Covid-19 Modelling Results, as at 10 April 2020

1. Total Confirmed Cases

My R code for Covid-19 modelling is at

https://raw.githubusercontent.com/DaveGiles1949/r-code/master/Canadian_Covid-19_Cases.R

The code will automatically download the latest data from my github account.

The chart below shows results based on *data from 2 March to 9 April inclusive*.

The Logistic model produces an "S-shaped" growth curve. One *disadvantage* is that this S-shape is symmetric about its point of inflection.
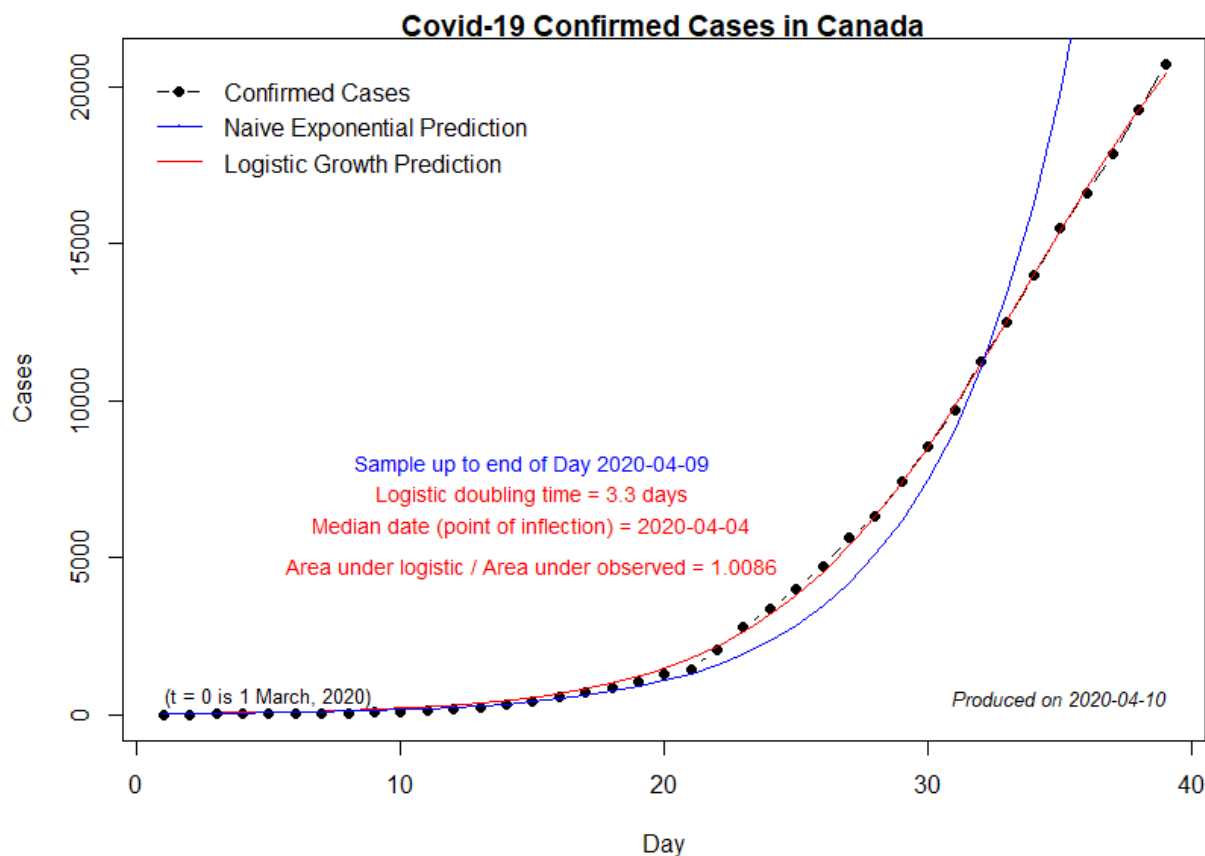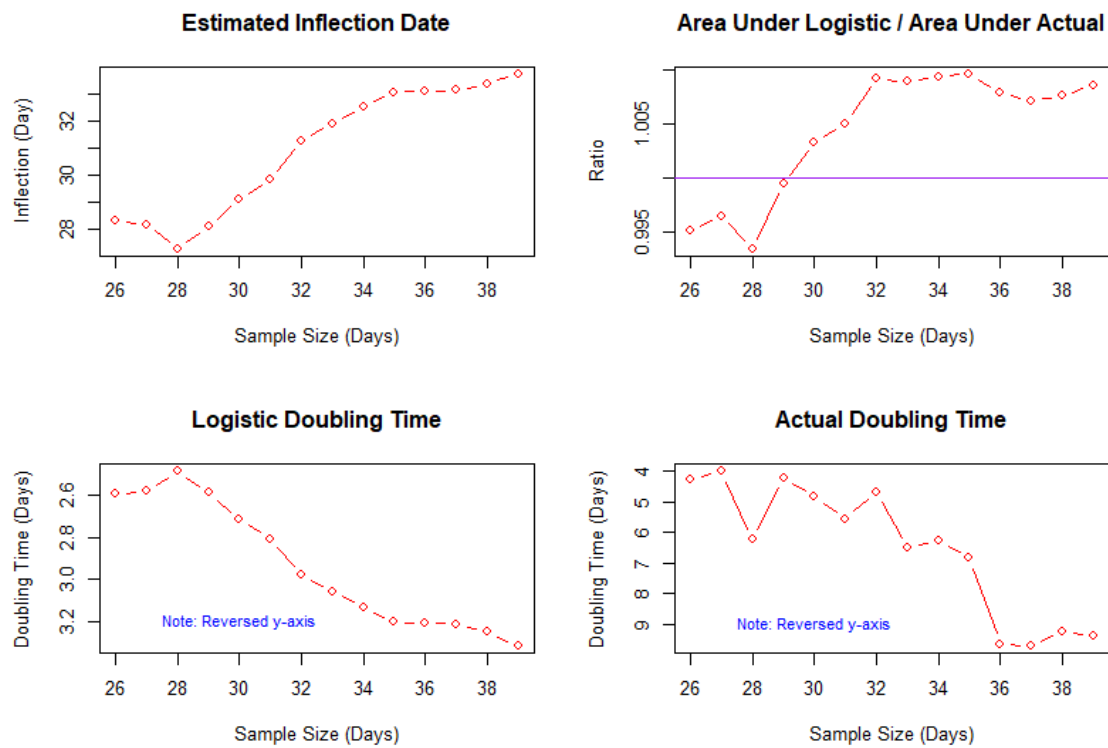

It's also interesting to see how the results change over time as more data become available.

This is summarized in the next set of charts, which are based on successive samples, each starting on 2 March, ending after 26, 27, …., 39 days. The last sample is the full sample used to get the chart above.

The second chart indicates the on-going "good fit" of the Logistic model to the observed data. A ratio value greater than 1.0 indicates that the model is over-predicting the actual data over the full sample range. A value of 1.0 would be "ideal", in a loose overall sense.

Both the observed and estimated "doubling times" for new cases have improved substantially. (Note the reverse axis on the last two charts, and the fact that a longer doubling time is better than a short one.)

Estimated Inflection Date

Area Under Logistic / Area Under Actual

Logistic Doubling Time

Actual Doubling Time

The following plot shows the projections for total confirmed cases of Covid-19 based on the latest version of the Logistic model. The projections go to 7 days beyond the end of the latest sample.
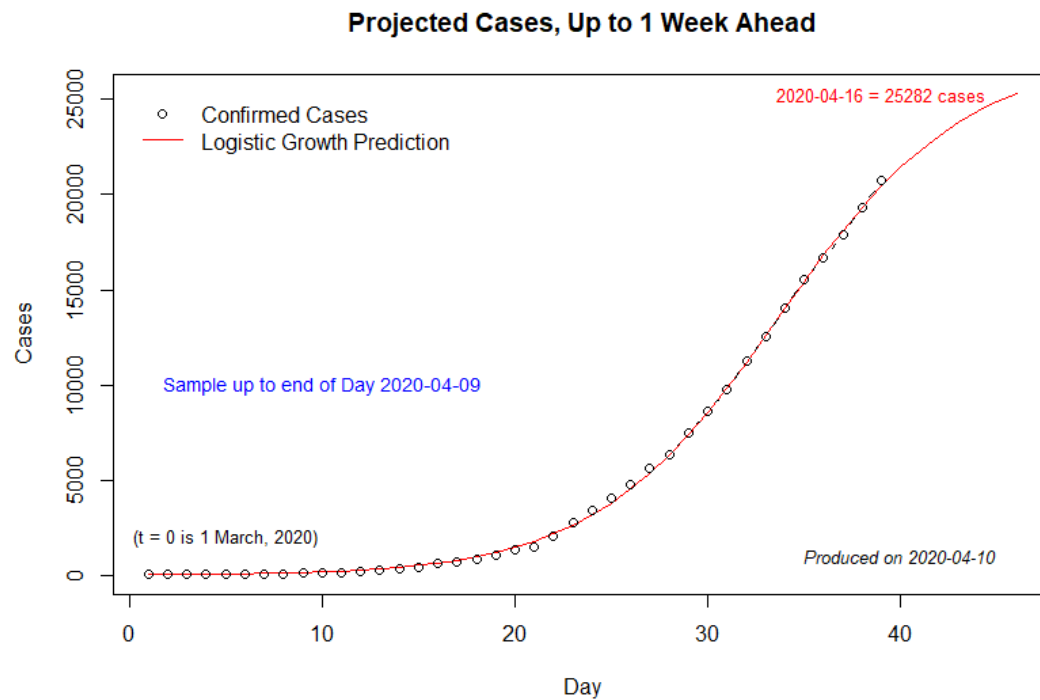
Projected Cases, Up to 1 Week Ahead

Table 1: Projected Covid-19 Cases in Canada

(Projections are in Blue; Actual Values are in Brackets)

Sample end: 08 April

09 Apr	10 Apr	11 Apr	12 Apr	13 Apr	14 Apr	15 Apr
20162 [20765]	21096	21916	22627	23236	23753	24188

Sample end: 09 April

10 Apr	11 Apr	12 Apr	13 Apr	14 Apr	15 Apr	16 Apr
21445 []	22339	23122	23798	24377	24868	25282

Sample end: 10 April

11 Apr	12 Apr	13 Apr	14 Apr	15 Apr	16 Apr	17 Apr

Sample end: 11 April

| 12 Apr	13 Apr	14 Apr	15 Apr	16 Apr	17 Apr	18 Apr

2. Total Number of Deaths

My R code for Covid-19 modelling is at

https://raw.githubusercontent.com/DaveGiles1949/r-code/master/Canadian_Covid-19_Deaths.R

The code will automatically download the latest data from my github account.

The chart below shows results based on *data from 15 March to 9 April inclusive*.

The Logistic model produces an "S-shaped" growth curve. One *disadvantage* is that this S-shape is symmetric about its point of inflection.
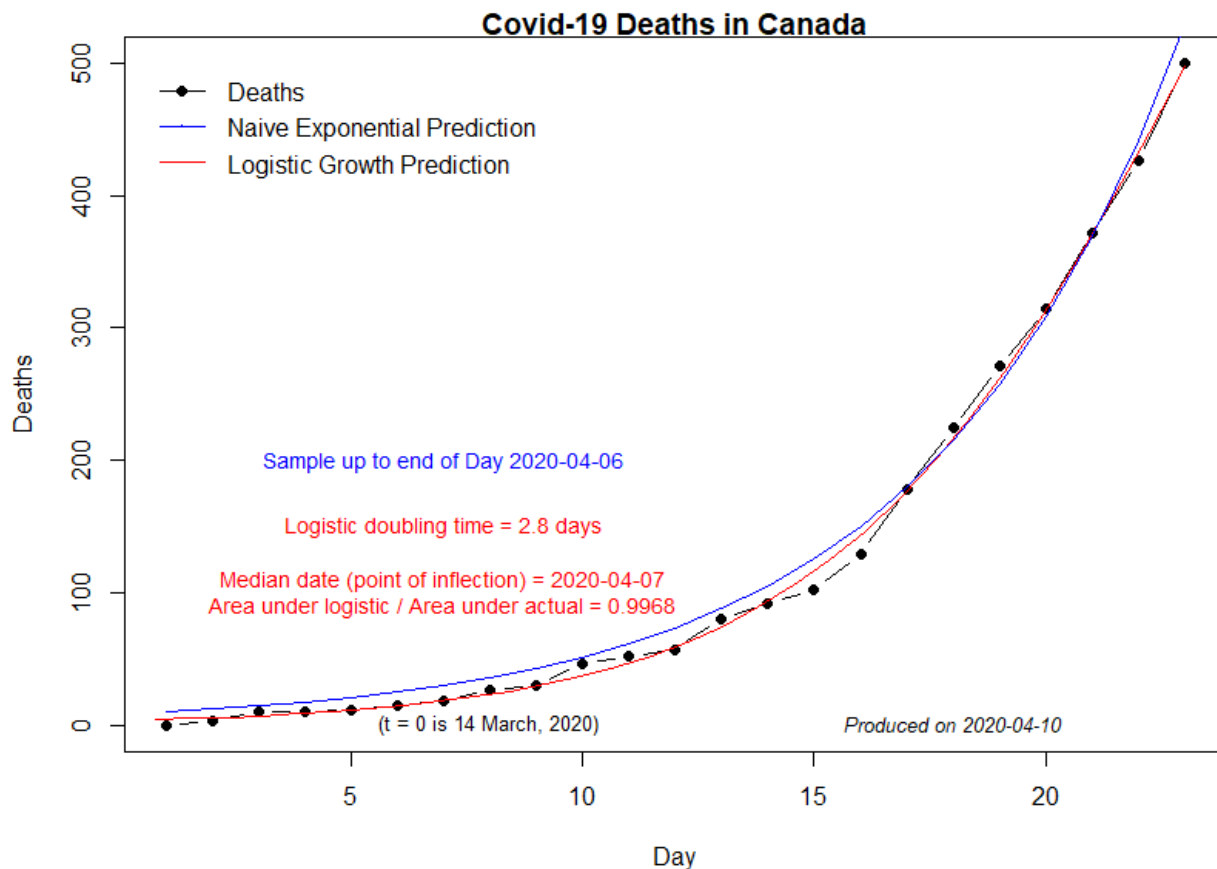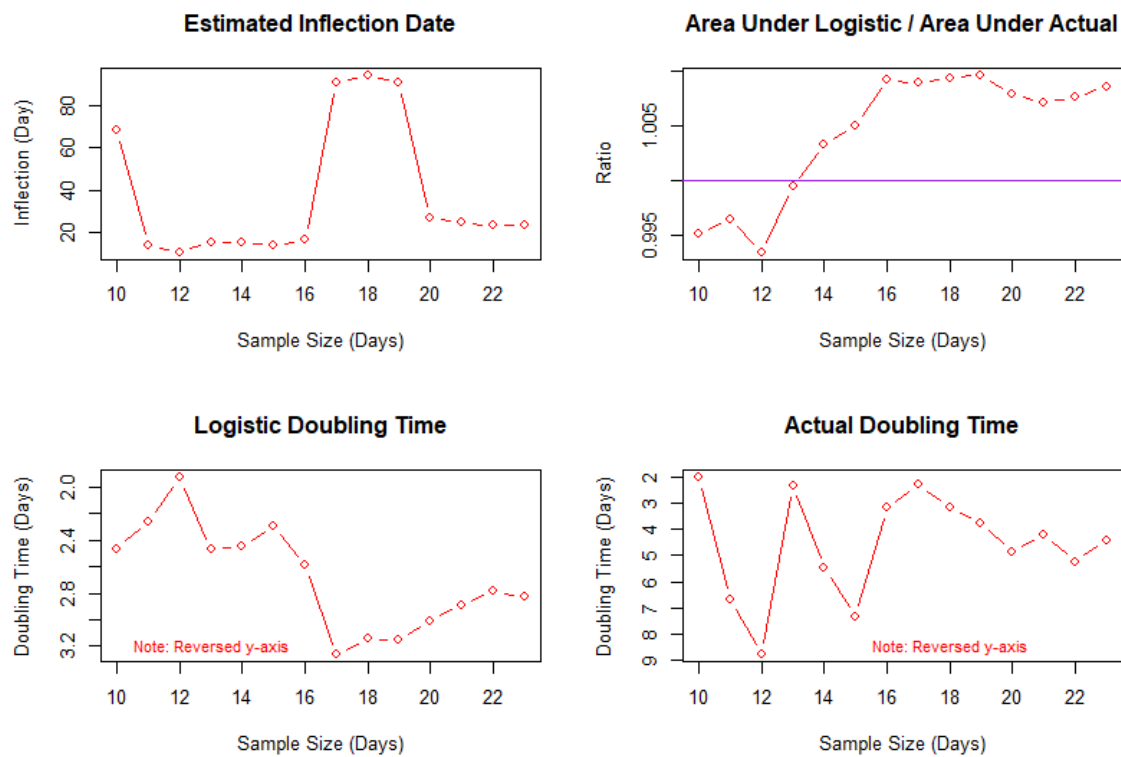

It's also interesting to see how the results change over time as more data become available.

This is summarized in the next set of charts, which are based on successive samples, each starting on 15 March, ending after 10, 11, …., 23 days. The last sample is the full sample used to get the chart above.

The second chart indicates the on-going "good fit" of the Logistic model to the observed data. A ratio value greater than 1.0 indicates that the model is over-predicting the actual data over the full sample range. A value of 1.0 would be "ideal", in a loose overall sense.

Both the observed and estimated "doubling times" for new cases have improved substantially. (Note the reverse axis on the last two charts, and the fact that a longer doubling time is better than a short one.)

Estimated Inflection Date

Area Under Logistic / Area Under Actual

Logistic Doubling Time

Note: Reversed y-axis

Actual Doubling Time

Note: Reversed y-axis

The following plot shows the projections for total confirmed cases of Covid-19 based on the latest version of the Logistic model. The projections go to 7 days beyond the end of the latest sample.
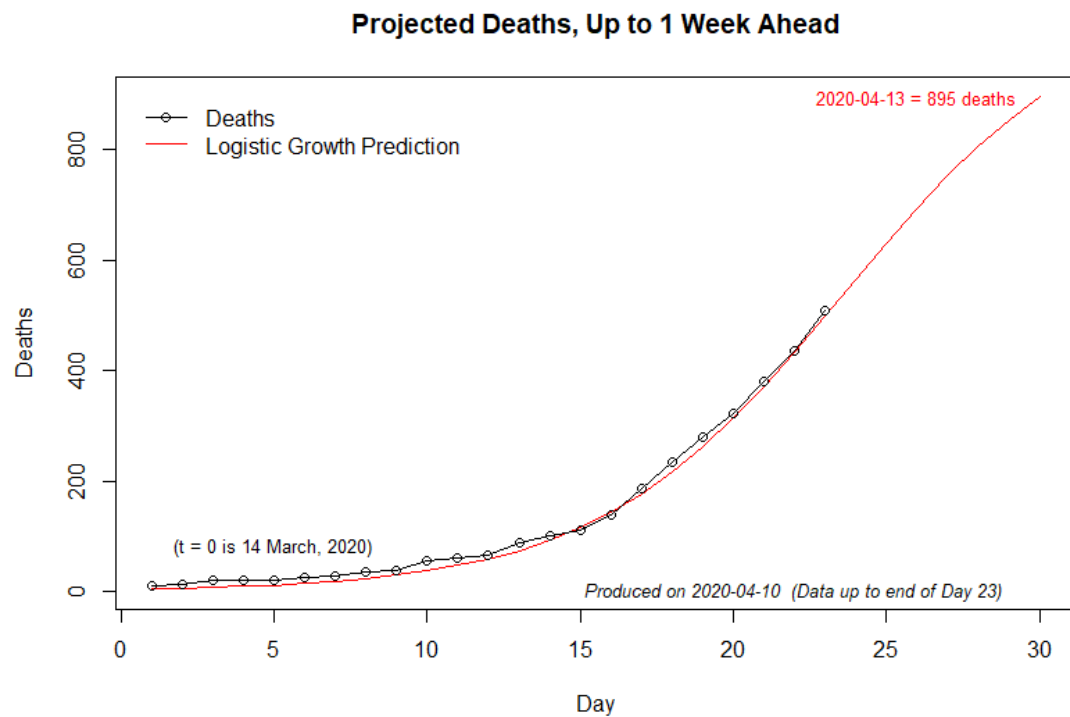
Projected Deaths, Up to 1 Week Ahead

Deaths
Logistic Growth Prediction

2020-04-13 = 895 deaths

(t = 0 is 14 March, 2020)

Produced on 2020-04-10 (Data up to end of Day 23)

Table 2: Projected Covid-19 Deaths in Canada

(Projections are in Red; Actual Values are in Brackets)

Sample end: 08 April

09 Apr	10 Apr	11 Apr	12 Apr	13 Apr	14 Apr	15 Apr
492 [509]	555	616	674	727	775	816

Sample end: 09 April

10 Apr	11 Apr	12 Apr	13 Apr	14 Apr	15 Apr	16 Apr
564 []	630	693	752	806	853	895

Sample end: 10 April

11 Apr	12 Apr	13 Apr	14 Apr	15 Apr	16 Apr	17 Apr

Sample end: 11 April

12 Apr	13 Apr	14 Apr	15 Apr	16 Apr	17 Apr	18 Apr