	16.6	3.4	100.0
2021	20.9	11.1	16.3	24.7	22.1	4.9	100.0
2031	19.0	12.4	14.6	21.9	24.9	7.2	100.0
2041	18.2	13.1	16.8	20.7	21.6	9.5	100.0
2051	20.6	11.6	19.7	19.5	18.7	9.9	100.0
% pop. change							
2001-11	-16.1	12.5	-21.9	9.2	25.3	55.4	-0.6
2011-21	-13.7	-21.0	4.1	-10.9	30.3	39.1	-2.0
2021-31	-10.3	10.9	-12.1	-12.7	11.3	45.9	-1.3
2031-41	-4.6	5.6	15.6	-5.3	-13.2	31.7	0.0
2041-51	14.5	-11.1	17.8	-5.4	-12.9	4.5	0.8
2001-51	-29.1	-7.5	-2.7	-23.9	37.4	333.9	-3.2

The population pyramids for the eastern Bay of Plenty sub-region (Figure 7) differ from those for the western Bay of Plenty sub-region (Figure 6) and the region as a whole (Figure 5) in two important ways in 2001, 2026 and 2051. Firstly, they all have a significantly wider base, reflecting the younger age structure in the eastern Bay of Plenty that is due to greater representation of Maori in the sub-region's population. This comparative "youthfulness' results in some much greater percentage shifts in the shares of people in the younger age groups over the projection period than are found in either the western Bay of Plenty or the region.

The second difference is in the smaller shares of people in the older age groups, especially those aged 60 and over. This is clearly evident in the population pyramid for 2051 for the eastern Bay of Plenty, where the shares of people in the age groups above 60 are smaller, and the "cap" on the pyramid representing the population aged 85 and over is not quite so pronounced (Figure 7).





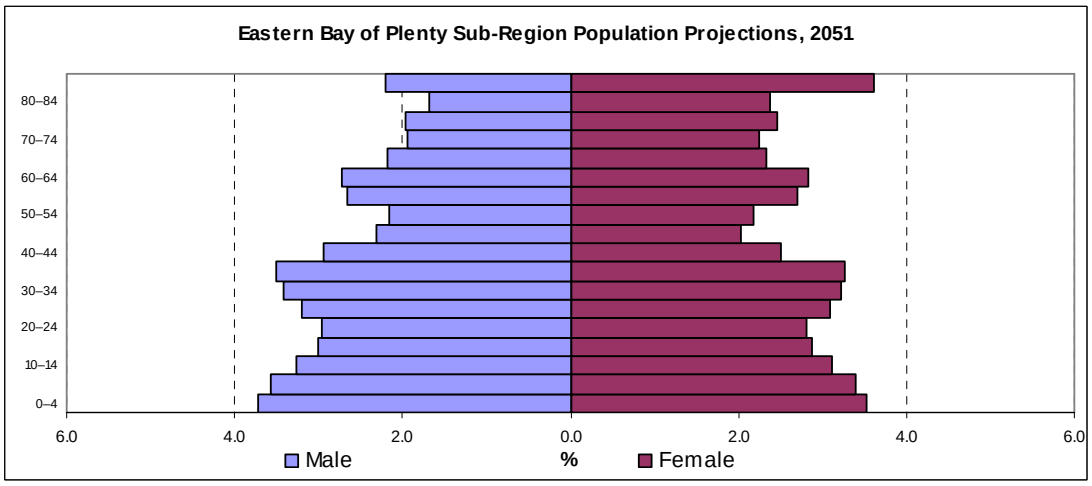


Figure 7 Projected population structure, eastern Bay of Plenty sub-region

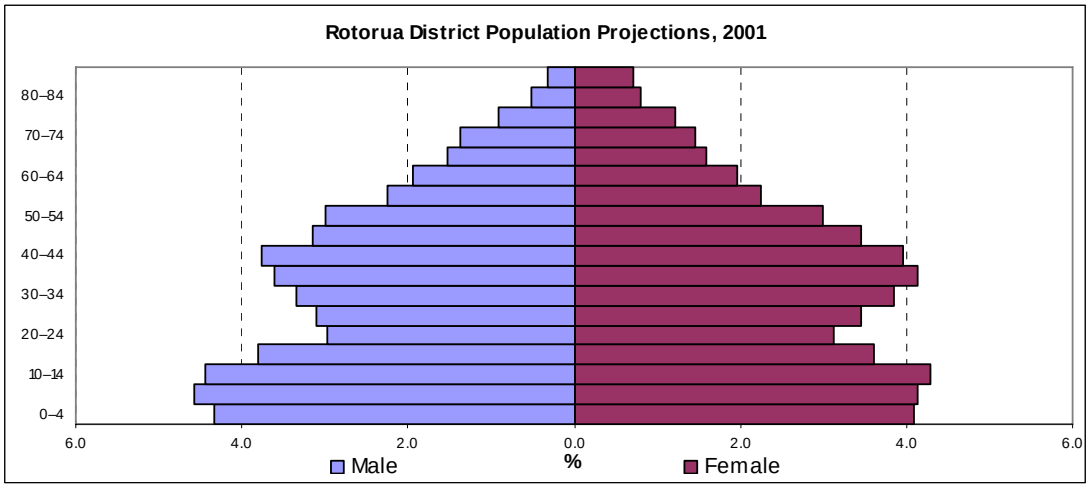
9.2.3 Rotorua district

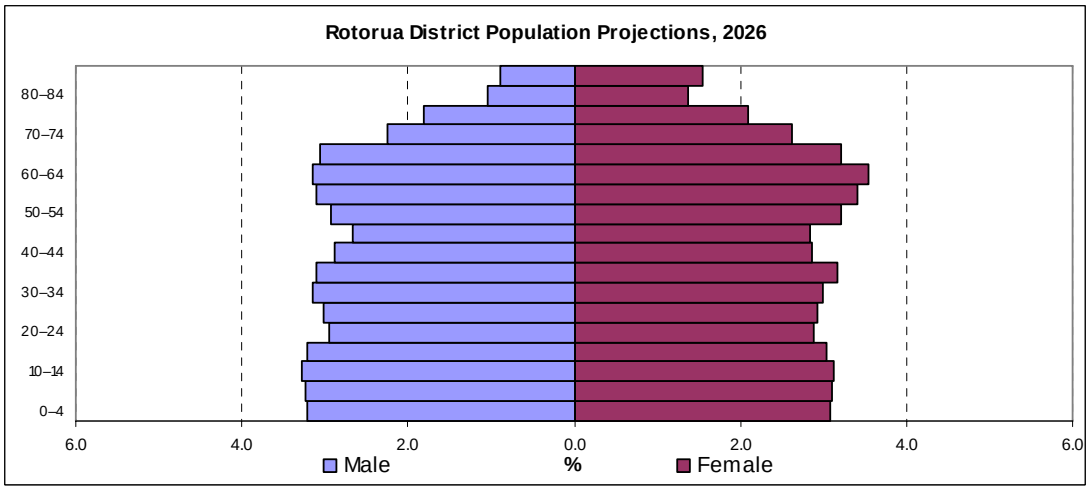
The patterns of change in Rotorua District's age structure over the projection period fall between those of the western and eastern Bay of Plenty sub-regions. In each of the decades the District's population increases, in contrast to the eastern Bay of Plenty's population which falls slowly through to 2041, but the increase in Rotorua is at a much slower rate than is found in the western Bay of Plenty (Table 38).

Table 38 Rotorua District: changes in age structure, 2001-2051

	Age Group						
Year	**0-14**	**15-24**	**25-39**	**40-59**	**60-79**	**80+**	**Total**
Population							
2001	17,290	9,040	14,380	16,590	8,020	1,560	66,900
2011	15,870	10,090	12,310	19,360	10,150	2,180	70,000
2021	14,210	9,450	13,090	18,320	13,970	2,940	72,000
2031	13,850	9,190	12,980	17,000	16,550	4,290	73,900
2041	13,960	9,180	13,330	17,150	15,580	5,830	75,000
2051	14,260	9,230	13,720	17,070	14,540	6,480	75,300
% population							
2001	25.8	13.5	21.5	24.8	12.0	2.3	100.0
2011	22.7	14.4	17.6	27.7	14.5	3.1	100.0
2021	19.7	13.1	18.2	25.4	19.4	4.1	100.0
2031	18.7	12.4	17.6	23.0	22.4	5.8	100.0
2041	18.6	12.2	17.8	22.9	20.8	7.8	100.0
2051	18.9	12.3	18.2	22.7	19.3	8.6	100.0
% pop. change							
2001-11	-8.2	11.6	-14.4	16.7	26.6	39.7	4.6
2011-21	-10.5	-6.3	6.3	-5.4	37.6	34.9	2.9
2021-31	-2.5	-2.8	-0.8	-7.2	18.5	45.9	2.6
2031-41	0.8	-0.1	2.7	0.9	-5.9	35.9	1.5
2041-51	2.1	0.5	2.9	-0.5	-6.7	11.1	0.4
2001-51	-17.5	2.1	-4.6	2.9	81.3	315.4	12.6

The overall increase in the District's population is projected to be just under 13 percent, with the major growth being in the two older age groups. The increase in the population aged 80 and over (315 percent) is, however, lower than either of the sub-regions due to the high proportion of Maori in the population of the District. This is also reflected in the smaller shares aged 60 and over in 2001 (14.3 percent) and 2051 (27.9 percent) than in the two sub-regions, and the correspondingly smaller "cap" on the population pyramid (Figure 8).





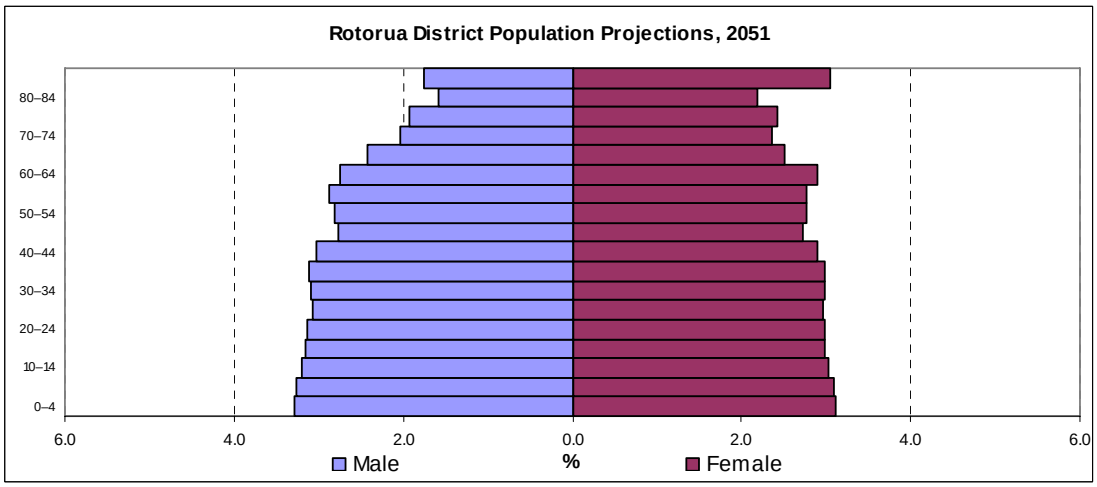


Figure 8 Projected population structure, Rotorua District

The population pyramid for Rotorua District has a much more regular structure than that for the eastern Bay of Plenty sub-region in 2026 and 2051. This reflects both the greater size of the projected population (75,300 in Rotorua District by 2051, under the assumptions for the modified medium projection variant, compared with 49,220 in the eastern Bay of Plenty) and the fact that there is only one base population structure that is being projected forward. In the case of the eastern Bay of Plenty sub-region the population pyramids are the product of aggregating the projections of three base populations for the respective TAs.

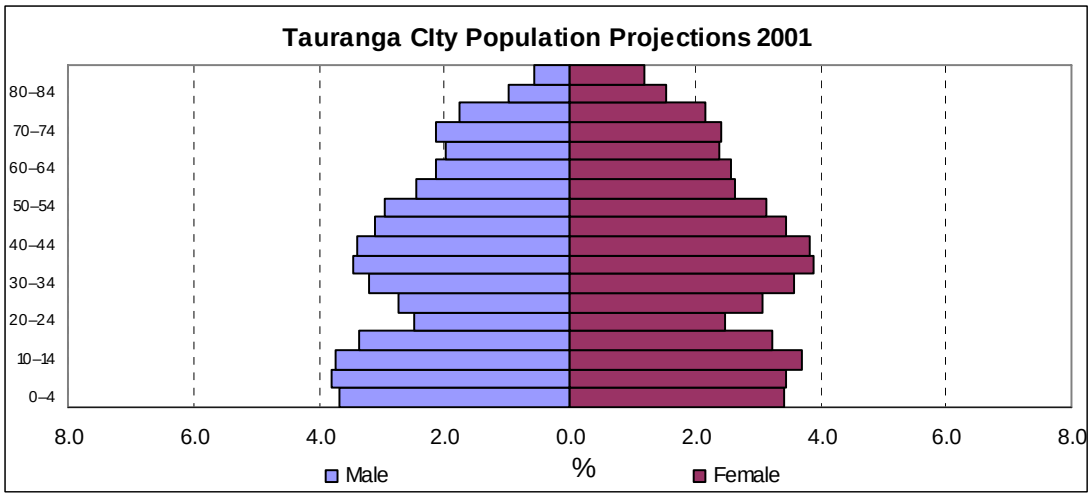
9.3 Changing structures of TA populations

When population pyramids are prepared for each of the TAs in the Bay of Plenty, the variability in both the base age-sex structures in 2001, and the way these structures evolve over the 50 years of the projection period, become very apparent. Figure 9 contains the population pyramids for Tauranga District, Western Bay of Plenty District, Whakatane District, Kawerau District and Opotiki District in 2001, 2026 and 2051. The ones for Rotorua District are given in Figure 8.

The distinguishing feature of the pyramids for TAs is the variability in their structures, especially in 2026 and 2051. This reflects both the differences in their base structures in 2001 (Chapter 7) and the ways the assumptions for fertility, mortality and net migration under the modified medium projection variants chosen for each TA play out in terms of structural change over the 50 years. These variations will not be discussed in detail here; the primary purpose of the Demographic Forecast 2051 Project was to obtain forecasts for the eastern Bay of Plenty sub-region and Rotorua District (Chapter 1). However, it is worth noting the diversity in outcomes for population structure produced by the modified medium variant projections, if for no other reason than to demonstrate the significant variability in projected populations when working at the TA level.

It should be kept in mind when reflecting on the trends suggested in the pyramids for TA populations that in some cases, such as those for Western Bay of Plenty District and Tauranga City, the pyramids shown in Figure 9 for 2026 and 2051 are produced from base populations for the respective TAs in 2001 and are treated as separate populations. Given that Tauranga City's population can only grow to the levels projected for 2051 by spilling over into Western Bay of Plenty District, it makes more sense to examine structural change in these populations at the sub-regional level.

A similar point can be made about the projected populations for Kawerau District and Whakatane District – Kawerau's population will be very much affected by what happens in Whakatane and Rotorua Districts over the next 50 years, and Whakatane District's population will be impacted by the expansion along the coast of Tauranga City's population. Sub-regional population structures, rather than those at the TA level, other than for Rotorua District and, perhaps, Opotiki District, are more meaningful for planning purposes.


Tauranga CIty Population Projections 2001
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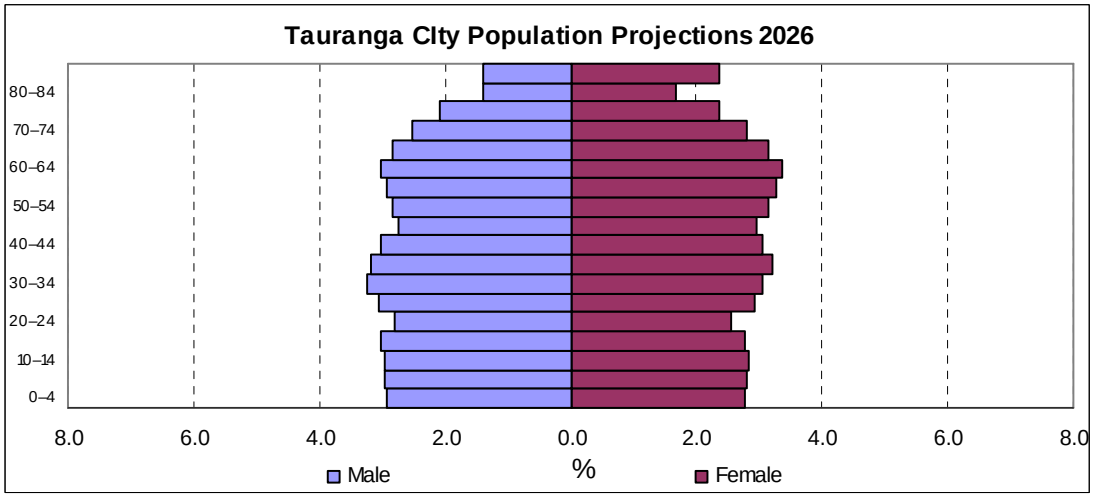
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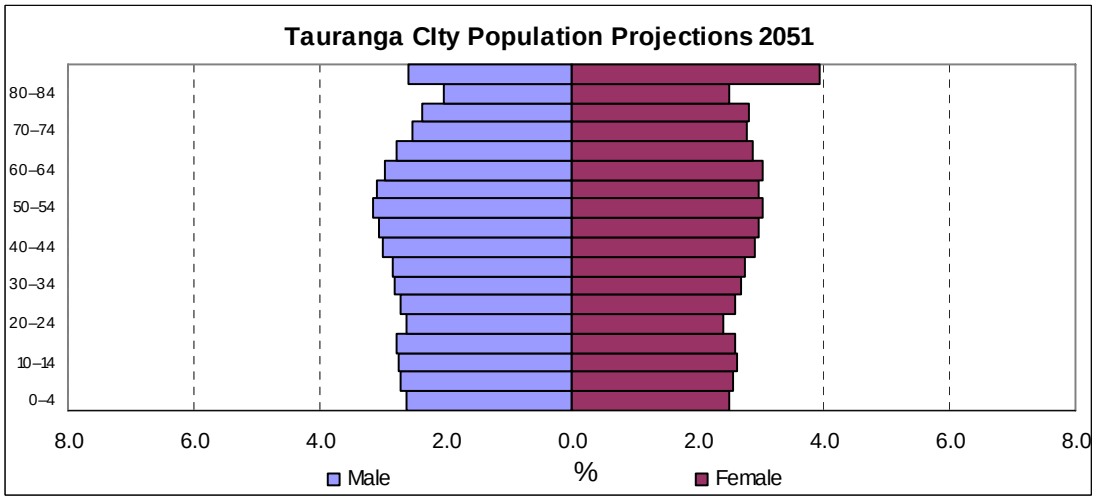
Tauranga CIty Population Projections 2051
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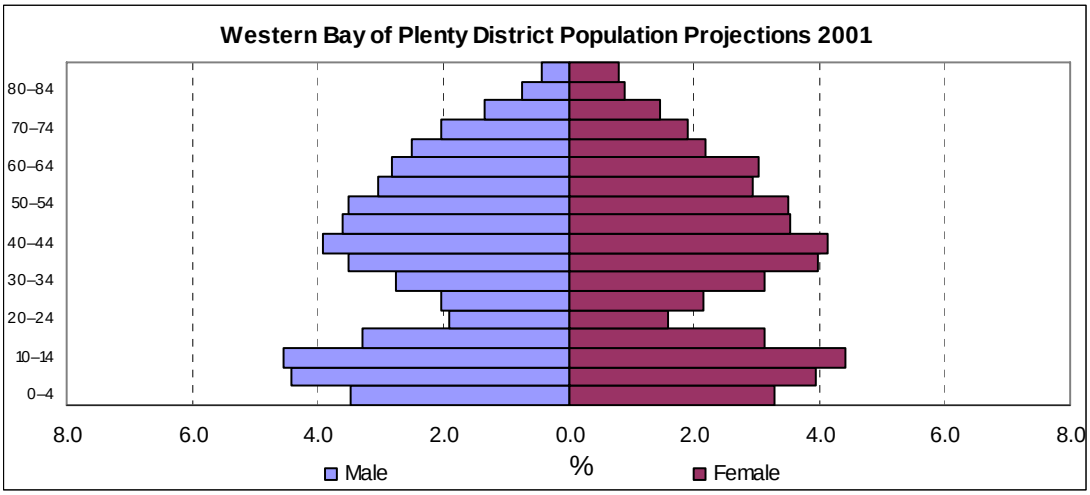
Western Bay of Plenty District Population Projections 2001
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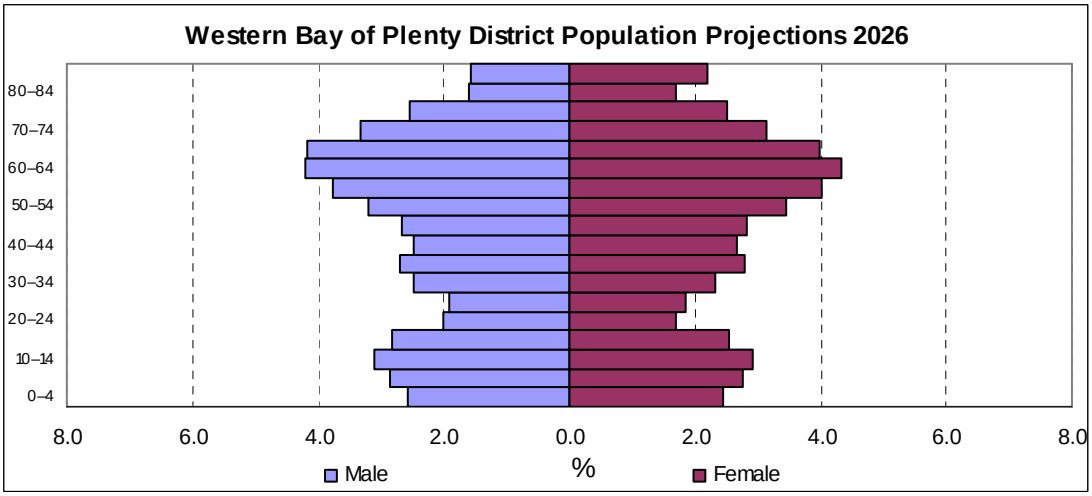
Western Bay of Plenty District Population Projections 2026
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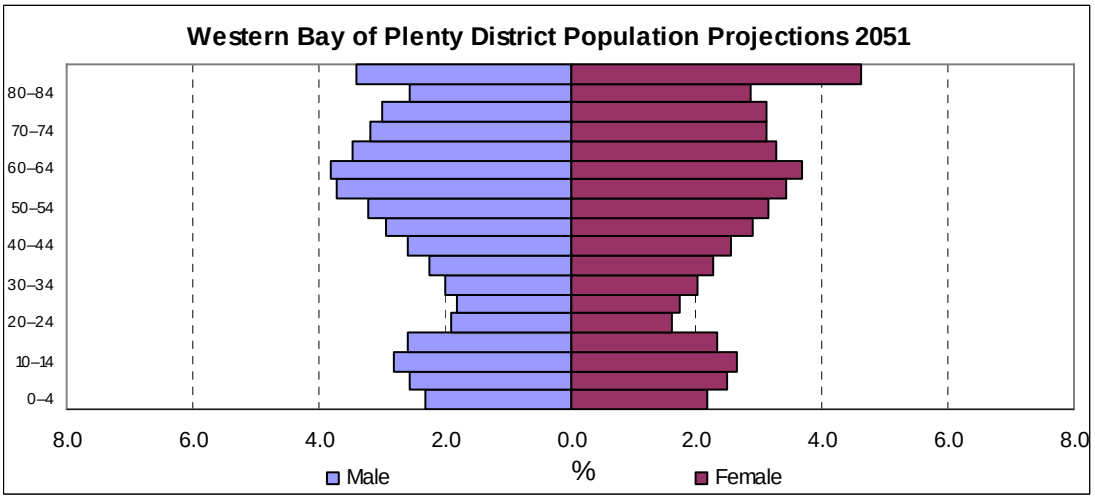
Western Bay of Plenty District Population Projections 2051
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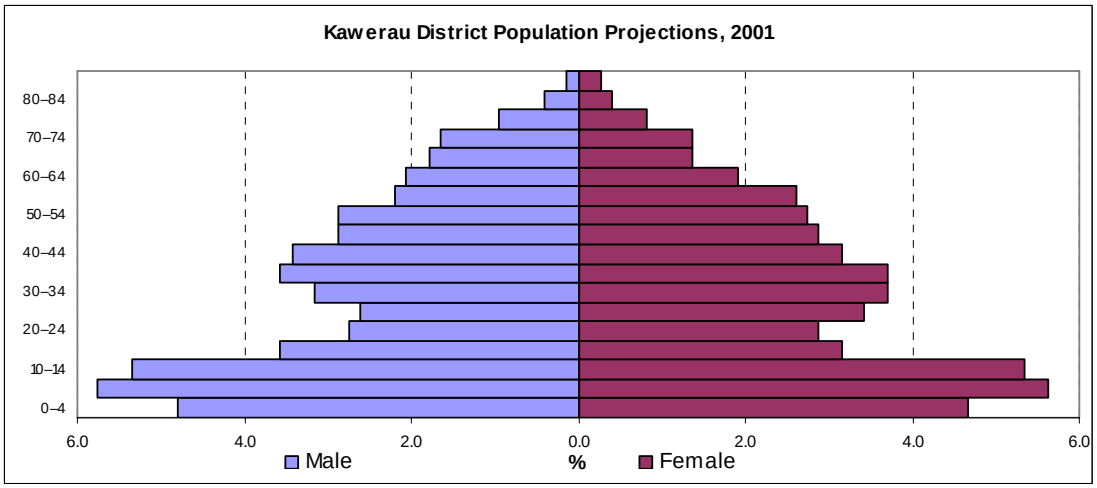
Kawerau District Population Projections, 2001
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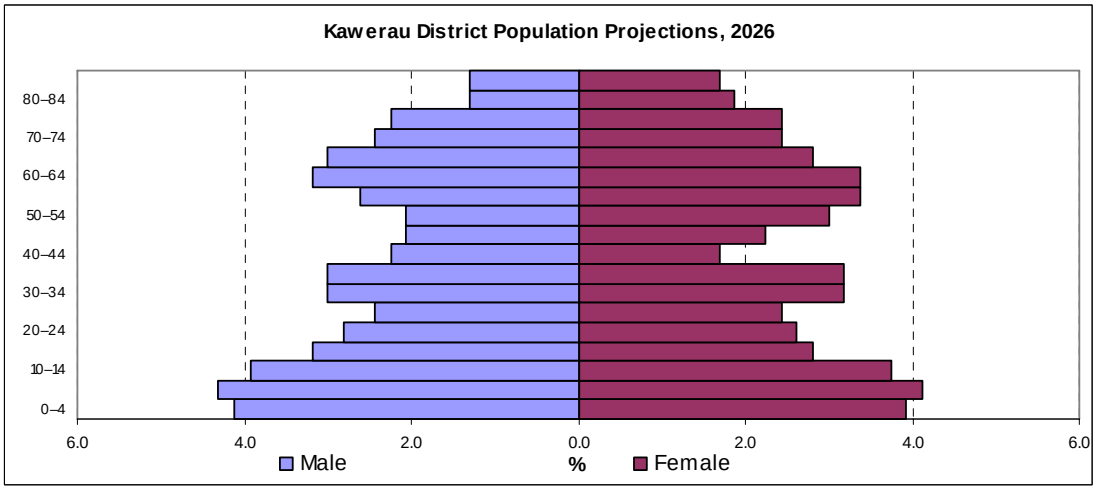
Kawerau District Population Projections, 2026
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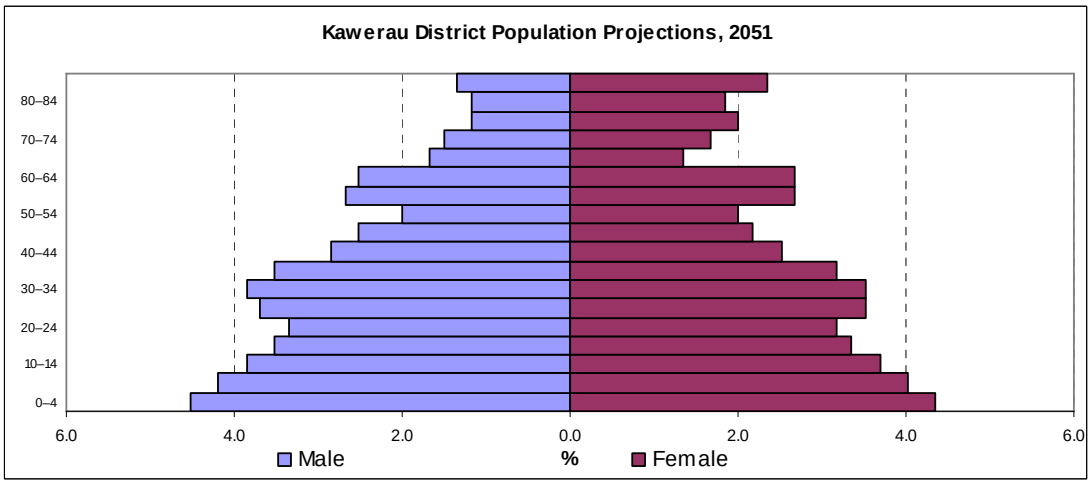
Kawerau District Population Projections, 2051
80–84
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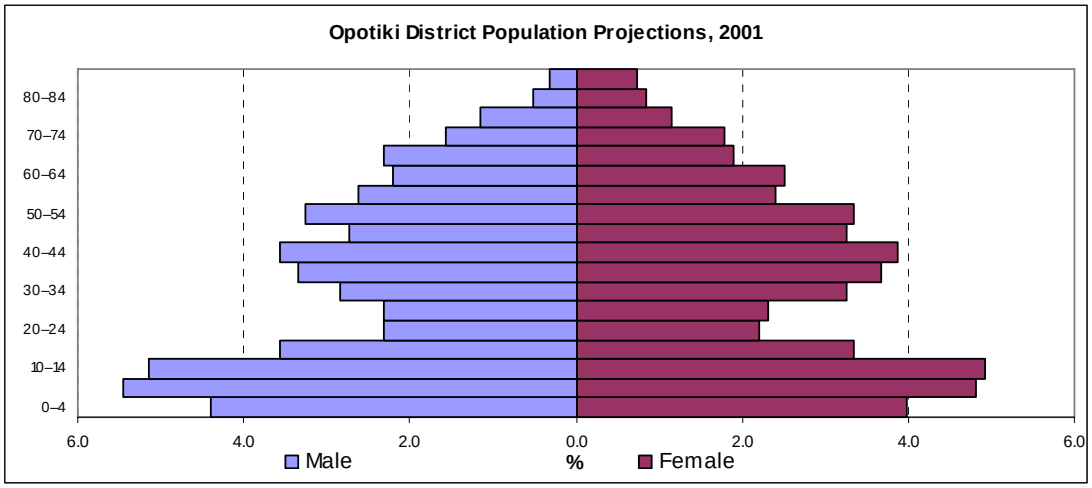

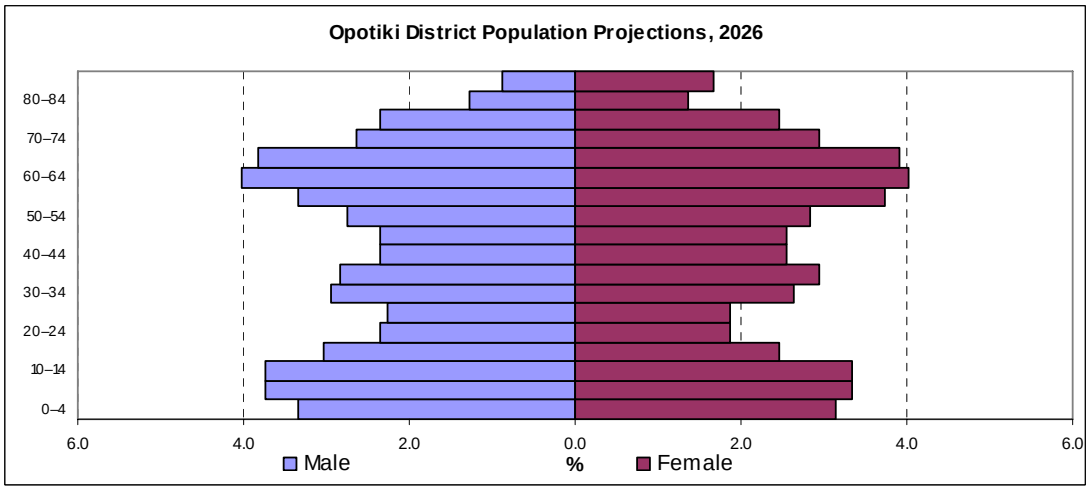

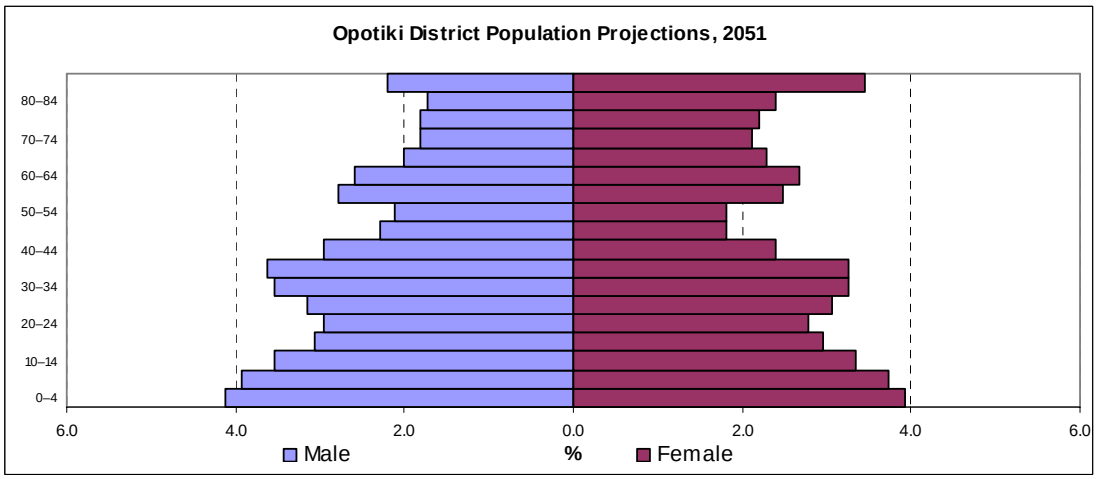

Figure 9 Projected population structures: Bay of Plenty TAs

Changes in the structures of the TA populations, in terms of shares in three broad age groups (0-14, 15-64, and 65 years and over) are summarized in Table 39. As noted earlier, more detailed information on the projected numbers at each five year age group can be found in Appendix 1.

Table 39 Bay of Plenty TAs: changes in population structure, 2001-2051

Year	TA WBPD	TC	RD	WD	KD	OD	BoP
% population. 0-14							
2001	24.1	21.8	25.9	27.3	31.4	28.6	24.5
2011	19.9	19.6	22.7	23.1	27.4	23.8	21.2
2021	17.3	17.8	19.7	20.2	24.6	21.4	18.6
2031	16.2	17.0	18.7	18.2	23.3	19.4	17.5
2041	15.4	16.3	18.6	17.2	22.1	19.0	16.9
2051	15.0	15.8	18.9	19.3	24.6	22.5	16.8
% population 15-64							
2001	61.6	61.2	63.7	61.5	59.6	59.1	61.8
2011	62.2	62.5	65.0	62.9	59.0	61.4	63.0
2021	59.3	61.5	63.4	59.9	57.0	58.7	61.2
2031	54.0	58.6	59.3	55.9	54.4	54.2	57.5
2041	51.7	57.0	57.9	55.5	57.3	54.5	56.1
2051	52.4	57.0	58.8	56.1	59.0	55.5	56.5
% population 65+							
2001	14.3	17.0	10.4	11.2	9.0	12.3	13.6
2011	17.9	17.9	12.4	14.0	13.6	14.8	15.9
2021	23.4	20.7	16.9	19.9	18.4	19.9	20.1
2031	29.7	24.5	22.0	26.0	22.2	26.4	25.0
2041	32.9	26.7	23.5	27.3	20.7	26.5	27.1
2051	32.6	27.2	22.3	24.6	16.4	21.9	26.7

The variations in population structure in the base populations (2001) are clearly evident in the higher shares of older people in Tauranga City (17.0 percent) and Western Bay of Plenty District (14.3 percent) by comparison with Rotorua District and the eastern Bay of Plenty TAs (Table 39). By comparison, the latter TAs have higher shares of their base populations aged 0-14 years. These differences in the younger and older populations persist through the projection period, with the western Bay of Plenty TAs consistently having “older“ populations than those in the eastern Bay of Plenty and Rotorua (Table 39).

In the case of the population aged 15-64 years – the bulk of the working age people – the shifts are more variable with Rotorua District having the highest proportion of its 2001 population in this broad age group (63.7 percent) and Kawerau ending up with the highest proportion (59.0) in 2051. The Districts with the lowest proportions in this age group in 2001 and 2051 are Opotiki and Western Bay of Plenty District respectively (Table 39), although as noted earlier the Western Bay of Plenty District figure does not mean much given that its population structure in the future will be profoundly influenced by the spill over of people in Tauranga City’s projected population.

The processes that determine the changes in population structure that have been described in this chapter are fertility, mortality and migration. In the next chapter we outline their respective contributions to the changes in the populations projected for the Bay of Plenty TAs, sub-regions and region. Attention is focused on the effect that the migration assumptions used in the Demographic Forecast 2051 Project have on changes in the numbers of people in both the total population as well as in selected age groups of the TAs and sub-regions.

Chapter 10: Projected components of population growth

The two components of population growth are natural increase (the balance of births over deaths) and net migration (the difference between in- and out-migration). In this chapter we consider contributions to the growth (or decline) in the regional, sub-regional and TA populations in the Bay of Plenty between 2001 and 2051 that are made by natural increase and net migration. Not surprisingly, the contributions vary across the TAs as a result of differing proportions of Maori with their higher fertility and mortality, divergent base population structures, and variations in net migration assumptions.

The first section identifies the contributions made by natural increase and net migration to population change between 2001 and 2051 under the modified medium projection variants used in Chapters 8 and 9. In the second section the role of net migration as a driver of population change is assessed in terms of its direct and indirect contributions. The direct contribution is made by the difference between in- and out-migrants; the indirect contribution relates to the births and deaths amongst the migrant population. Most analysis of migration in the context of future population growth focuses on the direct contribution. However, in the Bay of Plenty it is important to consider both types of contribution because of the quite different patterns of growth in the western sub-region on the one hand, and Rotorua and the eastern sub-region on the other.

10.1 The components of growth

The region's population is projected to increase by around 153,000 between 2001 and 2051 on the basis of the projections we have used. Of this total growth, only 27,000 (17.6 percent) is projected to be the result of natural increase – the balance between 194,800 births and 167,800 deaths over the 50 years (Table 40). The bulk of the growth, 126,000 (82.3 percent) is accounted for by the direct contribution of net migration – the balance between those moving into the Bay of Plenty and those moving out (Table 41).

As has already been shown in earlier chapters, only the western Bay of Plenty TAs have net migration gains between 2001 and 2051; the eastern Bay of Plenty TAs and Rotorua District all experience net losses under the modified medium projection variants. In the light of these quite divergent situations, it is useful to consider the contributions made by natural increase and net migration separately.

10.1.1 Natural increase

Table 40 summarises the projected births, deaths and natural increase by decade as well as for the 50 year period as a whole. The processes responsible for natural increase, fertility and mortality, are discussed with reference to the projected births and deaths.

Table 40 Births, deaths and natural increase, 2001-2051

Territorial Authority	2001-11	2011-21	2021-31	2031-41	2041-51	2001-51
Births						
Western BOP District	4860	4970	5380	5470	5640	26320
Tauranga City	13630	15370	17710	19330	20840	86880
Rotorua District	10540	9500	9380	9380	9620	48420
Whakatane District	4970	4260	3850	3850	4370	21300
Kawerau District	1230	920	800	860	1030	4840
Opotiki District	1460	1340	1250	1350	1640	7040
BAY OF PLENTY TAs	36690	36360	38370	40240	43140	194800
Western Bay of Plenty	18490	20340	23090	24800	26480	113200
Eastern Bay of Plenty	7660	6520	5900	6060	7040	33180
Rotorua District	10540	9500	9380	9380	9620	48420
Deaths						
Western BOP District	3280	4280	5840	8060	10110	31570
Tauranga City	8820	10770	13720	18770	24110	76190
Rotorua District	4960	5410	6520	8200	9360	34450
Whakatane District	2440	2750	3280	4100	4540	17110
Kawerau District	490	540	600	670	660	2960
Opotiki District	800	870	1050	1330	1470	5520
BAY OF PLENTY TAs	20790	24620	31010	41130	50250	167800
Western Bay of Plenty	12100	15050	19560	26830	34220	107760
Eastern Bay of Plenty	3730	4160	4930	6100	6670	25590
Rotorua District	4960	5410	6520	8200	9360	34450
Natural increase						
Western BOP District	1580	690	-460	-2590	-4470	-5250
Tauranga City	4810	4600	3990	560	-3270	10690
Rotorua District	5580	4090	2860	1180	260	13970
Whakatane District	2530	1510	570	-250	-170	4190
Kawerau District	740	380	200	190	370	1880
Opotiki District	660	470	200	20	170	1520
BAY OF PLENTY TAs	15900	11740	7360	-890	-7110	27000
Western Bay of Plenty	6390	5290	3530	-2030	-7740	5440
Eastern Bay of Plenty	3930	2360	970	-40	370	7590
Rotorua District	5580	4090	2860	1180	260	13970

10.2 Births

In the case of births, two patterns are apparent at the sub-regional level. The first is found in the western Bay of Plenty TAs, where numbers of births increase progressively through the 50 years, rising from 18,490 in the sub-region between 2001 and 2011 to 26,480 for the decade between 2041 and 2051 (Table 40). In the decade 2001-2011, the western Bay of Plenty sub-region accounted for 50 percent of the region's projected 36,690 births; by 2041-51 the sub-region is projected to account for 61 percent of the region's 43,140 births.

Contributing to both the increasing numbers as well as the share of births are the net migration gains to the populations of both the Western Bay of Plenty District and Tauranga City that have been described in Chapter 6. An indication of the magnitude of this contribution to births is given later in the chapter; it is sufficient to note here that migrants, especially those in their 20s, 30s and 40s, carry with them their reproductive potential, and this potential is a significant determinant of future population change in those regions they enter or leave.

In the eastern Bay of Plenty and Rotorua the numbers of births fall through the first three decades of the century before stabilizing between 2031-41 and then beginning to rise again (Table 40). This is despite the fact that these parts of the Bay of Plenty have higher shares of Maori, with their higher birth rates, in their populations. Clearly a process is operating to remove some of the reproductive potential of these areas, and that process is obviously net migration losses, especially between 2001 and 2026 before the zero net migration assumption is introduced under the medium projection variant for these parts of the region (see Chapter 6).

Over the 50 years of the projection period the assumptions behind the modified medium projection variants result in around 113,200 births in the western Bay of Plenty sub-region (58 percent of the 194,800 for the region as a whole), 33,180 (17 percent) in the eastern Bay of Plenty, and 48,420 (25 percent) in Rotorua District. The distributions by TA are shown in the first part of Table 40.

10.3 Deaths

All TAs and the two sub-regions show progressive increases in the numbers of deaths over the five decades. In the western Bay of Plenty sub-region, numbers almost treble from 12,100 in the decade 2001-11 to 34,220 in the decade 2041-51 (Table 40). For the eastern Bay of Plenty sub-region and Rotorua District the increases in numbers of deaths are more modest, almost doubling in both cases between 2001-11 and 2041-51.

Deaths in the western Bay of Plenty between 2001 and 2011 (12,100), account for just over 58 percent of the region's total projected deaths (20,790). By 2041-51 this share has risen to 68 percent. The numbers of deaths are projected to increase faster than the numbers of births, especially in the Western Bay of Plenty District; a sign that net migration gains are not only adding some reproductive potential to the area's population, but also contributing to the ageing of the non-Maori population especially, and the growing numbers of deaths in this population as it gets older.

In the eastern Bay of Plenty and Rotorua the slower increase in numbers of deaths is due to two factors: the younger Maori population and the net loss of people through migration which is removing some of those who would have contributed, eventually, to the deaths in their former places of residence. However, unlike the situation with regard to births, there is no absolute decrease in deaths per decade in any of the periods shown in Table 40; the ageing of the populations in all TAs in the Bay of Plenty ensures that the numbers of deaths rise progressively between 2001 and 2051 (Table 40).

The total number of deaths during the 50 years is 167,800 – just under two thirds (107,760 or 64 percent) of which are projected to be in the western Bay of Plenty. A further 21 percent (34,450) of the deaths are projected for Rotorua, with the eastern Bay of Plenty TAs accounting for the remaining 15 percent (25,590).

10.4 Natural increase

Natural increase remains positive over most decades in most of the TAs because the number of births exceeds the number of deaths. However, in Western Bay of Plenty District, negative natural increase, when deaths exceed births, begins in the 2020s under these projection assumptions, followed by Whakatane District in the 2030s, and Tauranga City in the 2040s. In the other three TAs natural increase is projected to remain positive throughout the 50 years (Table 40).

Because of the more rapid ageing of the population in the Western Bay of Plenty District (the population pyramids in Figure 9 for this District show this trend quite clearly), which is in part a function of the age of many of the migrants who retire into this area as well as into Tauranga City, the western Bay of Plenty sub-region experiences the smallest overall natural increase (5,440) over the 50 years (Table 40). There is a much larger increase in Rotorua District's population as a result of natural increase (13,970), followed by just under 8,000 for the 50 years in the eastern Bay TAs.

The patterns of natural increase shown for the Bay of Plenty TAs are quite optimistic, by comparison with SNZ's projections for population growth in many parts of rural and small-town New Zealand. In some parts of the country negative natural increase is already the pattern, and many TAs outside of metropolitan areas or their neighbouring peripheries are scheduled to have more deaths than births occurring by the 2020s.

In summary, the 113,200 births in the western Bay of Plenty sub-region are almost cancelled out by the 107,760 deaths that are projected for the next 50 years. The balance – 5,440 people – makes a very small contribution to the total population growth (146,210) projected for this part of the Bay of Plenty (Table 41). In the cases of the eastern Bay of Plenty and Rotorua District the contributions made by natural increase to overall population change are much greater, thanks to the net migration losses (Table 41).

Table 41 Natural increase, net migration and population change, 2001-2051

Territorial Authority	2001-11	2011-21	2021-31	2031-41	2041-51	2001-51
Natural increase						
Western BOP District	1580	690	-460	-2590	-4470	-5250
Tauranga City	4810	4600	3990	560	-3270	10690
Rotorua District	5580	4090	2860	1180	260	13970
Whakatane District	2530	1510	570	-250	-170	4190
Kawerau District	740	380	200	190	370	1880
Opotiki District	660	470	200	20	170	1520
BAY OF PLENTY TAs	15900	11740	7360	-890	-7110	27000
Western Bay of Plenty	6390	5290	3530	-2030	-7740	5440
Eastern Bay of Plenty	3930	2360	970	-40	370	7590
Rotorua District	5580	4090	2860	1180	260	13970
Net migration						
Western BOP District	6090	6540	7060	7420	7460	34570
Tauranga City	18360	20040	21820	22940	23040	106200
Rotorua District	-2500	-2040	-1000	0	0	-5540
Whakatane District	-2080	-2220	-1080	0	0	-5380
Kawerau District	-1700	-1000	-490	0	0	-3190
Opotiki District	-400	-180	-80	0	0	-660
BAY OF PLENTY TAs	17770	21140	26230	30360	30500	126000
Western Bay of Plenty	24450	26580	28880	30360	30500	140770
Eastern Bay of Plenty	-4180	-3400	-1650	0	0	-9230
Rotorua District	-2500	-2040	-1000	0	0	-5540
Population change						
Western BOP District	7670	7230	6600	4830	2990	29320
Tauranga City	23170	24640	25810	23500	19770	116890
Rotorua District	3080	2050	1860	1180	260	8430
Whakatane District	450	-710	-510	-250	-170	-1190
Kawerau District	-960	-620	-290	190	370	-1310
Opotiki District	260	290	120	20	170	860
BAY OF PLENTY TAs	33670	32880	33590	29470	23390	153000
Western Bay of Plenty	30840	31870	32410	28330	22760	146210
Eastern Bay of Plenty	-250	-1040	-680	-40	370	-1640
Rotorua District	3080	2050	1860	1180	260	8430

10.5 Net migration and population change

The net migration gains and losses to different parts of the region have already been discussed. It is sufficient here to note that for the western Bay of Plenty sub-region the direct contribution made by net migration to population growth in all decades between 2001 and 2051 is much larger than the contribution made by natural increase (Table 41). In the eastern Bay of Plenty and Rotorua District, net migration is negative for the first three decades in the projection period, before being held at zero after 2026. Natural remains positive, except for net losses in Whakatane District from 2031 (Table 41).

Population change is simply the sum of natural increase and net migration. Three patterns emerge when these two components are added together for the TAs and sub-regions in the Bay of Plenty (Table 41). Firstly there is the "high growth" western sub-region associated with significant net gains to Tauranga's population over the 50 years. Net migration (106,200) accounts for 91 percent of the projected population increase of 116, 890 in Tauranga City. Natural increase (10,690) contributes just over 9 percent, and this includes the contributions to births (and deaths) made by migration during the 50 years.

The Western Bay of Plenty District's population, if it is considered in isolation of what is happening in Tauranga, grows by 29,320 during the 50 years (Table 41). This is actually less than the direct contribution made by net migration (34,570), and the lower figure for growth comes as a result of a negative figure for natural increase over the period (-5,250).

It should be emphasized that treating the two western Bay TAs as separate populations for projection purposes is unrealistic because Tauranga's projected growth cannot be accommodated within the boundaries of the present city. For this reason it is much better to examine population growth in the western Bay of Plenty at the sub-regional rather than the TA level, and this is what was done for the WBOP SmartGrowth Project.

The second pattern of population change is found in Rotorua and Opotiki Districts – overall growth at modest levels due to natural increase being greater than net migration losses in all decades during the projection period (Table 41). In the case of Rotorua District, over two thirds (9,670 or 69 percent) of the total natural increase (13,970) for the 50 years comes between 2001 and 2021. In Opotiki District, the share of overall natural increase (1,520) in the first two decades (1,130 or 74 percent) is even greater.

This pattern of higher levels of natural increase earlier in the projection period than those found later is due to the significant contribution made by the current youthful Maori population to natural increase. In these two TAs net migration losses between 2001 and 2026, before the zero net migration assumption is introduced, are smaller than the contributions made by natural increase, resulting in population growth rather than decline through the 50 years.

The third pattern of population change is recorded for Whakatane and Kawerau Districts, where net migration losses more than account for the contributions made by net migration between 2001 and 2026. The zero net migration assumption from 2026 allows Kawerau's population to "recover' a little as a result of natural increase, but in the case of Whakatane, natural increase is projected to become negative by 2031, resulting in population change remaining negative as well (Table 41).

The combined effects of natural increase and net migration on Kawerau's population between 2001 and 2021 result in a further sizeable overall decline in the population by 1,580 (Table 41). Even though natural increase continues to fall in the District for the next two decades (2021-2041), net migration losses are also projected to fall and become zero after 2026, resulting in a return to positive growth.

In Whakatane District, on the other hand, natural increase (2,530) is projected to be larger than the net migration losses (-2,080) only during the first decade of the projection period (Table 41). In subsequent decades net migration losses exceed natural increase, and by 2031 the latter has become negative as a result of the number of deaths exceeding the number of births. Whakatane District covers a very large area from the coast through to and beyond Murupara. There are quite divergent populations and population trends within this large District with the coastal strip including Whakatane and Ohope experiencing population growth while other parts of the District are faced with declining numbers. Some separate projections for the coastal zone would be useful for planners.

10.6 Summary

The contributions to population change made by natural increase and net migration differ quite markedly across the Bay of Plenty TAs and sub-regions. Variations in the ways the two components of growth affect both the directions of population change, as well as the sizes of the populations at different times during the projection period, must be appreciated by planners – the region's demographic future is not going to be determined by the same mix of net migration and natural increase in all TAs and sub-regions. It is also important to appreciate that natural increase, as shown in Tables 40 and 41, is itself affected by migration during the projection period.

In the next section we disaggregate the direct and indirect contributions that migration makes to population change by comparing a set of hypothetical population estimates for the region's TAs and sub-regions, derived using projections that have zero net migration throughout the 50 years, with the estimates we obtain using the modified medium variant migration assumptions. In this way we can isolate the overall effect that migration has on population change under the assumptions employed in the modified medium variants.

10.7 The overall contribution of net migration to growth

Migration contributes to population change in two ways, firstly by people moving into and out of areas, with the balance between in and out movement being the net migration, and secondly through the effect that the movement of people into and out of areas has on births and deaths and thus on natural increase. Table 42 summarises the populations that result from application of the zero and modified medium migration assumptions.

Table 42 Populations under modified medium and zero net migration assumptions, 2001-2051

Territorial Authority	2001	2011	2021	2031	2041	2051
Modified medium net migration						
Western BOP District	39300	46900	54100	60700	65600	68600
Tauranga City	93300	116400	141100	166900	190400	210200
Rotorua District	66900	70000	72000	73900	75000	75300
Whakatane District	34000	34400	33700	33200	33000	32800
Kawerau District	7290	6320	5710	5410	5600	5970
Opotiki District	9540	9810	10100	10250	10250	10450
BAY OF PLENTY TAs	250330	283830	316710	350360	379850	403320
Western Bay of Plenty	132600	163300	195200	227600	256000	278800
Eastern Bay of Plenty	50830	50530	49510	48860	48850	49220
Rotorua District	66900	70000	72000	73900	75000	75300
Zero net migration						
Western BOP District	39300	40900	42900	44500	44800	45300
Tauranga City	93300	97100	100200	103000	103500	102700
Rotorua District	66900	73000	78700	84000	87300	89400
Whakatane District	34000	36900	40100	43200	45100	46900
Kawerau District	7290	8280	9390	10600	11700	12950
Opotiki District	9540	10400	11500	12700	13700	14950
BAY OF PLENTY TAs	250330	266580	282790	298000	306100	312200
Western Bay of Plenty	132600	138000	143100	147500	148300	148000
Eastern Bay of Plenty	50830	55580	60990	66500	70500	74800
Rotorua District	66900	73000	78700	84000	87300	89400
Differences due to migration						
Western BOP District	0	6000	11200	16200	20800	23300
Tauranga City	0	19300	40900	63900	86900	107500
Rotorua District	0	-3000	-6700	-10100	-12300	-14100
Whakatane District	0	-2500	-6400	-10000	-12100	-14100
Kawerau District	0	-1960	-3680	-5190	-6100	-6980
Opotiki District	0	-590	-1400	-2450	-3450	-4500
BAY OF PLENTY TAs	0	17250	33920	52360	73750	91120
Western Bay of Plenty	0	25300	52100	80100	107700	130800
Eastern Bay of Plenty	0	-5050	-11480	-17640	-21650	-25580
Rotorua District	0	-3000	-6700	-10100	-12300	-14100

10.7.1 The zero net migration variant

The hypothetical zero net migration variant differs from the modified medium variant in just one way – there is no addition or deletion of people due to migration through the 50 year projection period. The base population structures in 2001 are the same, and the fertility and mortality assumptions that are applied to this base structure to derive estimates of births and deaths are the same for both projection variants. The differences in the sizes of the populations produced by the two projection variants are due entirely to the net migration that is built into the modified medium variant.

10.7.2 The western Bay of Plenty

Because net migration makes a positive contribution to population change in the western Bay of Plenty sub-region, the zero net migration variant produces smaller populations at each year than the modified medium variant (Table 42). Thus, the population in 2021 for Tauranga City under the zero net migration variant is 100,200 compared with 141,100 under the modified medium variant. The overall contribution made by net migration between 2001 and 2021 is thus 40,900. By 2051 the combined direct and indirect contributions made by migration total 107,500 – more than the total resident population in the TA in 2001 (Table 42). The actual populations projected for Tauranga City in 2051 under the two variants are 102,700 (zero net migration) and 210,200 (modified medium net migration).

Western Bay of Plenty District also has higher populations under the assumptions used in the modified medium variant than under the zero net migration assumption because it experiences positive net migration throughout the projection period (Table 41). Thus, in 2021 the population for this TA is 11,200 greater under the modified medium variant (54,100) than it would be under the zero net migration variant (42,900). By 2051 this difference has grown to 23,300, with the populations being either 68,600 (modified medium) or 45,300 (zero net migration (Table 42).

For the western Bay of Plenty sub-region as a whole the overall contribution that migration makes to population growth over the 50 years is 130,800 – the difference between 278,800 (modified medium) and 148,000 (zero net migration). The 130,600 contribution is almost as large as the resident population in the sub-region (132,600) in 2001 (Table 42).

10.7.3 The eastern Bay of Plenty and Rotorua District

In the eastern Bay of Plenty and in Rotorua District the zero net migration variant produces larger populations at every year than the modified medium variant (Table 42). This is because of the net migration losses between 2001 and 2026 and the cumulative impact these have on the populations of these TAs before a zero net migration assumption is introduced in the modified medium variant from 2026.

It should be noted here, to avoid possible confusion, that the zero net migration projection variant has zero net migration from 2001 in ALL TAs. The modified medium projection variant has zero net migration in Rotorua and the eastern Bay of Plenty TAs from 2026.

The most positive outcome for the zero net migration variant is found in the eastern Bay of Plenty sub-region where a population of 74,800 is produced for 2051 compared with the modified medium variant's 49,220 (Table 42). The difference of 25,580 is the equivalent of half the sub-region's resident population of 50,830 in 2001. In the case of Rotorua District the differences between the modified medium and zero net migration variants are somewhat smaller – 14,100 over the 50 year period, between totals of 89,400 in 2051 (zero net migration) and 75,300 (modified medium net migration) (Table 42).

10.7.4 The Bay of Plenty region

Over the region as a whole, the populations estimated for 2051 by the zero net migration and the modified medium variants are 312,200 and 403,320 respectively – a difference of 91,120. The larger population for the modified medium variant is due to the sizeable contribution (130,800) made by migration to the western Bay of Plenty's population, discounted by the losses due to migration to the eastern Bay of Plenty and Rotorua District populations (-39,680) (Table 42).

10.7.5 The direct and indirect contributions made by migration

The differences due to migration that are shown in Table 42 are the sum of the direct and indirect contributions to population change made by migration. To isolate the direct (balance between in and out-migration) from the indirect (impact on natural increase) contributions it is necessary to identify the changes to TA and sub-regional populations by decade between 2001 and 2051 under the two projection variants (zero and modified medium). This is done in Table 43.

It can be seen in Table 43 that the modified medium variant produces much larger increases in the western Bay of Plenty sub-region's population at each decade than the zero net migration variant, while the converse is true for the eastern Bay of Plenty and Rotorua (Table 43). The overall differences due to migration, summed up in the third section of the table, fluctuate somewhat by decade for the various TAs, with the lowest gains (western Bay) and losses (eastern Bay and Rotorua) shown for 2041-51.

These differences due to migration are subdivided into direct and indirect components in Table 44. In this table the first section contains the overall contribution made by migration to population change in each decade, taken from Table 43. The second section contains the net migration gains and losses by decade taken from Table 41. These are the direct contributions that migration makes to population change under the assumptions used in the modified medium variant. The third section in Table 44 is the difference between the first and second sections – the indirect contribution made by migration through its cumulative effects on natural increase.

Table 43 Population change under modified medium and zero net migration, 2001-2051

Territorial Authority	2001-11	2011-21	2021-31	2031-41	2041-51	2001-51
Modified medium variant						
Western BOP District	7600	7200	6600	4900	3000	29300
Tauranga City	23100	24700	25800	23500	19800	116900
Rotorua District	3100	2000	1900	1100	300	8400
Whakatane District	400	-700	-500	-200	-200	-1200
Kawerau District	-970	-610	-300	190	370	-1320
Opotiki District	270	290	150	0	200	910
BAY OF PLENTY TAs	33500	32880	33650	29490	23470	152990
Western Bay of Plenty	30700	31900	32400	28400	22800	146200
Eastern Bay of Plenty	-300	-1020	-650	-10	370	-1610
Rotorua District	3100	2000	1900	1100	300	8400
Zero net migration						
Western BOP District	1600	2000	1600	300	500	6000
Tauranga City	3800	3100	2800	500	-800	9400
Rotorua District	6100	5700	5300	3300	2100	22500
Whakatane District	2900	3200	3100	1900	1800	12900
Kawerau District	990	1110	1210	1100	1250	5660
Opotiki District	860	1100	1200	1000	1250	5410
BAY OF PLENTY TAs	16250	16210	15210	8100	6100	61870
Western Bay of Plenty	5400	5100	4400	800	-300	15400
Eastern Bay of Plenty	4750	5410	5510	4000	4300	23970
Rotorua District	6100	5700	5300	3300	2100	22500
Differences due to migration						
Western BOP District	6000	5200	5000	4600	2500	23300
Tauranga City	19300	21600	23000	23000	20600	107500
Rotorua District	-3000	-3700	-3400	-2200	-1800	-14100
Whakatane District	-2500	-3900	-3600	-2100	-2000	-14100
Kawerau District	-1960	-1720	-1510	-910	-880	-6980
Opotiki District	-590	-810	-1050	-1000	-1050	-4500
BAY OF PLENTY TAs	17250	16670	18440	21390	17370	91120
Western Bay of Plenty	25300	26800	28000	27600	23100	130800
Eastern Bay of Plenty	-5050	-6430	-6160	-4010	-3930	-25580
Rotorua District	-3000	-3700	-3400	-2200	-1800	-14100

Table 44 Direct and indirect effects of migration on population change, 2001-2051

Territorial Authority	2001-11	2011-21	2021-31	2031-41	2041-51	2001-51
Difference due to migration						
Western BOP District	6000	5200	5000	4600	2500	23300
Tauranga City	19300	21600	23000	23000	20600	107500
Rotorua District	-3000	-3700	-3400	-2200	-1800	-14100
Whakatane District	-2500	-3900	-3600	-2100	-2000	-14100
Kawerau District	-1960	-1720	-1510	-910	-880	-6980
Opotiki District	-590	-810	-1050	-1000	-1050	-4500
BAY OF PLENTY TAs	17250	16670	18440	21390	17370	91120
Western Bay of Plenty	25300	26800	28000	27600	23100	130800
Eastern Bay of Plenty	-5050	-6430	-6160	-4010	-3930	-25580
Rotorua District	-3000	-3700	-3400	-2200	-1800	-14100
Direct effect of migration						
Western BOP District	6090	6540	7060	7420	7460	34570
Tauranga City	18360	20040	21820	22940	23040	106200
Rotorua District	-2500	-2040	-1000	0	0	-5540
Whakatane District	-2080	-2220	-1080	0	0	-5380
Kawerau District	-1700	-1000	-490	0	0	-3190
Opotiki District	-400	-180	-80	0	0	-660
BAY OF PLENTY TAs	17770	21140	26230	30360	30500	126000
Western Bay of Plenty	24450	26580	28880	30360	30500	140770
Eastern Bay of Plenty	-4180	-3400	-1650	0	0	-9230
Rotorua District	-2500	-2040	-1000	0	0	-5540
Indirect effect of migration						
Western BOP District	-90	-1340	-2060	-2820	-4960	-11270
Tauranga City	940	1560	1180	60	-2440	1300
Rotorua District	-500	-1660	-2400	-2200	-1800	-8560
Whakatane District	-420	-1680	-2520	-2100	-2000	-8720
Kawerau District	-260	-720	-1020	-910	-880	-3790
Opotiki District	-190	-630	-970	-1000	-1050	-3840
BAY OF PLENTY TAs	-520	-4470	-7790	-8970	-13130	-34880
Western Bay of Plenty	850	220	-880	-2760	-7400	-9970
Eastern Bay of Plenty	-870	-3030	-4510	-4010	-3930	-16350
Rotorua District	-500	-1660	-2400	-2200	-1800	-8560

10.8 The indirect effects of migration

The indirect contribution that net migration gains (western Bay of Plenty sub-region) and losses (eastern Bay of Plenty and Rotorua District) makes to population change for the region as a whole is negative at every decade of the projection period (Table 44). In other words, net migration, while making a positive direct contribution that gets larger at every decade and adds, over the 50 years, 126,000 people to the region's population, also has a negative impact on natural increase that gets larger at every decade, and removes from the region's population 34,880 between 2001 and 2051 (Table 44). The balance between these direct and indirect contributions made by migration is the 91,120 increment to the region's population that is the difference found between the populations in 2051 estimated under the modified medium and zero net migration variants (Table 42).

The only TA that shows a positive indirect effect of migration on the population over the 50 years is Tauranga City. Between 2001 and 2041 net migration gains to Tauranga City's population add more births than deaths to natural increase, although from 2031 it is clear that the cumulative effect of the net migration gains over the previous 30 years is producing almost as many deaths as births in the population. Between 2041 and 2051 deaths exceed births by quite a sizeable number and natural increase due to migration is negative (-2,440) for the first time.

In all the other TAs natural increase due to migration is negative in all decades through the projection period. In the case of Western Bay of Plenty District this is because the net migration gains are primarily older people who are no longer having children. Over time their contribution to natural increase in the District is to add to the number of deaths that would have occurred without migration.

In the eastern Bay of Plenty and Rotorua the negative indirect effects of migration are the result of the removal of reproductive potential from the population through larger out-migration flows than in-migration flows. By reducing the number of births that might otherwise have occurred if there had not been these net losses, migration diminishes the impact of fertility on the TA populations. It also removes people who would otherwise have been exposed to the risk of death if they had remained in the TAs between 2001 and 2051, but the reduction in deaths is more than compensated for by the reduction in births caused by migration, thus producing the negative indirect effects of migration in these parts of the region.

There are thus three patterns associated with the indirect effects of migration on population change in the Bay of Plenty:

- more births than deaths in Tauranga City due to net migration gains through to the 2031-41 decade;
- more deaths than births in Western Bay of Plenty District due to net migration gains in all decades;
- fewer births than deaths in Rotorua District and the eastern Bay of Plenty TAs due to net migration losses in all decades.

10.9 Summary

The population projections for the Demographic Forecast 2051 Project have been examined in terms of changes in population size (Chapter 8), changes in population structure (Chapter 9) and the contributions of natural increase and net migration to the projected population change (Chapter 10). This completes the analysis of the population projections per se.

The next two chapters use the projected populations discussed in Chapters 8-10 as the basis for some estimates of the size of the potential male and female labour forces by age, and the numbers of households by type of family. The assumptions used to convert the population projections into estimates of the size and age-sex composition of the labour force, and the numbers of households by type of family, are outlined in Chapter 3; Chapters 11 and 12 focus on the results of the application of these assumptions to the estimates of the total population discussed in Chapters 8-10.

Chapter 11: Projected labour force

Statistics New Zealand (2005b) released its revised national labour force projections on 26 September 2005. These updated the national labour force projections released in October 2004 (SNZ 2004), and are based on the same fertility, mortality and migration assumptions that have been used to derive the TA labour force projections for the Demographic Forecast 2051 Project.

Statistics New Zealand has not published an official series of sub-national labour force projections. The Bay of Plenty TA projections between 2001 and 2051 have been obtained by applying the national labour force participation rates for males and females in each five year age group, used by SNZ in its 2004 labour force projections, and the 2005 update, to the total populations projected for the TAs between 2001 and 2051.

As noted in Chapter 3 (section 3.2), the methodology is very simple and it does not make allowance for variations in labour force participation between the TAs on the basis of the different ethnic compositions of their resident populations. There are no separate national labour force projections for Maori at this stage, and for this reason the projections of labour forces at the TA level are restricted to the total population.

The first section outlines briefly the pattern of labour force participation, for Maori and non-Maori, as this was recorded in the 2001 census, for the Bay of Plenty sub-regions and TAs. This illustrates the variations across the region that cannot be taken into account in the labour force projections. The second section summarises some of the main changes in the size and age composition of the labour force that might be expected to occur if the age and sex-specific participation rates, used in the 2004 and 2005 SNZ national labour force projections, were to apply in the Bay of Plenty's projected medium variant populations through to 2051.

The September 2005 national labour force projections suggest that the country's labour force could increase from 1.97 million at 30 June 2001 to peak at 2.39 million in 2027, before stabilising as new entrants roughly balance retirements. The labour force comprises people aged 15 years and over who work for one or more hours per week for financial gain, or work without pay in a family business. It also includes people who are unemployed and actively seeking part-time or full-time work (SNZ 2005b).

11.1 Labour force participation in 2001: A snapshot

11.1.1 Characteristics of the labour force population in 2001

The labour force in the Bay of Plenty Region's TAs in 2001 is summarized in Tables 45 and 46 for some key age groups for Maori, non-Maori, and for males and females.

Table 45 The Bay of Plenty labour force, 2001: ethnicity, age and gender

	Age group				15 +		
Territorial Authority	**15-24**	**25-39**	**40-64**	**65-84**	**Males**	**Females**	**Total**
Maori							
Western BOP District	543	906	978	36	1329	1152	2481
Tauranga City	1551	2304	1983	63	3078	2820	5898
Rotorua District	2370	3555	3183	123	4764	4473	9237
Whakatane District	1110	1884	1920	87	2628	2379	5007
Kawerau District	291	585	603	9	804	690	1494
Opotiki District	372	642	723	63	912	879	1791
BAY OF PLENTY TAs	6237	9876	9390	381	13515	12393	25908
Western Bay of Plenty	2094	3210	2961	99	4407	3972	8379
Eastern Bay of Plenty	1773	3111	3246	159	4344	3948	8292
Rotorua District	2370	3555	3183	123	4764	4473	9237
Non-Maori							
Western BOP District	1734	4146	8985	882	8562	7203	15765
Tauranga City	5580	11643	17772	1002	18885	17145	36030
Rotorua District	3063	6942	10776	639	11325	10113	21438
Whakatane District	1305	2889	5190	372	5283	4476	9759
Kawerau District	126	381	654	30	681	507	1188
Opotiki District	207	459	1050	108	975	855	1830
BAY OF PLENTY TAs	12015	26460	44427	3033	45711	40299	86010
Western Bay of Plenty	7314	15789	26757	1884	27447	24348	51795
Eastern Bay of Plenty	1638	3729	6894	510	6939	5838	12777
Rotorua District	3063	6942	10776	639	11325	10113	21438
Total (inc. ethnicity ns)							
Western BOP District	2286	5118	10038	945	10002	8412	18414
Tauranga City	7182	14070	19917	1068	22167	20121	42288
Rotorua District	5487	10638	14181	783	16335	14772	31107
Whakatane District	2448	4854	7236	480	8064	6960	15024
Kawerau District	432	990	1275	45	1521	1233	2754
Opotiki District	582	1116	1800	171	1917	1758	3675
BAY OF PLENTY TAs	18417	36786	54447	3492	60006	53256	113262
Western Bay of Plenty	9468	19188	29955	2013	32169	28533	60702
Eastern Bay of Plenty	3462	6960	10311	696	11502	9951	21453
Rotorua District	5487	10638	14181	783	16335	14772	31107

Table 46 The Bay of Plenty labour force, 2001: ethnicity, age and gender (%)

	Age group				15 +		
Territorial Authority	**15-24**	**25-39**	**40-64**	**65-84**	**Males**	**Females**	**Total**
Maori							
Western BOP District	21.9	36.5	39.4	1.5	53.6	46.4	100
Tauranga City	26.3	39.1	33.6	1.1	52.2	47.8	100
Rotorua District	25.7	38.5	34.5	1.3	51.6	48.4	100
Whakatane District	22.2	37.6	38.3	1.7	52.5	47.5	100
Kawerau District	19.5	39.2	40.4	0.6	53.8	46.2	100
Opotiki District	20.8	35.8	40.4	3.5	50.9	49.1	100
BAY OF PLENTY TAs	24.1	38.1	36.2	1.5	52.2	47.8	100
Western Bay of Plenty	25.0	38.3	35.3	1.2	52.6	47.4	100
Eastern Bay of Plenty	21.4	37.5	39.1	1.9	52.4	47.6	100
Rotorua District	25.7	38.5	34.5	1.3	51.6	48.4	100
Non-Maori							
Western BOP District	11.0	26.3	57.0	5.6	54.3	45.7	100
Tauranga City	15.5	32.3	49.3	2.8	52.4	47.6	100
Rotorua District	14.3	32.4	50.3	3.0	52.8	47.2	100
Whakatane District	13.4	29.6	53.2	3.8	54.1	45.9	100
Kawerau District	10.6	32.1	55.1	2.5	57.3	42.7	100
Opotiki District	11.3	25.1	57.4	5.9	53.3	46.7	100
BAY OF PLENTY TAs	14.0	30.8	51.7	3.5	53.1	46.9	100
Western Bay of Plenty	14.1	30.5	51.7	3.6	53.0	47.0	100
Eastern Bay of Plenty	12.8	29.2	54.0	4.0	54.3	45.7	100
Rotorua District	14.3	32.4	50.3	3.0	52.8	47.2	100
Total (inc. ethnicity ns)							
Western BOP District	12.4	27.8	54.5	5.1	54.3	45.7	100
Tauranga City	17.0	33.3	47.1	2.5	52.4	47.6	100
Rotorua District	17.6	34.2	45.6	2.5	52.5	47.5	100
Whakatane District	16.3	32.3	48.2	3.2	53.7	46.3	100
Kawerau District	15.7	35.9	46.3	1.6	55.2	44.8	100
Opotiki District	15.8	30.4	49.0	4.7	52.2	47.8	100
BAY OF PLENTY TAs	16.3	32.5	48.1	3.1	53.0	47.0	100
Western Bay of Plenty	15.6	31.6	49.3	3.3	53.0	47.0	100
Eastern Bay of Plenty	16.1	32.4	48.1	3.2	53.6	46.4	100
Rotorua District	17.6	34.2	45.6	2.5	52.5	47.5	100

There are significant differences in the age composition of the Maori and non-Maori labour forces – over half of the latter was aged between 40 and 64 years in 2001, compared with just over 36 percent of the Maori labour force (Table 46). The younger labour force (15-24 years) accounted for 24.1 percent of the 25,908 Maori who were aged 15 years or more, and who were either working or actively seeking work at the time of the census (Table 45). The 6,237 Maori aged 15-24 accounted for just under 34 percent of the 18,417 people in the Bay of Plenty TAs in this age group who were in the labour force – a much higher share than the 23 percent of Maori (25,908) aged 15 and over in the region's labour force (113,262) (Table 45). Maori comprise only 17 percent of the region's labour force aged 40-64 years, and 11 percent of those between 65 and 84 years.

The age composition of both the Maori and non-Maori labour forces varied somewhat across the TAs (Table 46). In the case of Maori, there were lower shares in the younger labour force (15-24 years) in the eastern Bay of Plenty TAs than in Rotorua District or the western Bay of Plenty TAs. Tauranga City had the highest share (26 percent) in this age group, reflecting the attraction of employment prospects in this part of the region. In the case of the older labour force (40-64), Kawerau, Opotiki and Western Bay of Plenty Districts had higher shares of Maori (around 40 percent) than the other TAs. There were smaller variations between TAs in the shares of gender in the labour force (Table 46).

The oldest non-Maori labour forces were found in the Western Bay of Plenty District and in Opotiki District – in these Districts 57 percent of the labour force was aged 40-64 years, and a further 5-6 percent aged 65-84 years. The youngest non-Maori labour force was found in Tauranga City where over 15 percent were aged 15-24 years compared with 11 percent in the Western Bay of Plenty and Opotiki Districts (Table 46). At a sub-regional level, the eastern Bay of Plenty TAs had an older non-Maori workforce by comparison with Rotorua District and the western Bay of Plenty – a similar pattern to that found for the Maori labour force (Table 46). As with the Maori labour force, there were relatively minor variations across the TAs in the shares of non-Maori males and females in their labour forces. The major exception was Kawerau District with its higher share of males (57 percent) in the labour force than was the case in the other TAs (Table 46).

When the total population is considered, Western Bay of Plenty District stands out as having the an older labour force than the other TAs (Table 46). In the Western Bay of Plenty 12 percent of the labour force was aged 15-24 years, 54 percent aged 40-64, and 5 percent aged 65-84. This compares with much younger labour forces for Tauranga City and Rotorua District where 17 percent were aged 15-24 years, 46-47 percent 40-64 years, and 2.5 percent 65-84 years. The main reason for the younger labour forces in these two TAs is the sizeable younger Maori components in the region's major urban populations.

11.1.2 Labour force participation and work status, 2001

The labour force participation rates (percentages of all people in the age, gender and ethnic groups who were in the labour force in 2001) are shown in Table 47.

Table 47 The Bay of Plenty labour force, 2001: participation rates (per 100 in group)

	Age group				15 +		
Territorial Authority	**15-24**	**25-39**	**40-64**	**65-84**	**Males**	**Females**	**Total**
Maori							
Western BOP District	57.1	69.4	68.8	12.0	70.0	54.9	62.0
Tauranga City	63.7	73.9	73.6	14.3	75.4	61.2	67.9
Rotorua District	62.5	75.1	74.4	15.8	74.8	61.8	67.8
Whakatane District	56.1	68.8	67.3	14.9	67.8	55.4	61.3
Kawerau District	50.0	68.9	70.8	10.0	70.3	56.0	62.9
Opotiki District	55.4	66.3	61.3	20.4	61.7	52.5	56.8
BAY OF PLENTY TAs	59.9	72.0	70.8	15.2	71.6	58.6	64.4
Western Bay of Plenty	62.0	72.8	71.9	13.8	73.7	59.2	66.1
Eastern Bay of Plenty	54.8	68.1	66.5	16.4	66.8	54.8	60.5
Rotorua District	62.5	75.1	74.4	15.8	74.8	61.8	67.8
Non-Maori							
Western BOP District	67.1	80.9	80.9	19.7	73.1	60.0	66.5
Tauranga City	73.7	80.9	77.0	7.6	68.1	53.6	60.4
Rotorua District	70.7	83.8	82.7	13.0	75.7	62.5	68.8
Whakatane District	73.1	84.4	81.6	13.8	74.2	60.5	67.3
Kawerau District	62.7	77.9	70.8	6.3	63.6	49.1	56.6
Opotiki District	69.7	77.3	73.2	16.2	64.5	55.3	59.6
BAY OF PLENTY TAs	71.7	81.9	79.4	11.5	71.3	57.5	64.1
Western Bay of Plenty	72.0	80.9	78.3	10.7	69.6	55.4	62.1
Eastern Bay of Plenty	71.7	82.7	79.0	13.4	71.5	58.6	64.9
Rotorua District	70.7	83.8	82.7	13.0	75.7	62.5	68.8
Total							
Western BOP District	61.9	75.3	77.1	18.9	70.1	57.1	63.5
Tauranga City	71.3	79.6	76.6	7.8	68.9	54.4	61.2
Rotorua District	66.7	80.5	80.5	13.4	75.3	62.0	68.3
Whakatane District	64.0	77.3	76.9	14.2	71.8	58.4	64.9
Kawerau District	52.9	71.9	69.9	7.7	66.1	52.7	59.4
Opotiki District	59.1	70.0	67.6	16.9	62.6	53.5	58.0
BAY OF PLENTY TAs	66.6	78.3	77.2	11.8	71.4	57.6	64.2
Western Bay of Plenty	69.4	79.4	77.6	10.8	70.0	55.7	62.5
Eastern Bay of Plenty	59.6	72.7	71.9	13.6	67.1	54.9	60.8
Rotorua District	66.7	80.5	80.5	13.4	75.3	62.0	68.3

There are some interesting variations in levels of participation by age group and sex across the TAs. This is not the place for a substantive analysis, but it can be noted that Tauranga City has lower overall labour force participation (61.2 per 100 aged 15 and over in the population) than might have been expected given the nature of its urban economy, especially for non-Maori men and women, and for people aged 40 years and over (Table 47). This compares with an overall national labour force participation rate, as determined from census data, of 66.7 in 2001 (SNZ 2002: 634).

The lowest overall rates of labour force participation in the Bay of Plenty in 2001 were found in Opotiki (58 per 100 people aged 15 and over) and Kawerau (59.4). The highest over all level of participation was in Rotorua District (68.3 per 100), and this applied to both males and females (Table 47). The high level of participation in Rotorua District applied to Maori as well as non-Maori, and for females, Rotorua had the highest participation levels in both cases (61.8 for Maori and 62.5 for non-Maori).

It is important to recall that the "labour force" includes those people who are unemployed and seeking work; it is not just the people who were actively employed at the time of the census. There were 2,781 people who indicated that they were unemployed and seeking work in Rotorua District in 2001 (SNZ 2002: 631) – the equivalent of 8.9 percent of the total labour force of 31,107 (Table 48). This is a much lower unemployment rate than that found in the eastern Bay of Plenty TAs (12.2 percent in Whakatane District, 16.0 percent in Opotiki District, and 19.9 percent in Kawerau District), and it is also marginally lower than the rate for Tauranga City (9.0 percent) (Table 48). Only Western Bay of Plenty District had a lower unemployment rate (6.7 percent).

Table 48 Work status, labour force in Bay of Plenty TAs, 2001 (%)

Territorial Authority	Work status			Total labour force
	Full-time	Part-time	Unemployed	
Western BOP District	70.0	23.4	6.7	18,414
Tauranga City	67.5	23.5	9.0	42,288
Rotorua District	69.5	21.6	8.9	31,107
Whakatane District	65.1	22.7	12.2	15,024
Kawerau District	59.7	21.0	19.3	2,754
Opotiki District	60.0	24.0	16.0	3,675
BAY OF PLENTY TAs	67.7	22.8	9.5	113,262
Western Bay of Plenty	68.2	23.5	8.3	79,100
Eastern Bay of Plenty	63.5	22.7	13.8	18,900
Rotorua District	69.5	21.6	8.9	27,000

The higher labour force participation in Rotorua is not due to an unusually high level of unemployment – indeed, this District had the second highest share of its labour force in full-time employment in 2001, just behind Western Bay of Plenty District (Table 48).

11.2 The labour force projections

11.2.1 A Caveat

The brief overview of some characteristics of the labour force the Bay of Plenty at the time of the 2001 census indicates that there is quite considerable variation across the various TAs, both in participation rates as well as levels of full- and part-time employment, and levels of unemployment. There are also differences between the Maori and non-Maori populations in terms of participation and work status, and these have differential impacts on the overall rates and percentages for the TAs.

The variability outlined above cannot be taken into account in the projections of the labour force through to 2051. The projections apply national labour force participation rates to the estimated resident population in June 2001, and the projected populations, by five year age group and sex, through to 2051. They "smooth out" the variations in participation rates by ethnicity in the different TAs that are shown in Tables 46 and 47. The differences in labour force size projected for 2021 and 2051 in Table 49 reflect the variations in age structure in the different TAs, rather than any region-specific factors related to the local population composition or economy. This caveat is important; the labour force projections are very much a refined set of demographic estimates. They are more a measure of a potential labour force assuming participation rates in the region were the same as the assumed national labour force participation rates for the next 50 years.

11.2.2 The changing age composition of the labour force, 2001-2051

The estimated resident TA labour forces for June 2001, shown in Table 49, are slightly larger than those identified in Table 45. The June year labour forces, in common with the June year resident population estimates, are larger than the census populations for the same areas, largely as a result of adjustments for under-enumeration and temporary absence of residents overseas. The age groups used for the older labour force in Table 49 are also slightly different from those used in Table 47. This is because the labour force projections are for five year age groups up to 80+, not 84 and over.

Three tables summarize the main data for the labour force projections: the numbers in each age group in the TAs and sub-regions in 2001, 2021 and 2051 (Table 49), the percentages of each TA's labour force that is in the different age groups (Table 50) and the percentage changes in numbers in each age group, between 2001 and 2021, 2021 and 2051, and over the 50 years between 2001 and 2051 (Table 51). The changes in size and age composition of the labour force are quite diverse across the region, reflecting the different population futures that have been discussed in Chapters 8, 9 and 10.

Between 2001 and 2021 the labour forces in all TAs get progressively older, with Western Bay of Plenty and Opotiki Districts remaining the "oldest" in terms of shares aged over 40 years by 2021 (Table 50). Between 2021 and 2051, the pattern changes somewhat – the labour forces of the eastern Bay of Plenty TAs become "younger" as a result of the introduction of a zero net migration assumption (see Chapters 6 and 8).

Table 49 The Bay of Plenty labour force by age group, 2001, 2021, 2051

	Age group					
Territorial Authority	**15-24**	**25-39**	**40-59**	**60-79**	**80+**	**Total**
2001						
Western BOP District	2370	5520	9140	1700	20	18750
Tauranga City	6700	14840	19160	3430	70	44200
Rotorua District	5680	11440	13740	1940	30	32830
Whakatane District	2610	5360	7080	1060	10	16120
Kawerau District	560	1190	1360	230	0	3340
Opotiki District	670	1360	1970	340	0	4340
BAY OF PLENTY TAs	18590	39710	52450	8700	130	119580
Western Bay of Plenty	9070	20360	28300	5130	90	62950
Eastern Bay of Plenty	3840	7910	10410	1630	10	23800
Rotorua District	5680	11440	13740	1940	30	32830
2021						
Western BOP District	3170	6070	12460	4450	50	26200
Tauranga City	10350	21130	29710	8630	140	69960
Rotorua District	5880	10530	15460	4510	50	36430
Whakatane District	2290	4440	7170	2370	30	16300
Kawerau District	430	770	1070	320	0	2590
Opotiki District	650	1280	2070	770	10	4780
BAY OF PLENTY TAs	22770	44220	67940	21050	280	156260
Western Bay of Plenty	13520	27200	42170	13080	190	96160
Eastern Bay of Plenty	3370	6490	10310	3460	40	23670
Rotorua District	5880	10530	15460	4510	50	36430
2051						
Western BOP District	3510	6670	14190	5220	140	29730
Tauranga City	13660	27770	43010	12890	340	97670
Rotorua District	5780	11050	14470	4210	90	35600
Whakatane District	2310	5120	5490	1840	50	14810
Kawerau District	490	1020	990	270	10	2780
Opotiki District	770	1680	1640	540	10	4640
BAY OF PLENTY TAs	26520	53310	79790	24970	640	185230
Western Bay of Plenty	17170	34440	57200	18110	480	127400
Eastern Bay of Plenty	3570	7820	8120	2650	70	22230
Rotorua District	5780	11050	14470	4210	90	35600

Table 50 The Bay of Plenty labour force by age group, 2001, 2021, 2051 (%)

	Age group (%)					
Territorial Authority	**15-24**	**25-39**	**40-59**	**60-79**	**80+**	**Total**
2001						
Western BOP District	12.6	29.4	48.7	9.1	0.1	100
Tauranga City	15.2	33.6	43.3	7.8	0.2	100
Rotorua District	17.3	34.8	41.9	5.9	0.1	100
Whakatane District	16.2	33.3	43.9	6.6	0.1	100
Kawerau District	16.8	35.6	40.7	6.9	0.0	100
Opotiki District	15.4	31.3	45.4	7.8	0.0	100
BAY OF PLENTY TAs	15.5	33.2	43.9	7.3	0.1	100
Western Bay of Plenty	14.4	32.3	45.0	8.1	0.1	100
Eastern Bay of Plenty	16.1	33.2	43.7	6.8	0.0	100
Rotorua District	17.3	34.8	41.9	5.9	0.1	100
2021						
Western BOP District	12.1	23.2	47.6	17.0	0.2	100
Tauranga City	14.8	30.2	42.5	12.3	0.2	100
Rotorua District	16.1	28.9	42.4	12.4	0.1	100
Whakatane District	14.0	27.2	44.0	14.5	0.2	100
Kawerau District	16.6	29.7	41.3	12.4	0.0	100
Opotiki District	13.6	26.8	43.3	16.1	0.2	100
BAY OF PLENTY TAs	14.6	28.3	43.5	13.5	0.2	100
Western Bay of Plenty	14.1	28.3	43.9	13.6	0.2	100
Eastern Bay of Plenty	14.2	27.4	43.6	14.6	0.2	100
Rotorua District	16.1	28.9	42.4	12.4	0.1	100
2051						
Western BOP District	11.8	22.4	47.7	17.6	0.5	100
Tauranga City	14.0	28.4	44.0	13.2	0.3	100
Rotorua District	16.2	31.0	40.6	11.8	0.3	100
Whakatane District	15.6	34.6	37.1	12.4	0.3	100
Kawerau District	17.6	36.7	35.6	9.7	0.4	100
Opotiki District	16.6	36.2	35.3	11.6	0.2	100
BAY OF PLENTY TAs	14.3	28.8	43.1	13.5	0.3	100
Western Bay of Plenty	13.5	27.0	44.9	14.2	0.4	100
Eastern Bay of Plenty	16.1	35.2	36.5	11.9	0.3	100
Rotorua District	16.2	31.0	40.6	11.8	0.3	100

Table 51 The Bay of Plenty labour force by age group, changes 2001-2051

Territorial Authority	Age group (% change) 15-24	25-39	40-59	60-79	80+	Total
2001-2021						
Western BOP District	33.8	10.0	36.3	161.8	150.0	39.7
Tauranga City	54.5	42.4	55.1	151.7	104.6	58.3
Rotorua District	3.5	-8.0	12.5	132.5	66.7	11.0
Whakatane District	-12.3	-17.2	1.3	123.6	200.0	1.1
Kawerau District	-23.2	-35.3	-21.3	39.1	0.0	-22.5
Opotiki District	-3.0	-5.9	5.1	126.5	0.0	10.1
BAY OF PLENTY TAs	22.5	11.4	29.5	142.0	117.9	30.7
Western Bay of Plenty	49.1	33.6	49.0	155.0	114.7	52.8
Eastern Bay of Plenty	-12.2	-18.0	-1.0	112.3	300.0	-0.5
Rotorua District	3.5	-8.0	12.5	132.5	66.7	11.0
2021-2051						
Western BOP District	10.7	9.9	13.9	17.3	180.0	13.5
Tauranga City	32.0	31.4	44.8	50.4	140.2	39.7
Rotorua District	-1.7	4.9	-6.4	-6.7	80.0	-2.3
Whakatane District	0.9	15.3	-23.4	-22.4	66.7	-9.1
Kawerau District	14.0	32.5	-7.5	-15.6	0.0	7.3
Opotiki District	18.5	31.3	-20.8	-29.9	0.0	-2.9
BAY OF PLENTY TAs	16.5	20.6	17.4	19.0	127.4	18.6
Western Bay of Plenty	27.0	26.6	35.6	39.1	150.5	32.6
Eastern Bay of Plenty	5.9	20.5	-21.2	-23.4	75.0	-6.1
Rotorua District	-1.7	4.9	-6.4	-6.7	80.0	-2.3
2001-2051						
Western BOP District	48.1	20.8	55.3	207.1	600.0	58.6
Tauranga City	103.9	87.1	124.5	278.5	391.5	121.2
Rotorua District	1.8	-3.4	5.3	117.0	200.0	8.4
Whakatane District	-11.5	-4.5	-22.5	73.6	400.0	-8.1
Kawerau District	-12.5	-14.3	-27.2	17.4	0.0	-16.8
Opotiki District	14.9	23.5	-16.8	58.8	0.0	6.9
BAY OF PLENTY TAs	42.7	34.2	45.1	188.1	395.4	55.0
Western Bay of Plenty	89.4	69.1	102.1	245.8	437.8	102.5
Eastern Bay of Plenty	-7.0	-1.1	-22.0	62.6	600.0	-6.6
Rotorua District	1.8	-3.4	5.3	117.0	200.0	8.4

While there is some variability across the region in changes in the age composition of the projected labour force between 2001 and 2051 (Table 50), the much more significant changes are in the projected changes in numbers at each age group (Table 51). The statistics for the three sub-regions capture these changes well: the western Bay of Plenty could see a 50 percent growth in its labour force between 2001 and 2021, with slower growth (32.6 percent) over the next 30 years. In the case of Rotorua District, the projections suggest there could be growth in the total labour force by around 11 percent between 2001 and 2021, with a small decline (-2.3 percent) between 2021 and 2051. In the case of the eastern Bay of Plenty sub-region, the labour force is projected to decline slightly by 2021, and then to experience a larger decline in the subsequent 30 years (Table 51).

Patterns of change by age group are complex and reflect the irregular age structures of the TA populations (see chapters 7 and 9). In the western Bay of Plenty TAs numbers in each age group increase in both periods, with the labour force aged 60 and over experiencing significant increases between 2001 and 2021 in both Western Bay of Plenty District and Tauranga City (Table 51). In Rotorua District and the eastern Bay of Plenty TAs there is a decrease in the labour force aged 25-39 years between 2001 and 2021, reflecting on-going net out-migration, but there are gains again between 2021 and 2051 when the zero net migration assumption applies. During this latter period, Rotorua District and the eastern Bay of Plenty sub-region experience decreases in the labour force aged between 40 and 79 years – a very different pattern from that found for the western Bay of Plenty sub-region (Table 51).

The labour force, like the population structure generally, will fluctuate in size by age group, especially in Rotorua and the eastern Bay of Plenty TAs (Tables 49 and 51). The age compositions of the TA populations as a whole, as well as their labour forces, will tend to become more diverse over the next 50 years, and this makes generalization about trends difficult. One obvious point that is clearly evident in all three tables, is that the size and share of the labour force that is in the age group 60-79 years will increase dramatically over the 50 years, based on SNZ's (2004, 2005b) latest national labour force participation rates.

In June 2001 the 8,700 people aged 60-79 years, who were deemed to be in the labour force in the Bay of Plenty TAs comprised 7.3 percent of the total (119,580) (Table 50). The share aged 15-24 at this time was 15.5 percent. By June 2021 these shares are projected to be: 13.5 percent for the 60-79 year olds, and 14.6 percent for the 15-24 year olds. These shares do not change much over the period 2021-2051 (13.5 percent for the labour force aged 60-79 years and 14.3 percent for the age group aged 15-24 years); much of the ageing of the workforce will occur within the next 20 years. This is likely to be more significant than is shown in these projections because there will be an increasing number and share of people over the age of 60 staying on at work. Such shifts in the labour force participation rates over time have not been built into the projections developed for the Demographic Forecast 2051, and to this end the figures should be treated as conservative estimates of the size of the future older labour force.

Chapter 12: The household projections

On 27 October 2005 Statistics New Zealand (2005c) released their updated sub-national family and household projections based on the sub-national and national population projections that have been used as the basis for the Demographic Forecast 2051 Project. These projections are for the population living in private dwellings. People in non-private dwellings (hospitals, prisons, halls of residence, for example), as well as unoccupied dwellings and dwellings, which are not the usual residence of people (holiday homes, second homes etc) are excluded.

SNZ (2005c: 5) observed with regard to the situation at the national level that: "the projected increase in the number of households (28 percent) between 2001 and 2021 is greater than the projected growth of both families (24 percent), and population (18 percent) reflecting the trend towards smaller average household sizes". They went on to state that the household growth rate is projected to exceed the population growth rate in all regions and territorial authorities. At a regional level, the Bay of Plenty is forecast to have the third highest percentage increase (35 percent, medium variant) in number of households between 2001 and 2021, after the Auckland (46 percent) and Tasman (40 percent) regions (SNZ 2005c: 1).

Within the Bay of Plenty region, Western Bay of Plenty District is projected to have a 51 percent increase in the number of households between 2001 and 2021, followed closely by Tauranga City on 49 percent. Only five territorial authorities exceed these percentage increases in numbers of households: Queenstown-Lakes District (82 percent), Selwyn District (59 percent), Rodney District (58 percent), Manukau City (54 percent) and Waimakariri District (52 percent). The total number of households in the western Bay of Plenty sub-region, as projected by Statistics New Zealand, will rise from an estimated 52,000 at 30 June 2001 to 77,800 by 30 June 2021 (SNZ 2005c).

In the household projections prepared for the WBOP SmartGrowth Project it was estimated that the number of households in private dwellings in the western Bay of Plenty sub-region could increase to 79,600 by 2021 under the modified medium projection variant assumptions used for that project (Bedford 2003: 5). The household projections prepared for the Demographic Forecast 2051 Project, based on the medium variant assumptions outlined in Chapter 8, produce a total of just over 79,100 households in private dwellings for 30 June 2021 – 1,300 more than the SNZ medium variant projection of 77,800 for this sub-region (Table 52).

The main difference between the two sets of projections for the western Bay of Plenty sub-region relates to the number of households containing two parents with children – the SNZ projections have 10,700 in this category for Tauranga City in 2001, while our estimate is for 13,000, with smaller numbers in the couple only and sole parent categories. These variations are related partly to differences in population structures generated by the projections for the sub-region that result from the way the migration assumptions for Tauranga City are applied (see Chapter 8), and partly to differences in the way in which on-going changes in the composition of families and households are taken into account in the projections. These issues are discussed further in the next section.

Table 52 SNZ and Project household projection variants, 2021

Territorial Authority	SNZ "High"	SNZ "Medium"	SNZ "Low"	Project "Medium"
Western BOP District	24,500	22,300	20,500	21,500
Tauranga City	61,400	55,500	50,100	57,600
Rotorua District	30,800	29,000	27,300	27,000
Whakatane District	15,000	14,100	13,200	12,900
Kawerau District	2,500	2,300	2,000	2,100
Opotiki District	4,500	4,200	3,800	3,900
BAY OF PLENTY TAs	138,700	127,400	116,900	125,000
Western Bay of Plenty	85,900	77,800	70,600	79,100
Eastern Bay of Plenty	22,000	20,600	19,000	18,900
Rotorua District	30,800	29,000	27,300	27,000

Source: The Statistics New Zealand projections can be found in SNZ (2005c)

In the cases of Rotorua District and the eastern Bay of Plenty TAs the projections prepared for the Demographic Forecast 2051 Project produce lower numbers of households for 2021 than the SNZ family and household medium variant projections. For Rotorua, the difference is 2,000 – SNZ's medium variant projection has 29,000 households in the District in 2021 while the Project's projections produce a total of 27,000 for that year (Table 52). In the eastern Bay of Plenty TAs, SNZ's medium variant projections have the total number of households as high as 20,600 in 2021 compared with 18,900 in the case of the Project's projections, a difference of 1,700 (Table 52).

In summary, the Project's projections give somewhat higher numbers of households for the western Bay of Plenty and lower numbers for the eastern Bay of Plenty and Rotorua. For the region as a whole, these differences partly cancel themselves out. The projected numbers of households for the Bay of Plenty Region TAs are: 127,400 (SNZ's medium variant) and 125,000 (Project's modified medium variant). These are not major differences for projections over a 20 year period. The Project's household projection of 125,000 is well above the SNZ "low" variant (116,900) for the region's TAs. The SNZ "high" variant for the Bay of Plenty's TAs is 138,700 households.

In the next section we outline some differences in the methods and assumptions underpinning the SNZ and Project household projections. The method used to produce the estimates of households for the Demographic Forecast 2051 Project was described in Chapter 3 (section 3.3) and will not be discussed in detail again in this chapter. A comparison of the broad household types defined by SNZ and the Project is made in this section. Following this, the changes in the different types of household identified in the Project's projections are examined at the TA and sub-region levels for the periods 2001-2021 and 2021-2051.

Statistics New Zealand has not produced household projections out to 2051 and the Project's projections beyond 2021 must be treated as being very speculative. However, given that the household projections are derived directly from population projections, it is possible to produce projected household numbers through to 2051 if one has population projections that go out this far. These numbers were requested as part of the brief for the Demographic Forecast 2051 Project.

12.1 Methodology and assumptions

12.1.1 Independent Projection Series

In both the SNZ and the Project projections, the "propensity" method has been used to derive the projections of households and family types (SNZ 2005c: 3). The cohort component method (see Chapters 3 and 8) has been used to derive the population projections, and then rates for the different living arrangement types have been applied to the population projections to produce projections in the living arrangement types. These populations are then aggregated to give projections of broad family and household types.

Because the two sets of projections were developed independently, unlike the population projections used in this report, which were all generated by SNZ, there are some variations in the way the families and households were constituted and the living arrangement type rates have been derived. These have had an impact on the numbers in the three broad household types: households with families, households with one person, and "other" households where there are two or more people living together, but not in couple or parent-child relationships with each other (Table 53).

Table 53 summarizes the projected household distribution for 2021, showing the SNZ and Project household projections for each TA, and the differences between these. By far the most numerous are the households containing families defined as "two or more people living together, with at least one couple and/or parent-child relationship, with or without other people" (SNZ 2005c). In both the SNZ and the Project projections these account for around 70 percent of all households in 2021. The one person households, where there is only one person living alone in a private dwelling, comprise a further 25-26 percent of the total households, with the other multi-person households (just called "other" in Table 53), account for the remaining 3-4 percent. In this broad sense, the two projection series produce similar outcomes for the 125,000-127,400 households in the Bay of Plenty TAs in 2021.

Table 53 Broad household types, 2021: SNZ and Project medium variant projections

Territorial Authority	Family	One person	Other	Total
Statistics New Zealand projections				
Western BOP District	16,200	5,400	700	22,300
Tauranga City	38,100	14,800	2,600	55,500
Rotorua District	19,700	7,700	1,600	29,000
Whakatane District	9,800	3,800	500	14,100
Kawerau District	1,600	600	100	2,300
Opotiki District	2,800	1,200	200	4,200
BAY OF PLENTY TAs	88,200	33,500	5,700	127,400
Western Bay of Plenty	54,300	20,200	3,300	77,800
Eastern Bay of Plenty	14,200	5,600	800	20,600
Rotorua District	19,700	7,700	1,600	29,000
Project projections				
Western BOP District	15,800	5,110	590	21,500
Tauranga City	41,320	14,850	1,430	57,600
Rotorua District	19,070	6,700	1,230	27,000

Whakatane District	9,070	3,390	440	12,900
Kawerau District	1,500	500	100	2,100
Opotiki District	2,710	1,030	160	3,900
BAY OF PLENTY TAs	89,470	31,580	3,950	125,000
Western Bay of Plenty	57,120	19,960	2,020	79,100
Eastern Bay of Plenty	13,280	4,920	700	18,900
Rotorua District	19,070	6,700	1,230	27,000
Difference				
Western BOP District	-400	-290	-110	-800
Tauranga City	3,220	50	-1,170	2,100
Rotorua District	-630	-1,000	-370	-2,000
Whakatane District	-730	-410	-60	-1,200
Kawerau District	-100	-100	0	-200
Opotiki District	-90	-170	-40	-300
BAY OF PLENTY TAs	1,270	-1,920	-1,750	-2,400
Western Bay of Plenty	2,820	-240	-1,280	1,300
Eastern Bay of Plenty	-920	-680	-100	-1,700
Rotorua District	-630	-1,000	-370	-2,000

There are some quite large differences in the numbers of households of particular types between the two projections. For example, there are 1,270 more households with families in the Bay of Plenty TAs in the Project projections in 2021 than are found in the SNZ household projections (Table 53). This is due to a much higher estimate of families for Tauranga City (41,320) in the Project projections than was the case with the SNZ projections (38,100) (Table 53). However, Tauranga City is the only TA where the Project projections are ahead of the SNZ ones in total number of households; for the other TAs there is a smaller number in the Project projections than found in the SNZ projections, especially for Rotorua District and Whakatane District (Table 53).

The main reason for the higher estimate of families in Tauranga is the use of a constant migration assumption in the population projections (see Chapters 1 and 8) and the impact this has had on the age-sex composition of the city's population. The method used to assign people to particular household types (the living arrangement type rates) is sensitive to the age structure of the population because it essentially assigns people on the basis of their age and sex to the different living arrangement types (see Chapter 3 and SNZ 2005c: 7-8).

In the other TAs the smaller number of households is due, in large part, to the inclusion in the SNZ projections of several assumptions about the nature of change in the distribution of people across the different household types. In the Project projections the living arrangement type rates found in 2001 were held constant through the projection period; they were not adjusted in accordance with any assumptions about changes in living arrangements over time. The data were not available to assess the nature of change over time in the numbers of households of different types because they had not been produced using the "propensity" method before 2001. As SNZ (2005c: 1) point out: "Prior to the 2001-base projections, household projections were produced using a 'household head' method".

12.1.2 The SNZ assumptions about living arrangement trends

The SNZ family and household projections do have assumptions built into them about future change in the distributions of people across the different living arrangement types " based on an assessment of observed trends between 1986 and 2001, and likely future trends, by sex and five year age group" (SNZ 2005c: 4-5). Information on such trends have been developed in-house by SNZ, and were not available at the time the Project household projections were produced.

The changes that SNZ has built into their household projections, which are held constant across all TAs, are quite complex. It is therefore not surprising that there are differences between the two projection series in terms of the numbers of family, one person, and other multi-person households. These assumed changes are summarized below so that the reader can see what how trends in living arrangements are taken into consideration in the SNZ projection series. These changes are not specifically accounted for in the Project projections.

Partner in couple without children family: Increasing rates for males and females at most ages, especially at ages 30-54 years for males and 30-44 years and 85-94 years for females. This reflects lower fertility rates, with fewer couples having children, and a slight convergence of male life expectancy to female life expectancy, with more couples having both partners to older ages.

Partner/parent in two-parent family: Decreasing rates for males and females at most ages, especially at ages 25-64 years for males and 25-54 years for females. This reflects lower fertility rates, with fewer couples having children.

Child in two-parent family: Decreasing rates at most ages, especially at ages 0-19 years. This reflects increased rates of single parenting from separation, divorce, childbearing outside of couple relationships, and more complex shared-care arrangements.

Parents in one-parent family: Increasing rates at most ages, especially at ages 25-39 years. This reflects increased rates of single parenting.

Child in one-parent family: Increasing rates at most ages, especially at ages 0-19 years. This reflects increased rates of single parenting.

Person in other multi-person household: Increasing rates at ages 15-24 years associated with higher numbers of students.

Person in one-person household: Increasing rates at most ages, especially 30-74 years for males and 35-44 years for females. These increases are associated with increased rates of marriage dissolution, decreasing rates of people forming partnerships, and lower fertility rates. The proportion of females aged 60-79 years living alone is assumed to drop slightly, given a slight convergence of male life expectancy to female life expectancy.

Person in non-private dwelling: Increasing rates at ages 15-24 years associated with higher numbers of students. Decreasing rates at ages 85+ associated with increasing life expectancy and declines in morbidity rates (SNZ 2005c: 5).

12.1.3 A caveat

It is perhaps surprising, given the quite complex nature of the assumed changes in living arrangements, that the differences between the two projection series are quite small for most TAs. Overall, as already noted, the Project projections generate a

higher number of households (especially households containing families) for the western Bay of Plenty sub-region (+1,300) and lower numbers for the eastern Bay of Plenty sub-region (-1,700) and Rotorua District (-2,000) than the SNZ projections.

Planners working with household projections should take these differences into account when considering the implications of the projections for future household numbers in each TA. In doing this, though, do keep in mind that the SNZ "high" and "low" variants for their household projections produce greater variations in overall numbers of households for most of the TAs than the differences found between the SNZ and Project projection series (Table 52). In this regard it should be noted, however, that the Project projections of overall household numbers fall outside the range for the SNZ low variant in two TAs: Rotorua District and Whakatane District. In these two areas it seems the Project household projections are probably too conservative. This caveat should be born in mind when considering the statistics on different household living arrangements that are discussed in the next section.

12.2 Changing patterns of household composition, 2001-2051

To derive estimates of numbers of households on the basis of living arrangements, the range of possibilities for such arrangements had to be grouped into a small number of categories. As noted in Chapter 3 (section 3.3), the methodology that was employed to achieve this grouping was the same as that used in the WBOP SmartGrowth Project. The population structures for each TA derived from the medium variant projections were used to estimate the numbers of households in six broad living arrangement categories, on the basis of the actual distribution of people, by age and sex, across these categories at the time of the 2001 Census of Population and Dwellings. The six categories of household are:

- Couple only households (no children)
- Two parent households with children
- Sole parent households with children
- One person households
- Households of unrelated and related people
- Other types of households containing unrelated people

The "family" households identified in Table 53 comprise those in categories 1, 2, 3 and 5 (category 5 includes people who are related to each other, as well as people who are not related). The "other" multi-person households include those in category 6, while the one person households are those in category 4. The categories for "family" and "other" households are not exactly synonymous with those used in SNZ's 2005 projections, and this accounts for some of the difference between the two projection series.

The numbers of households in each of the six categories, projected by decade through to 2051, are summarized for the three sub-regions and the region in Table 54, and for the TAs in the western Bay of Plenty sub-region and the eastern Bay of Plenty sub-region in Table 55. In all areas except Kawerau District numbers of households are projected to increase through to 2041, and in the western Bay Plenty sub-region, through to 2051. However, the numerical increases in the eastern Bay of Plenty TAs tend to be quite small, especially from 2011 (Tables 52 and 53). In the western Bay of Plenty TAs there are numerical increases through to 2051 in all categories of household living arrangement, and in the case of one

person households there is a three-fold increase in Tauranga City. In the eastern Bay of Plenty TAs this category of living arrangement also experiences the most dramatic increase over the 50 years, but it is a much slower growth than in the west.

Table 54 Projected households by category, sub-regions and region, 2001-2051

Category	2001	2011	2021	2031	2041	2051
Western BOP sub-region						
Couple only HH	15670	21340	27210	33550	38820	42570
Two parents with children HH	12920	16210	18370	20290	22130	23920
Sole parent with children HH	5970	7470	8490	9460	10450	11330
One person HH	11120	15260	19960	25430	30000	33010
HH or related/unrelated people	1910	2540	3050	3510	3900	4310
Other multi-person HH	1310	1680	2020	2260	2500	2760
TOTAL	48900	64500	79100	94500	107800	117900
Rotorua District						
Couple only HH	5470	6470	7300	8010	8290	8200
Two parents with children HH	6580	7130	6930	6730	6730	6850
Sole parent with children HH	3560	3880	3740	3680	3700	3750
One person HH	4720	5700	6700	7660	8030	7840
HH or related/unrelated people	920	1050	1100	1080	1090	1100
Other multi-person HH	1050	1170	1230	1240	1260	1260
TOTAL	22300	25400	27000	28400	29100	29000
Eastern BOP sub-region						
Couple only HH	4220	4870	5330	5680	5770	5610
Two parents with children HH	4930	5050	4620	4280	4190	4410
Sole parent with children HH	2920	2960	2750	2640	2590	2660
One person HH	3670	4320	4920	5540	5690	5360
HH or related/unrelated people	540	580	580	570	570	570
Other multi-person HH	720	720	700	690	690	690
TOTAL	17000	18500	18900	19400	19500	19300
Bay of Plenty TAs						
Couple only HH	25360	32680	39840	47240	52880	56380
Two parents with children HH	24430	28390	29920	31300	33050	35180
Sole parent with children HH	12450	14310	14980	15780	16740	17740
One person HH	19510	25280	31580	38630	43720	46210
HH or related/unrelated people	3370	4170	4730	5160	5560	5980
Other multi-person HH	3080	3570	3950	4190	4450	4710
TOTAL	88200	108400	125000	142300	156400	166200

Table 55 Projected households by category, western and eastern BOP TAs, 2001-2051

Category	2001	2011	2021	2031	2041	2051
Western Bay of Plenty District						
Couple only HH	4700	6440	8120	9800	10940	11470
Two parents with children HH	4200	5000	5340	5560	5790	6040
Sole parent with children HH	1460	1710	1830	1910	2040	2130
One person HH	2800	3900	5110	6410	7320	7650
HH or related/unrelated people	330	430	510	580	630	670
Other multi-person HH	410	520	590	640	680	740
TOTAL	13900	18000	21500	24900	27400	28700
Tauranga City						
Couple only HH	10970	14900	19090	23750	27880	31100
Two parents with children HH	8720	11210	13030	14730	16340	17880
Sole parent with children HH	4510	5760	6660	7550	8410	9200
One person HH	8320	11360	14850	19020	22680	25360
HH or related/unrelated people	1580	2110	2540	2930	3270	3640
Other multi-person HH	900	1160	1430	1620	1820	2020
TOTAL	35000	46500	57600	69600	80400	89200
Whakatane District						
Couple only HH	2910	3420	3750	3990	4080	3900
Two parents with children HH	3390	3520	3200	2960	2880	2960
Sole parent with children HH	1830	1880	1720	1620	1570	1620
One person HH	2430	2910	3390	3810	3950	3700
HH or related/unrelated people	380	410	400	390	390	390
Other multi-person HH	460	460	440	430	430	430
TOTAL	11400	12600	12900	13200	13300	13000
Kawerau District						
Couple only HH	560	560	540	570	580	580
Two parents with children HH	660	600	500	460	450	530
Sole parent with children HH	510	460	400	400	400	410
One person HH	500	510	500	510	510	520
HH or related/unrelated people	60	60	60	60	60	60
Other multi-person HH	110	110	100	100	100	100
TOTAL	2400	2300	2100	2100	2100	2200
Opotiki District						
Couple only HH	750	890	1040	1120	1110	1130
Two parents with children HH	880	930	920	860	860	920
Sole parent with children HH	580	620	630	620	620	630
One person HH	740	900	1030	1220	1230	1140
HH or related/unrelated people	100	110	120	120	120	120
Other multi-person HH	150	150	160	160	160	160
TOTAL	3200	3600	3900	4100	4100	4100

A better perspective of rates of change in the different categories of household at the sub-regional and regional levels can be seen in Table 56. Also shown in these tables are the changes in the distribution of households by category at 2001, 2021 and 2051.

Table 56 Changes in household numbers and composition, sub-regions and the region

	% change			% category		
Category	**2001-21**	**2021-51**	**2001-51**	**2001**	**2021**	**2051**
Western BOP sub-region						
Couple only HH	73.6	56.4	171.7	32.0	34.4	36.1
Two parents with children HH	42.2	30.2	85.1	26.4	23.2	20.3
Sole parent with children HH	42.2	33.5	89.8	12.2	10.7	9.6
One person HH	79.5	65.4	196.9	22.7	25.2	28.0
HH or related/unrelated people	59.7	41.3	125.7	3.9	3.9	3.7
Other multi-person HH	54.2	36.6	110.7	2.7	2.6	2.3
TOTAL	61.8	49.1	141.1	100.0	100.0	100.0
Rotorua District						
Couple only HH	33.5	12.3	49.9	24.5	27.0	28.3
Two parents with children HH	5.3	-1.2	4.1	29.5	25.7	23.6
Sole parent with children HH	5.1	0.3	5.3	16.0	13.9	12.9
One person HH	41.9	17.0	66.1	21.2	24.8	27.0
HH or related/unrelated people	19.6	0.0	19.6	4.1	4.1	3.8
Other multi-person HH	17.1	2.4	20.0	4.7	4.6	4.3
TOTAL	21.1	7.4	30.0	100.0	100.0	100.0
Eastern BOP sub-region						
Couple only HH	26.3	5.3	32.9	24.8	28.2	29.1
Two parents with children HH	-6.3	-4.5	-10.5	29.0	24.4	22.8
Sole parent with children HH	-5.8	-3.3	-8.9	17.2	14.6	13.8
One person HH	34.1	8.9	46.0	21.6	26.0	27.8
HH or related/unrelated people	7.4	-1.7	5.6	3.2	3.1	3.0
Other multi-person HH	-2.8	-1.4	-4.2	4.2	3.7	3.6
TOTAL	11.2	2.1	13.5	100.0	100.0	100.0
Bay of Plenty TAs						
Couple only HH	57.1	41.5	122.3	28.8	31.9	33.9
Two parents with children HH	22.5	17.6	44.0	27.7	23.9	21.2
Sole parent with children HH	20.3	18.4	42.5	14.1	12.0	10.7
One person HH	61.9	46.3	136.9	22.1	25.3	27.8
HH or related/unrelated people	40.4	26.4	77.4	3.8	3.8	3.6
Other multi-person HH	28.2	19.2	52.9	3.5	3.2	2.8
TOTAL	41.7	33.0	88.4	100.0	100.0	100.0

The very different patterns of growth in projected living arrangements for households for the western Bay of Plenty sub-region, Rotorua District and the eastern Bay of Plenty TAs are immediately obvious in the first three columns of the table. Whereas numbers of households in most of the categories will increase by over 50 percent between 2001 and 2021 in the western Bay of Plenty, no category in the other sub-regions will increase by this much, and in the eastern Bay of Plenty some categories will experience declines in numbers of households (Table 56).

The category that will see the largest percentage increases is one person households – an almost 80 percent increase in the western Bay of Plenty, 42 percent in Rotorua, and 34 percent in the eastern Bay of Plenty sub-region. The other major category of growth in the three sub-regions is in couples without children in the household. These increase by over 70 percent in the western Bay of Plenty sub-region, with increases of 33 percent and 26 percent in the other two sub-regions (Table 56). Growth in the two categories of living arrangement with children – couples and sole parents – is the slowest in the three sub-regions. There is an actual decline in numbers of households in these living arrangement categories in the eastern Bay of Plenty sub-region – a decline that continues through to 2051. In all parts of the region this shift in favour of households without children present reflects the trend towards an older age structure for the population in the region and in New Zealand generally as fertility is held at low levels through the projection period.

Growth in numbers of households in all categories is projected to be lower over the 30 years between 2021 and 2051 in all sub-regions (Table 56). In the western Bay of Plenty the six categories of household increase by at least 30 percent, with one person households growing by a further 65 percent. In Rotorua and the eastern Bay of Plenty sub-region, the categories including children either decline or remain virtually static. Growth by more than 5 percent is found in the households comprising couples only or one person households (Table 56).

The different patterns of growth in categories of household are reflected in the changing distributions of households over the six categories. The last three columns in the table show the increasing shares in the couple only and one person households, with the former remaining the predominant household type through to 2051 (Table 56). The distributions for Rotorua District and the eastern Bay of Plenty sub-region are quite similar in the three years shown: 2001, 2021, and 2051. The major difference with the western Bay of Plenty sub-region is in the share of couple only families, which is consistently around 8 percent greater than in the other two sub-regions. There are correspondingly smaller shares in the two household categories with children (Table 56).

For the region as a whole, the category that is projected to grow most slowly over the 50 years is the sole parent category (43 percent) – a rather surprising finding given the significant growth in this category of household in recent years. The category that will grow most rapidly, on the other hand, is the one person household, and the numbers in this category are projected to increase by over 130 percent between 2001 and 2051 (Table 56). However, as is apparent in Table 56, and even more obvious in Table 57 where the TAs in the western and eastern Bay of Plenty are shown separately, there are major differences in this growth across the region.

Table 57 Changes in household numbers and composition, western and eastern BOP TAs

	% change			% category		
Category	**2001-21**	**2021-51**	**2001-51**	**2001**	**2021**	**2051**
Western Bay of Plenty District						
Couple only HH	72.8	41.3	144.0	33.8	37.8	40.0
Two parents with children HH	27.1	13.1	43.8	30.2	24.8	21.0
Sole parent with children HH	25.3	16.4	45.9	10.5	8.5	7.4
One person HH	82.5	49.7	173.2	20.1	23.8	26.7
HH or related/unrelated people	54.5	31.4	103.0	2.4	2.4	2.3
Other multi-person HH	43.9	25.4	80.5	2.9	2.7	2.6
TOTAL	54.7	33.5	106.5	100.0	100.0	100.0
Tauranga City						
Couple only HH	74.0	62.9	183.5	31.3	33.1	34.9
Two parents with children HH	49.4	37.2	105.0	24.9	22.6	20.0
Sole parent with children HH	47.7	38.1	104.0	12.9	11.6	10.3
One person HH	78.5	70.8	204.8	23.8	25.8	28.4
HH or related/unrelated people	60.8	43.3	130.4	4.5	4.4	4.1
Other multi-person HH	58.9	41.3	124.4	2.6	2.5	2.3
TOTAL	64.6	54.9	154.9	100.0	100.0	100.0
Whakatane District						
Couple only HH	28.9	4.0	34.0	25.5	29.1	30.0
Two parents with children HH	-5.6	-7.5	-12.7	29.7	24.8	22.8
Sole parent with children HH	-6.0	-5.8	-11.5	16.1	13.3	12.5
One person HH	39.5	9.1	52.3	21.3	26.3	28.5
HH or related/unrelated people	5.3	-2.5	2.6	3.3	3.1	3.0
Other multi-person HH	-4.3	-2.3	-6.5	4.0	3.4	3.3
TOTAL	13.2	0.8	14.0	100.0	100.0	100.0
Kawerau District						
Couple only HH	-3.6	7.4	3.6	23.3	25.7	26.4
Two parents with children HH	-24.2	6.0	-19.7	27.5	23.8	24.1
Sole parent with children HH	-21.6	2.5	-19.6	21.3	19.0	18.6
One person HH	0.0	4.0	4.0	20.8	23.8	23.6
HH or related/unrelated people	0.0	0.0	0.0	2.5	2.9	2.7
Other multi-person HH	-9.1	0.0	-9.0	4.6	4.8	4.5
TOTAL	-12.5	4.8	-8.3	100.0	100.0	100.0
Opotiki District						
Couple only HH	38.7	8.7	50.7	23.4	26.7	27.6
Two parents with children HH	4.5	0.0	4.5	27.5	23.6	22.4
Sole parent with children HH	8.6	0.0	8.6	18.1	16.2	15.4
One person HH	39.2	10.7	54.1	23.1	26.4	27.8
HH or related/unrelated people	20.0	0.0	20.0	3.1	3.1	2.9
Other multi-person HH	6.7	0.0	6.7	4.7	4.1	3.9
TOTAL	21.9	5.1	28.1	100.0	100.0	100.0

In the western Bay of Plenty, Tauranga City stands out as the "growth" area, with all categories of household living arrangement increasing by more than 100 percent over the 50 years, and one person households increasing by more than 200 percent during the period. Western Bay of Plenty District follows with lower increases, but still more than a doubling of households over the 50 years (Table 57). In these projections, the increase in Tauranga City's total number of households between 2001 and 2021 is higher than that for Western Bay of Plenty District – the reverse of the situation that is found in the latest Statistics New Zealand family and household projections (SNZ 2005c). As noted earlier, the main reason for this is the use of a different migration assumption in the Demographic Forecast 2051 Project's medium variant projections than that used in the SNZ's official sub-national projections for Tauranga City.

The only District to experience a decline in numbers of households between 2001 and 2021 is Kawerau and this is mainly due to the projected drop in households with children present (Table 57). The medium variant SNZ household projections for Kawerau also project a decline over this period of 300 households – a similar number to that found in Table 55. Over the subsequent 30 years, numbers of households in Kawerau increase slowly in the two family categories without children, as well as in the two categories where there are children present. During this period, Kawerau's growth is more positive than that found in either Whakatane District or Opotiki District where only the couples with no children and the one-person households actually increase.

12.3 A caution

It is important to treat the projected changes in categories of household and the numerical and percentage shifts in the total numbers of households in private dwellings over the period 2021-2051 with considerable caution. It has already been noted that the household projections for the Demographic Forecast 2051 Project have held the living arrangement type rates found in 2001 constant through the projection period. This makes it possible to isolate the impact that the changing age-sex composition of the population has on household types and composition. All of the change discussed in this chapter is due to the projected age structures for the different TAs (Chapters 7 and 9).

As noted in the introduction to this chapter, the SNZ's (2005c) latest sub-national family and household projections, which do allow for changes in living arrangement type rates, generally produce higher numbers of households for most of the Bay of Plenty TAs than the Project's projections (Table 52). It is unlikely that they would have continued to do this for the eastern Bay of Plenty TAs if SNZ had pushed their household projections out to 2051. This is because their population projections for the period 2021-2051 would have been more conservative than the Project ones (see Chapter 8). In this regard, the household projections for the eastern Bay of Plenty TAs and Rotorua District, shown in Tables 52-55, should not be deemed unnecessarily pessimistic. From 2021 the assumption of zero net migration in all of these TAs, rather than continued net migration losses, allows the population structures to recover somewhat and for some growth in number of households to continue in all of the region's TAs.

Chapter 13: Looking ahead: diverse demographic futures

The demographic situation in the Bay of Plenty region is a complex one. As has been shown in this report, there are divergent histories of population change between 1981 and 2001 in the three major sub-regions, and between TAs within these sub-regions. The contemporary population is characterized by much more rapid population growth in the two TAs that comprise the western Bay of Plenty than in Rotorua District and in the three TAs that comprise the eastern Bay of Plenty.

The variations in total population growth in the three sub-regions disguise a dynamic that is not analysed in depth in this report: the quite divergent growth and age-sex composition characteristics of the Maori and non-Maori components of the population. Rotorua District and the eastern Bay of Plenty have larger shares of their populations that are Maori, and this situation is likely to persist in the future. Their demographic futures will thus be influenced much more significantly by trends in Maori population growth than will the futures of the TAs in the western Bay of Plenty.

Looking ahead, the challenge for planners in the eastern Bay of Plenty and Rotorua is not so much the changes in absolute numbers of residents, but rather the trends in population growth and the changes in age-sex composition. In the western Bay of Plenty, on the other hand, it is both the numerical growth in population and households, as well as the trends and changes in age composition that will pose challenges.

The Bay of Plenty region is currently one of the country's "growth poles" in crude demographic terms. It is likely to remain so, especially in the western sub-region, thanks to a combination of net migration gains and natural increase in a population that has a larger share of Maori with their higher fertility rates than the national population as a whole. Rotorua District and the eastern Bay of Plenty TAs will experience much slower population growth and, in some places, on-going decline in numbers, but there is the potential for a shift towards a different pattern in the future, especially for coastal parts of the region and for Rotorua District. The spill-over effects of rapid population growth in the western Bay of Plenty will impact increasingly on population change in Rotorua District, as well as Whakatane and possibly Kawerau Districts.

In this final chapter the provisional results of the 2006 Census of Population and Dwellings are reviewed briefly. This is followed with some observations on the main reasons for migration to and from the region that were revealed in a survey of internal migration in the Bay of Plenty that was carried out by the Migration Research Group between April and June 2005. A more detailed analysis of the results of this survey can be found in Ho et al. (2006). The third and concluding section of the chapter returns to the challenge of understanding population dynamics in a region like the Bay of Plenty, and one important limitation of the sorts of projections that can be produced using conventional methodologies like those used in the Demographic Forecast 2051.

13.1 Provisional results of the 2006 census

The provisional results of the 2006 census suggest that all of the Bay of Plenty TAs, except Tauranga City, have experienced larger percentage increases (or smaller percentage decreases in the cases of Kawerau and Opotiki Districts) since 2001 in their census night populations, than was the case between 1996 and 2001 (Table 58). This reflects a national trend towards greater population increases between 2001 and 2006 than in the previous five year period (SNZ 2006).

Table 58 Changes in census night population counts, Bay of Plenty TAs

	Census night population			% change	
Territorial Authority	**1996**	**2001**	**2006**	**1996-01**	**2001-06**
Western BOP District	35,283	38,478	42,400	9.1	10.2
Tauranga City	78,324	91,842	104,700	17.3	14.0
Rotorua District	68,991	68,775	70,400	-0.3	2.4
Whakatane District	33,507	33,009	33,000	-1.5	0.0
Kawerau District	7,752	6,951	6,750	-10.3	-2.9
Opotiki District	9,555	9,162	8,990	-4.1	-1.9
BAY OF PLENTY TAs	233,412	248,217	266,240	6.3	7.3
Western Bay of Plenty	113,607	130,320	147,100	14.7	12.9
Eastern Bay of Plenty	50,814	49,122	48,740	-3.3	-0.8
Rotorua District	68,991	68,775	70,400	-0.3	2.4
New Zealand	3,681,546	3,820,749	4,116,900	3.8	7.8

Source: Statistics New Zealand (2006), Table 3. The 2006 figures are provisional counts

It is important to keep in mind that these population figures refer to the numbers of people actually enumerated in the area on census night – residents there at the time of the census and visitors who were in the area on census night. They do not include people temporarily absent from their usual residences at the time of the census. The figures used in the Demographic Forecast 2051 Project are the usually resident populations – the ones that exclude visitors and include people who are temporarily absent at the time of the census. These resident population figures for the 2006 census will be available around November 2006.

For all TAs, except Kawerau, the census night populations were larger than the resident populations in 1996 and 2001 (see Table 4 in this report for the resident populations in these TAs). This means that there were more visitors in all TAs except Kawerau than there were people temporarily absent on census night. The differences were not large – for the western Bay of Plenty sub-region, for example, the total de facto population in 2001 was 130,320 (Table 58) while the resident population in the census that year was 129,138 (Table 4). In the case of Rotorua District the relevant figures for 2001 were 68,775 and 64,509, while in the eastern Bay of Plenty sub-region there were 49.122 people present on census night and 48,990 residents in 2001 (Tables 58 and 4).

The slower growth in Tauranga City over the five years 2001-2006 was suggested in Statistics New Zealand's projections for this TA in 2002. The Western Bay of Plenty SmartGrowth Project projections assumed that the rate of population growth between 1996 and 2001 would continue for the subsequent 5 years, reflecting a more optimistic set of migration assumptions. The resident population estimates are likely to suggest a somewhat lower rate of growth between the 2001 and 2006 censuses than was the case between 1996 and 2001, notwithstanding the continued popularity of the western Bay of Plenty as a destination for migrants within New Zealand.

13.2 Reasons for migration to and from the Bay of Plenty

The two main drivers of population change – natural increase and net migration – have been examined at some length in Chapter 10. It has already been noted earlier in this chapter that planners need to be aware of the different contributions that these two drivers make to changes in the sizes and compositions of TA populations in the region. Net migration makes a much bigger numerical contribution to population growth in the western Bay of Plenty than elsewhere in the region, but everywhere the movement of people in and out of the region is impacting on local populations.

Ho et al. (2006) have examined in some detail the migration of people into and out of Bay of Plenty TAs between 1 October 2003 and 30 September 2004. They found that the two most important reasons given by people for moving into all of the Bay of Plenty TAs were: desire for a change in residential environment, and a wish to be closer to family. Except for people moving to Rotorua, where job opportunities were more important as a reason for movement than in any other TA in the region, climate was one of the lifestyle reasons for moving into the Bay of Plenty. Indeed, respondents gave lifestyle and family reasons more emphasis than economic reasons for moving into Bay of Plenty TAs, except for Rotorua District.

As far as reasons for leaving TAs in the region for other places of residence, desire to live in a new area, desire to be closer to family and friends, and limited income opportunities in the Bay of Plenty, were cited most frequently by migrants who had left most of the region's TAs. In a sense the movement of people into and out of the region was for essentially the same reasons, with economic reasons tending to be cited more frequently amongst the out-migrants who responded to the survey than amongst the in-migrants.

The importance of lifestyle and family-related factors in the rationalizations for movement into and out of all Bay of Plenty TAs reinforces findings from earlier surveys of migration in the western Bay of Plenty (Lidgard and McLeay 2002; McLeay 2003; Bedford et al. 2005). In their Vision Statement, the authors of *The Western Bay of Plenty Sub-Region 50 Year Strategy and Implementation Plan* (SmartGrowth 2004: 10) state, amongst other things, that:

> *In 50 years time …*
>
> *The western Bay of Plenty is a place where people can contribute to and enjoy a quality of life that meets their needs and aspirations. It provides lifestyle choices from surf to mountain tops which support and reflect the natural attributes of the area…*
>
> *The area continues to be a popular place for people to move to, attracted by the mild climate and coastal setting. The area defines itself by its impressive recreation and leisure opportunities.*

An emphasis on lifestyle and leisure, supported by appropriate economic opportunity and enterprise, pervades the SmartGrowth strategy. Its authors are reflecting very much the attributes of the western Bay of Plenty and, indeed the Bay of Plenty region as a whole, that were valued most highly by both in-migrants and out-migrants in the 2004 survey. As Ho et al. (2006) point out, the physical environment was the most frequently cited valued attribute of the Bay of Plenty as a place to live by in-migrants to all TAs in the region. Just under half of all respondents to the 2004 survey stated this was a valued attribute, followed by quality of life and recreation/leisure opportunities. Out-migrants gave these attributes the same ranking and emphasis.

This emphasis on lifestyle-related factors is not something that has featured prominently in the New Zealand literature on internal migration. In the absence of data on reasons given for movement, and a tendency to rely on attributes of local labour and housing markets to explain the patterns of population movement revealed in censuses, this is hardly surprising. However, as the large post-war baby boom cohorts move into the older labour force age groups, it is likely that factors other than wage differentials, job vacancies, and prices of accommodation are going to be the main reasons for their internal migration.

In a major cross-national survey of 9,500 inter-regional migrants in five Nordic countries, Lundholm et al. (2004) found that social commitments, environmental preferences and life values were much more important motives for recent population movement than getting a job or changing jobs. Indeed, less than one fifth of their respondents in four of the countries surveyed mentioned employment as a reason for their most recent move. A national sample survey, that includes people who have not moved recently as well as those who have moved, is currently being scoped by Statistics New Zealand and is likely to be carried out during 2007. This survey will provide valuable information for assessing whether the findings from the Bay of Plenty postal survey apply more generally in New Zealand, or reflect the views of people moving into and out of this particular region.

13.3 Another dimension to population change in the Bay of Plenty

It must be appreciated that the resident populations of each TA and sub-region are only one component of the population, albeit the main one for most parts of the year, that makes use of the resources and facilities in the area. A challenge for planners, and one that cannot be addressed in standard projections of the resident population, is the extensive and increasing population that uses the Bay of Plenty for recreation – the second home dwellers, the tourists, the visitors -- all of whom place demands on the region's infrastructure and services. These non-residents are not captured in conventional definitions of populations, or addressed in conventional projections. Yet they are a very important component of what might be called a region's "effective" population – the population that uses places.

In the case of Rotorua District and the eastern Bay of Plenty sub-region, especially around Whakatane and along the coast from Whakatane to Opotiki, the numbers of people moving into, out of and through the TAs has been increasing as numbers of visitors from within New Zealand and overseas have taken the opportunity to enjoy the tourist attractions in Rotorua and the iconic beaches along the Bay of Plenty coastline. As one of the North Island's most prominent tourist attractions, Rotorua's "effective" population has been growing a lot faster than the trends in residential population change would suggest. The estimates of migration used in population projections are not necessarily reliable indicators of the impact of population movement on a city or district that is heavily impacted by tourism.

The projections produced for the Demographic Forecast 2051 only tell part of the full story of population dynamics in the Bay of Plenty. The large numbers of visitors who come and go daily, weekly and seasonally are a very important component of a region's population on any one day of the year, especially in TAs with quite small numbers of residents. The Demographic Forecast 2051 Project, and its associated survey of reasons for migration into and out of the Bay of Plenty, has provided an important but not a complete assessment of the changing populations at TA, sub-regional and regional levels.

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