

Guest Numbers in Northland

This is a model answer for Time Series. It is an old model but updated to account for the changes in the standard. Although the data is a little out of date now the analysis isn't affected by that.

Introduction

I was provided with a set of data about guests staying in commercial accommodation in the various provinces of New Zealand. The original source of the data was Statistics New Zealand at http://www.stats.govt.nz/browse_for_stats/industry_sectors/accommodation.aspx.

The data is for all types of accommodation – hotel, motel, backpackers etc – for which visitors pay a commercial user for a night's stay.

It also does not distinguish the reason for the night's stay, so we cannot sort out tourists, business people, etc.

I selected the Northland region from the set of provinces, because it is very dependent on tourism, so accommodation numbers are important for that area.

Northland

Visitors to Northland, both foreign and local, add over \$75 million to the local economy just on accommodation (see chart next page) and half a billion dollars in total.

One reason Northland gets so many tourists "is the proximity of Auckland, not only providing a large population base, but also an international gateway into New Zealand" (www.stats.govt.nz/~_media_Statistics_browse-categories_population_migration_nz-a-regional-profile_Northland.pdf).

Interesting information about the source and spending of international tourists can be seen at <http://www.tourismnewzealand.com/markets-stats/>. It indicates that 22% of visitor days spent are back-packers, even though they are only 11% of visitors, which shows there is going to be a difference between visitor numbers and stays.

Not all tourists stay in accommodation though – the Bay of Islands has large cruise ships that visit but do not feature in accommodation statistics.

Northland, other than the oil refinery at Marsden Point and farming is short on large employers and Tourism makes a significant contribution, which is important in an area with traditional high unemployment (www.stats.govt.nz/~_media_Statistics_browse-categories_population_migration_nz-a-regional-profile_Northland.pdf).

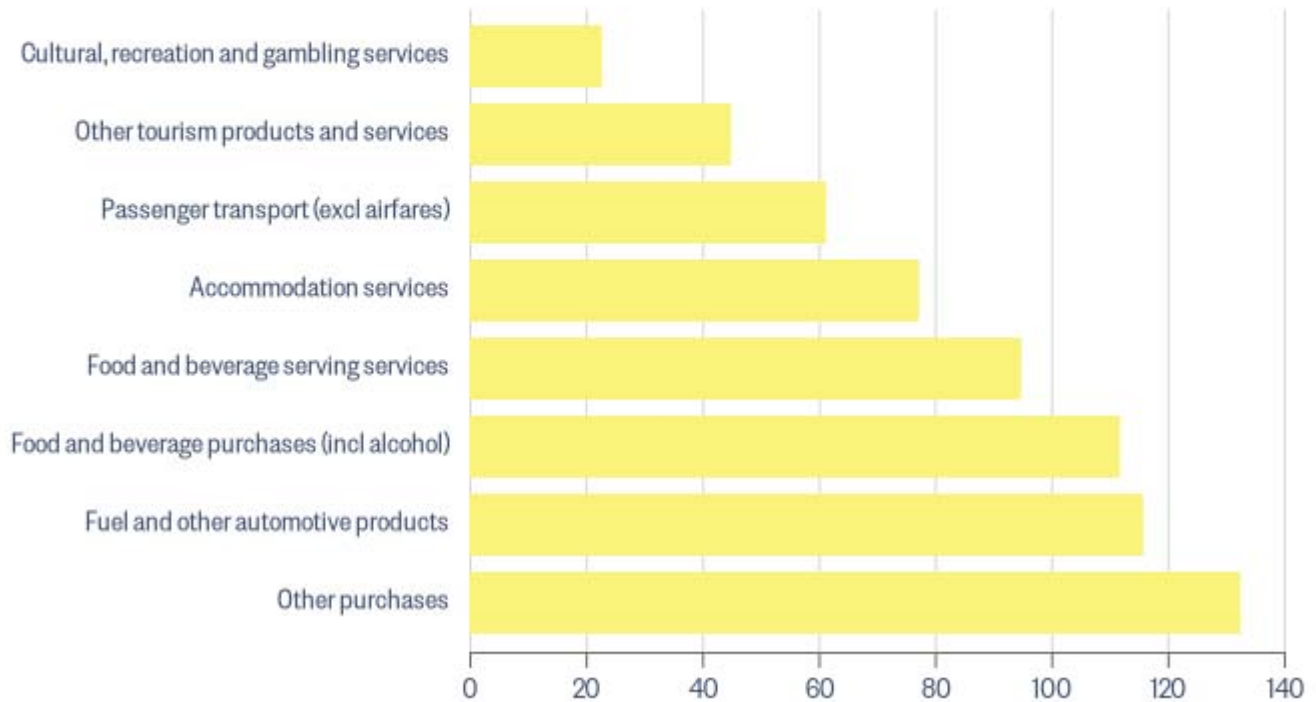
The Northland Tourism website <http://www.northlandnz.com/> gives the following number of places to stay: Bay of Islands (198) Whangarei & Tutukaka Coast (148) Top of the North (60) Kauri Coast & Hokianga (37). While every part of the province has large numbers of visitor accommodation, it is clear that the Bay of Islands is the dominant location.

Some of the people staying in the accommodation will be people on business. This is likely to be such a small number in Northland, given the lack of the sorts of businesses that generate much travel, that it will be swamped by the tourists. Some of the visitors will be people seeing family etc, rather than thinking of themselves as tourists. From the accommodations' point of view they are no different though – they pay just the same and the reason for their trip is irrelevant.

Visitor spend on tourism products and services in Northland RTO, New Zealand

Domestic plus international visitors, year to March 2015, NZD millions

Source: Ministry of Business, Innovation, and Employment



Target Audience

Obviously anyone with a commercial interest in a hotel, motel etc is interested in the local trends in accommodation. They can plan more effectively if the trends are sufficiently strong.

However tourism trends are important to anyone interested in the Northland economy – tourism operators, restaurants and even just local businesses. Government, both local body and national also need information on the likely pattern of growth, to plan better.

Plain visitor numbers can be used, but changes in the types of stay have to be taken into account. If the proportion of backpackers rises then the number of days spent will also rise – because they tend to stay longer – even if actual visitor numbers are flat.

The numbers of visitors will include some for business or personal reasons, which will not make any difference to accommodation providers, but will affect those with interests not directly linked to accommodation would be wise to look at the plain numbers as well, so see how they interact.

Data Analysis

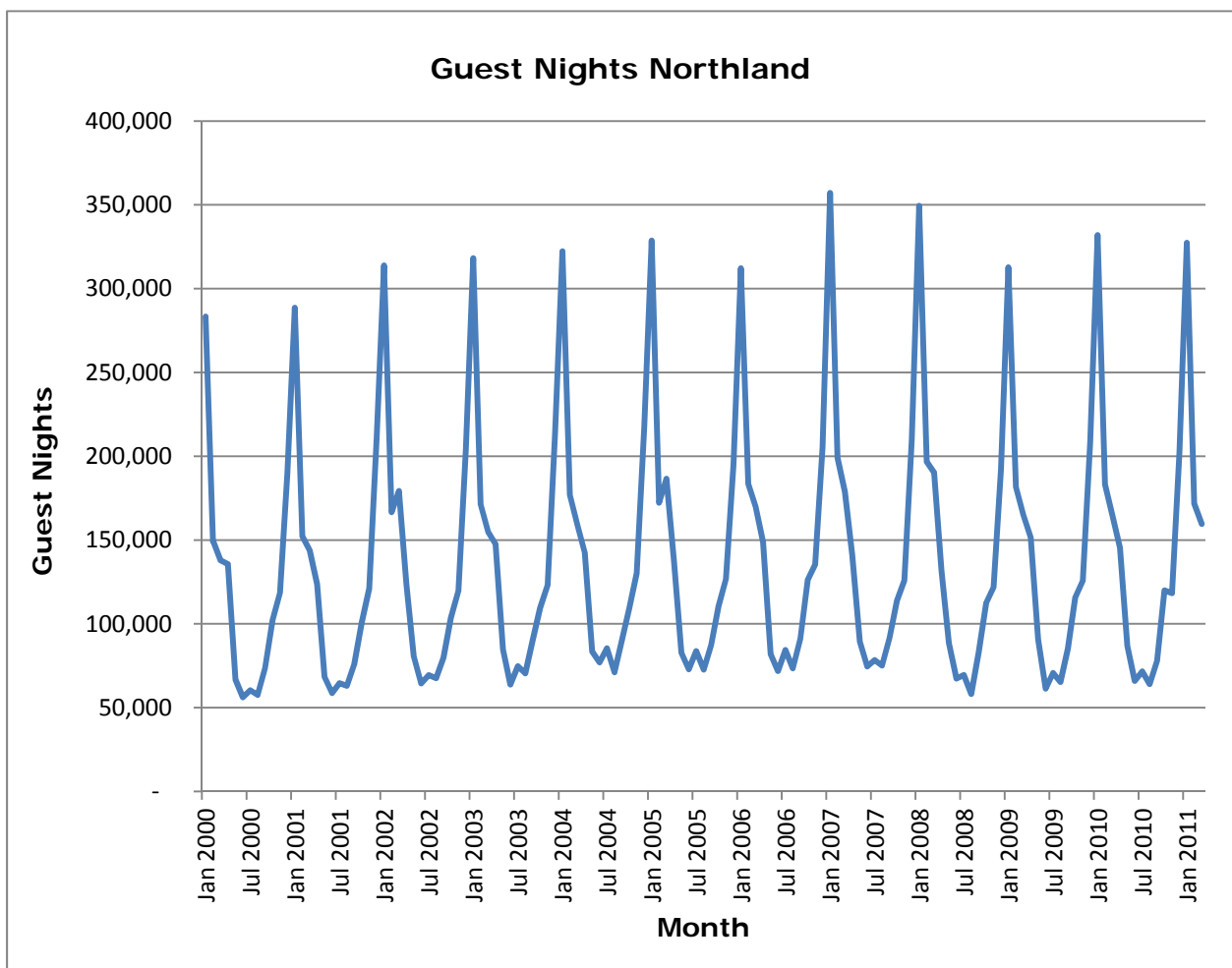
The data when plotted has a clear main pattern of spike for January and trough for June which is a little as one fifth the value (350,000 peak and 70,000 trough).

The peak is differently shaped on the right hand side. I wondered if this is to do with the timing of Easter and found that 2002 and 2005 had a March Easter, caused a small side-spike in the data. Normally March is less than February, but the increase from the Easter guests causes this pattern to change (at the expense of April guests).

The troughs show a regular pattern of July being higher than the months around it. This must surely be down to the school holidays.

That the pattern is so dependent on the school holiday times suggests that an enormous number of the visitors must be Kiwis, or possibly Australians as they share similar holidays.

I presume some of the variability is due to weather, but it was hard to find a way to link this.

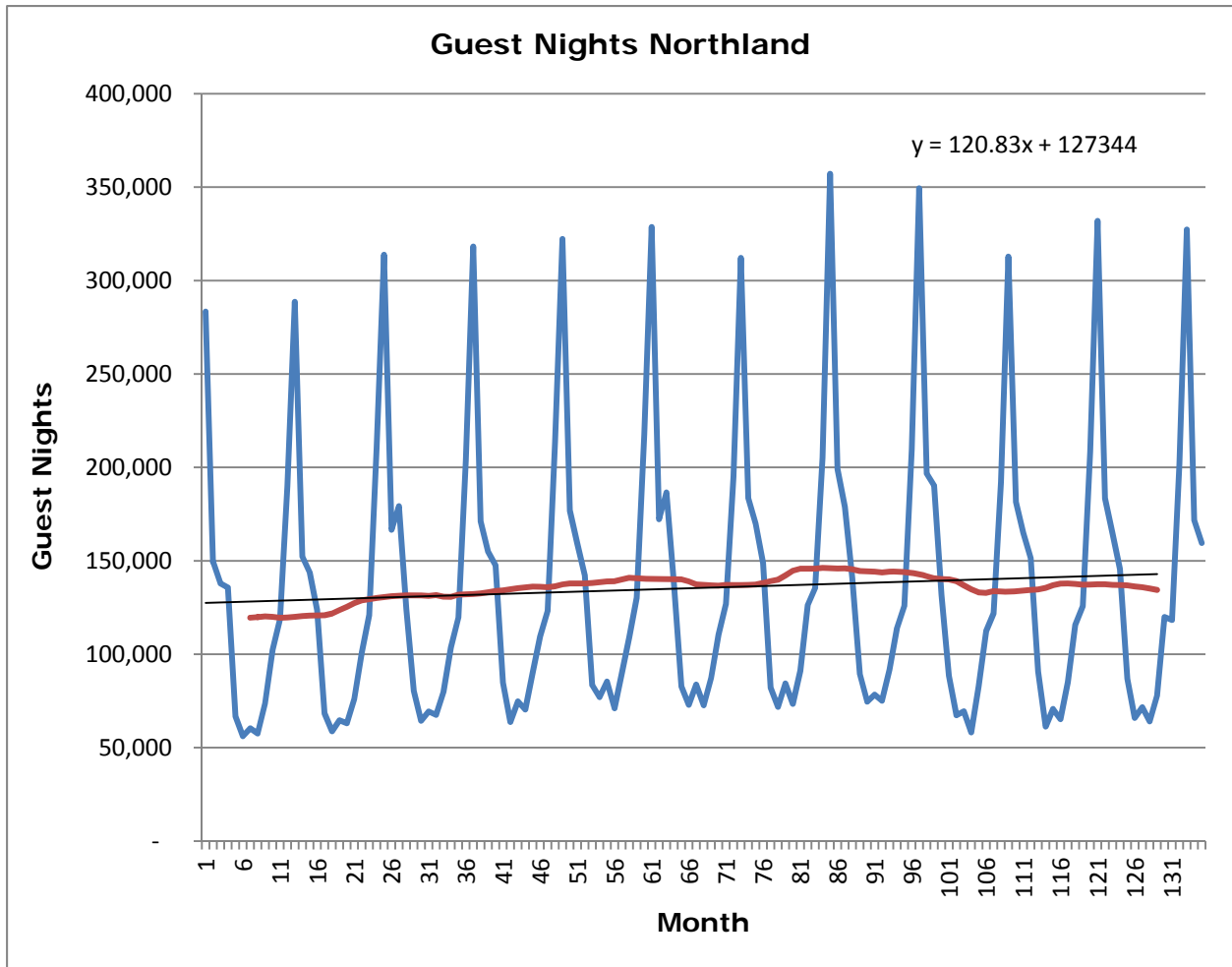


There is little obvious movement in the lower months over the whole period, although from 2003 to 2007 is higher than the others. The highest months do seem to have higher peaks at the end compared to the start.

Given the regular nature of the seasonal pattern, I am comfortable using the data to predict for each month into the future. There will inevitably be some element of randomness, but monthly predictions are likely to be accurate for the near future.

The only element I would suggest that might affect this is the placement of the Easter holidays for the March to April period.

Discussion of Long Term Trends



A running 12 month average has been added, in red. This shows a pattern of increase in the first half and decrease in the second half.

A linear trend line was added using the Excel feature on the moving average. You can see clearly the pattern of being over in the middle and under on the ends.

The monthly increase is 121 people from the gradient of the trend line.

Assuming the trend is correct, I would predict each month will be 1,450 higher visitor numbers than the same month in the previous year. (*The slope of 120.8 is per month, so each month is on average 12×121 more people than the same month in the previous year.*)

My research shows that the expected trend for tourism, both internal and foreign, is steady growth for New Zealand as a whole. I found nothing to suggest that the long term trend for Northland is likely to be any different from the rest of the country.

I feel that the long term trend for Northland is likely to be upwards at the approximately 1,500 extra visitors for each month based on the trend. However, my predictions in the medium term are different (see later).

Seasonal Patterns

These are the numbers I calculated as the differences for each month from the moving mean for that month.

Seasonal effects

Jan	187,690
Feb	42,533
Mar	33,294
Apr	3,325
May	-52,281
Jun	-68,023
Jul	-61,097
Aug	-68,054
Sep	-50,610
Oct	-25,060
Nov	-10,807
Dec	68,830

Northland shows a very strong seasonal pattern, with a January well above the mean, and December clearly the next strongest. February and March also show strong numbers. The Winter months (June, July, August and September have very low numbers).

The pattern is clearly seasonal, with Summer months showing strong numbers and the colder months very low numbers. As powerful is the effect of the Christmas holidays, which is why December is so large, even though it isn't as warm as February.

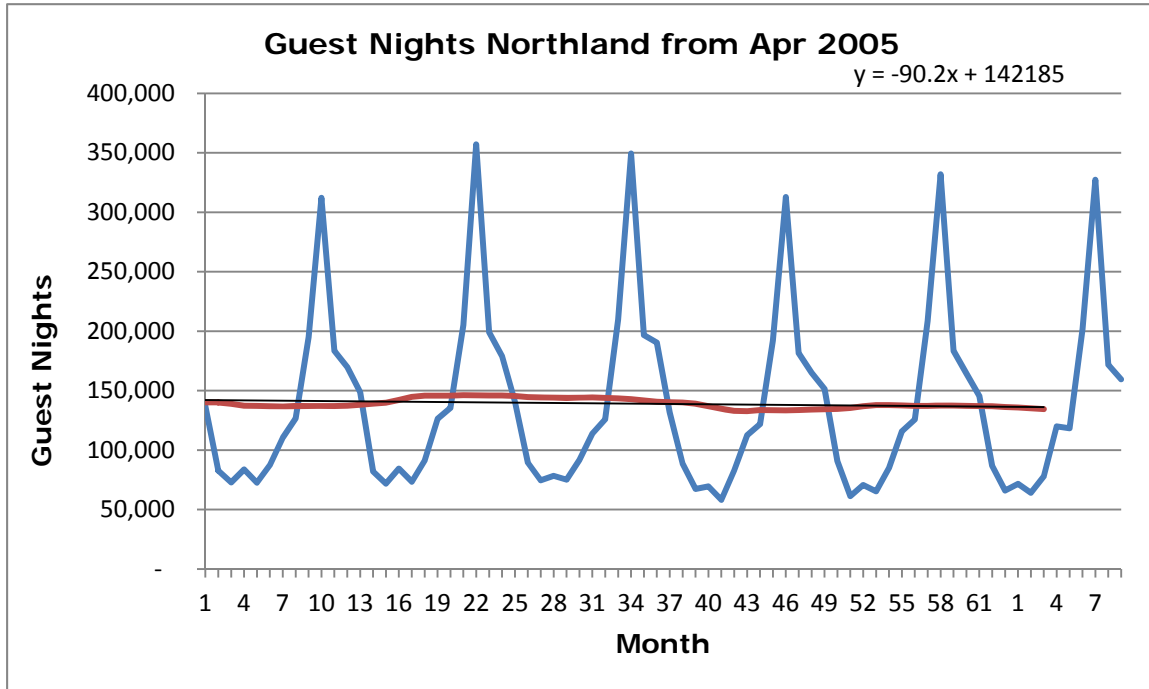
I have also calculated the standard deviations in the monthly values. Those for June and July in Auckland are very large, despite being on smaller base numbers, which means they must be particularly erratic.

	Differences for season	Standard Deviation
Jan	187,690	13536
Feb	42,533	8586
Mar	33,294	11054
Apr	3,325	8804
May	-52,281	3934
Jun	-68,023	4086
Jul	-61,097	4453
Aug	-68,054	4226
Sep	-50,610	2807
Oct	-25,060	4839
Nov	-10,807	4120
Dec	68,830	7992

This shows that the greatest variability is the summer months, but especially March due to the changing time of Easter. (January has a bigger s.d. but on a much larger value.)

Predictions

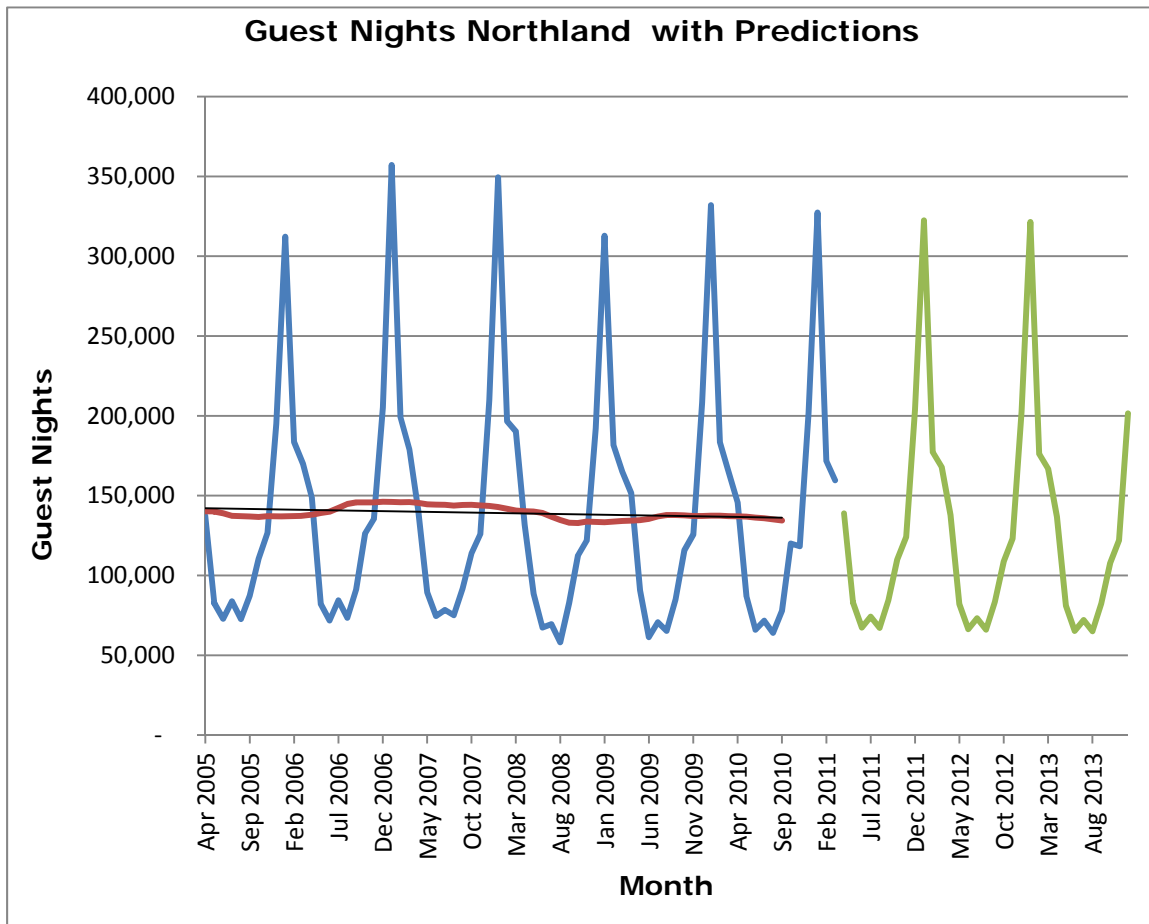
I was unprepared to make my short term predictions based on the long term trend. Although my research shows the long term linear trend is likely correct, we cannot get around the fact that for the last few years the medium term trend is downwards.



We can see this gives a drop of 90 people per month in the trend line, which is more or less 1,000 less per year for each month compared to the one in the next year.

The graph takes April 2005 = 1. I took the number for January 2012 (82) put it into the trend line and got a prediction for visitors in that month of 322,500, after seasonal adjustment.

July 2013 would be predicted to have $100 \times -90.2 + 142,185 - 61,097 = 72,100$ visitors.



Limitations for Predictions

In order to make predictions more accurate the reason for the downward trend in overall numbers (even as the rest of NZ rises steadily) should be examined. It appears to be driven mostly by Summer numbers.

Predictions for Northland in March and April need to take account of the timing of Easter.

The predictions for later 2011 would need to take into account the effect of the Rugby World Cup held then.

The predictions assume that all the different parts of the Northland region will experience the same overall trend in visitor numbers. While I think that is likely to be a good prediction – since I did not find any evidence of major changes in the sights to see or the ways to get there in the foreseeable future – there is a chance this is untrue.

For those interested in predicting tourism in Northland, as opposed to merely predicting the numbers of night stays, it would be useful if we could sort out business and personal visitors from tourists.

For those running accommodation it would be helpful if those staying in motels, hotels, camping grounds and backpackers were sorted out, as they may have different trends.

Conclusion

Northland shows a very strong and regular seasonal pattern which has remained unchanged over 10 years, apart from the (predictable) effect of Easter. Research shows no reason to expect any rapid changes in the next few years.

The long term trend is upwards, fairly gently, and the medium term is downwards, fairly gently. Oddly, they may both be correct, as the expectations are that tourist numbers will rise, but nothing much is expected to change regarding Northland in the short term.

I have made predictions that, subject to the usual random variation, that I have a reasonable confidence in. I would however not expect the long term trend to be downwards, so do not believe they should be pushed out any further.