COVID-19 Decision Support System

Better Decisions Save Lives &
Speed Economic Recovery

CANADA FORECAST UPDATE

scarsin

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www.scarsin-covid.com

November 23, 2020

Objectives

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- To provide a holistic view of the current Scarsin Covid-19 solution in terms of:
  1. Forecast for Canada based on Nov 17 data >>> Bottom up health region insights
  2. Model design and support for robust intervention analysis >>> Inform decision support
  3. Process support for emergency operations center >>> Ready for immediate deployment

- Scarsin stands ready to help Canada with a national solution capable of driving collaboration, consolidation and robust intervention analysis (non-pharmaceutical and pharmaceutical)

  – 9,000 hours of development by a team of cross functional experts
  – Reverse engineered to support policy maker decision analysis
  – Runs on the Scarsin enterprise class forecasting platform (10+ years in the market w Global 500 companies)

- **WE ARE HERE TO HELP!!!**

Current Forecast

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- Scarsin forecasting is completed bottom up at the health region, then consolidated to the provincial and national level
- Dynamic interventions are run at all 92 health regions and adjusted daily over time, thereby making them much more responsive to changes in behavior
- Inputs are informed by third party data (facebook, google, apple, …)
- Any announced public health interventions are implemented, any potential planned are <u>not</u>
  - Ontario announcement of Peel & Toronto lockdowns included
  - Fraser and Vancouver Coastal temporary social interventions included
- Dynamic behavior changes to infection locations are implemented (household, community, schools, university/colleges, workplaces, travel…), especially relating to the holiday break
- **This report demonstrates the power of being able to model robust public health interventions (see the list of model input parameters on slide 33**

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Scarsin Covid-19 DPR DSS V2.20

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Saving Lives, Speeding Economic Recovery

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Statistical & ALSCODE Forecast Triangulation - Canada

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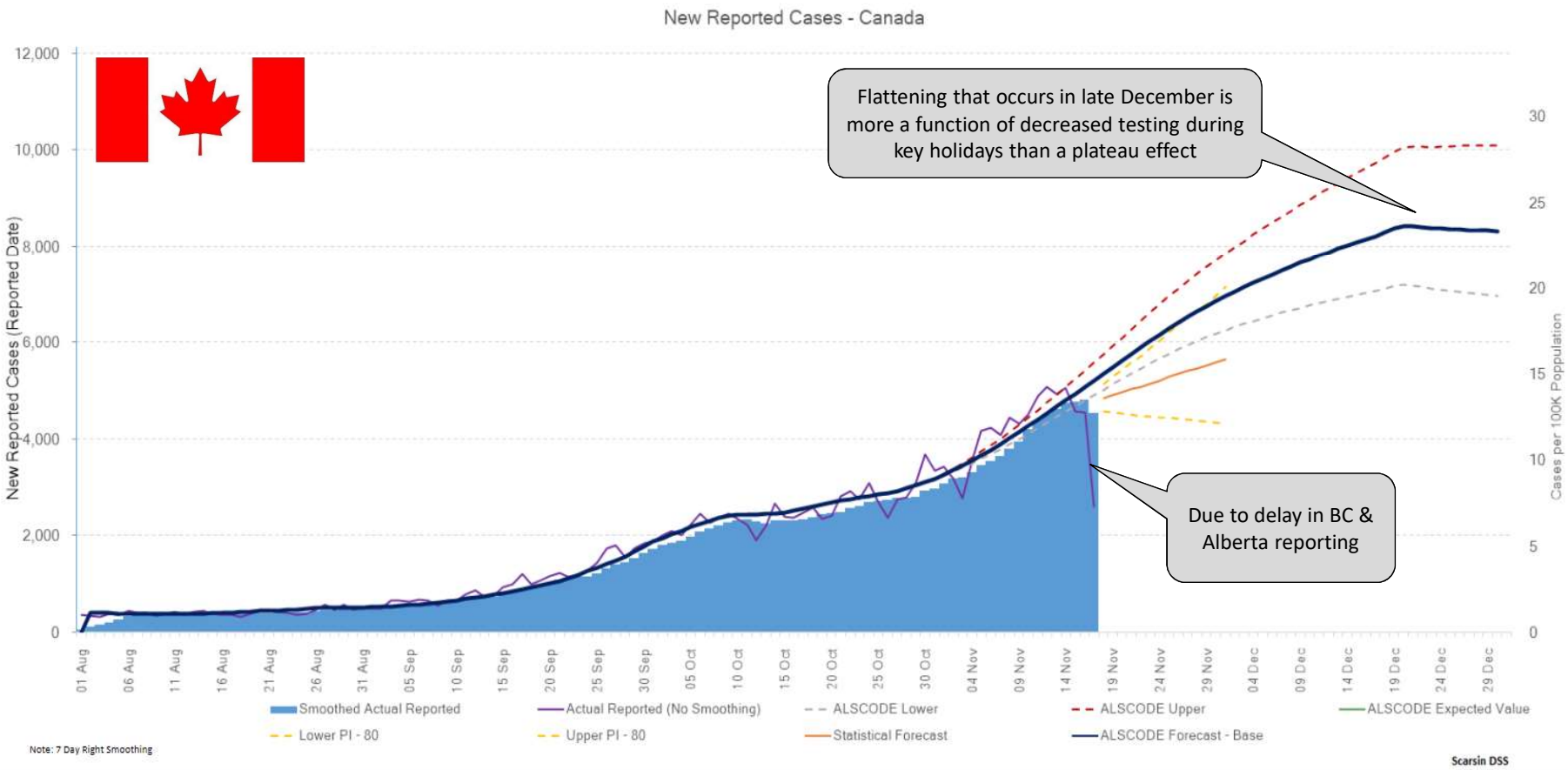

Start Date: 01 Aug 2020

End Date: 31 Dec 2020

Forecast: WIP

Range: Base, Lower, Upper, Expected Value

Smoothing: No Smoothing

Province: Canada

Health Regions

- Canada
  - Ontario
    - Central LHIN
      - York Regional
    - Central East LHIN
      - Durham Regional
      - Haliburton, Kawartha,
      - Hastings and Prince Ec
      - Peterborough County-
    - Central West LHIN
      - Peel Regional
    - Champlain LHIN
      - City of Ottawa
      - Renfrew County and D
    - Erie St. Clair LHIN
      - Chatham-Kent
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      - Windsor-Essex County
    - Hamilton Niagara Haldim
      - Haldimand-Norfolk
      - City of Hamilton
      - Niagara Regional Area
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COVID-19 Dynamics - Canada

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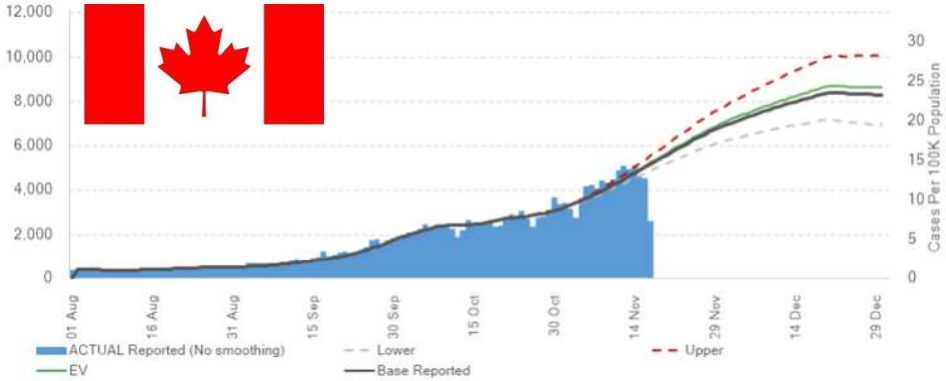
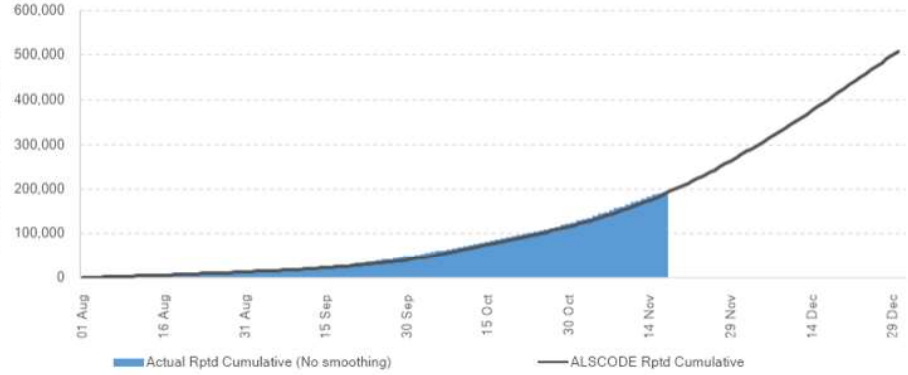
New Reported Cases



Cumulative Reported Cases



Start Date: 01 Aug 2020

End Date: 31 Dec 2020

Forecasts: WIP

Age Group: All

Reported/Death: Reported | Death

Range: Base, Lower, Upper,

Smoothing options: No smoothing

Province: Canada

Health Regions

- Canada
  - Ontario
    - Central LHIN
      - York Regional
    - Central East LHIN
      - Durham Regional
      - Haliburton, Kawartha,
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      - Peterborough County--
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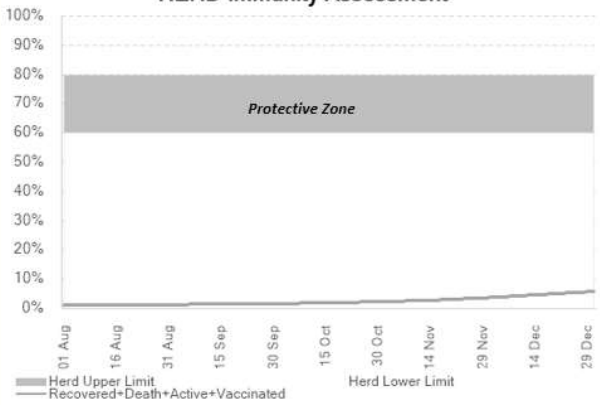
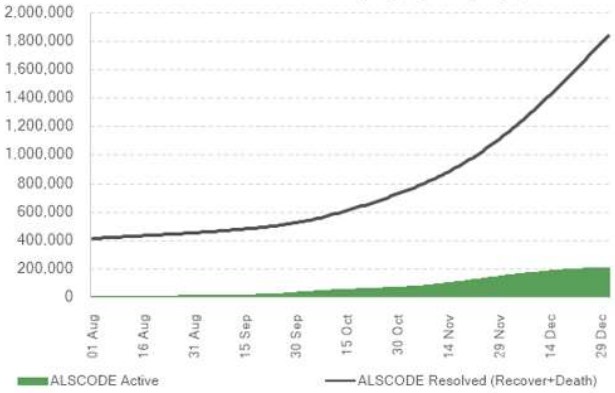
      - Chatham-Kent
      - Lambton
      - Southwestern
      - Windsor-Essex County
    - Hamilton Niagara Haldir
      - Haldimand-Norfolk
      - City of Hamilton
      - Niagara Regional Area

HERD Immunity Assessment



Active Cases by Symptomatology

Resolved vs Active Cases (Asympt+Sympt)



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NOV 17 – Last Actual Data

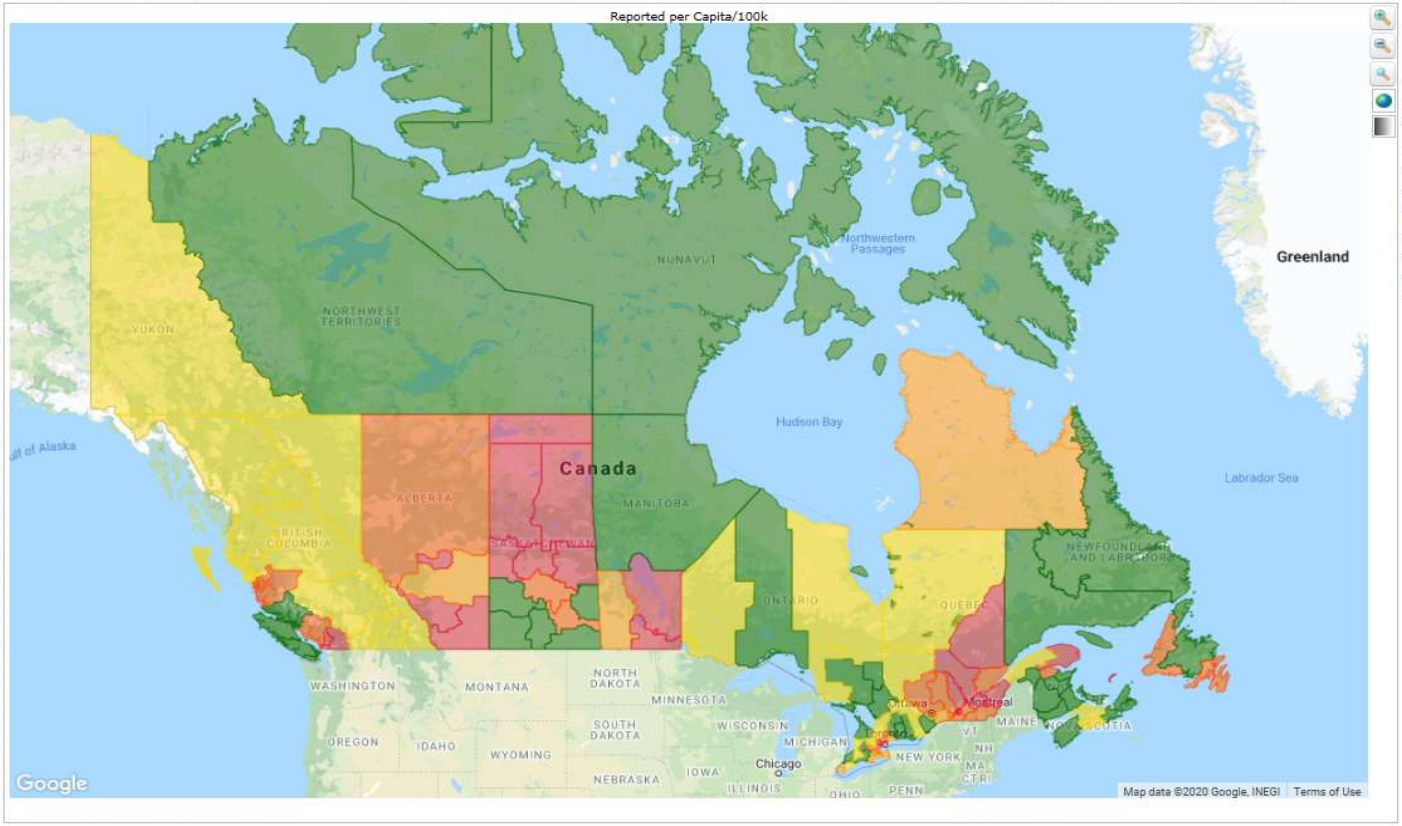
Scarsin Covid-19 DPR DSS V2.20

Health Region Mapping

Scarsin Covid-19 Decision Support System

Province/Territory: Canada | Avg Selection: Last 5 Days | Date: 17 Nov 2020 | Forecast: WIP | Measure: Reported per Capita/100k | Sort By: Last 5 day Avg

Prov.	Health Region	Reported			
		Cumm Reported	Last 5 Days Avg Daily Rpt.	Reported Trend	Reported Per 100k
ON	City of Toronto	34,781	492.6	18.1% ↑	18.0
ON	Peel Regional	19,966	434.0	25.2% ↑	31.4
BC	Fraser	13,906	432.3	20.8% ↑	25.1
AB	Calgary Zone	17,745	345.4	12.5% ↑	22.3
AB	Edmonton Zone	15,557	341.0	10.9% ↑	25.8
QC	Montréal	47,010	306.5	9.1% ↑	15.8
MB	Winnipeg	7,526	273.1	12.8% ↑	37.9
QC	Lanaudière	9,998	188.4	17.2% ↑	38.1
QC	Montérégie	18,315	160.4	1.0% →	11.9
BC	Vancouver Coastal	6,718	140.9	24.5% ↑	12.5
QC	Saguenay	3,183	139.4	12.2% ↑	50.4
ON	York Regional	8,877	135.0	16.9% ↑	12.2
QC	Mauricie	5,634	93.5	9.2% ↑	18.4
QC	Capitale-Nationale	9,926	90.4	11.7% ↑	12.4
MB	Southern	1,968	90.3	24.9% ↑	47.0
QC	Laval	8,483	81.3	16.4% ↑	19.2
QC	Laurentides	7,346	71.4	12.1% ↑	12.1
ON	Waterloo	2,845	70.9	81.0% ↑	13.2
QC	Chaudière-Appalaches	4,698	70.1	3.0% ↗	16.7
QC	Estrie	3,638	70.0	18.5% ↑	14.8
ON	Halton Regional	3,077	68.3	17.7% ↑	12.5
AB	North Zone	2,993	65.4	21.1% ↑	14.8
ON	City of Hamilton	2,648	57.1	20.1% ↑	10.6
ON	City of Ottawa	8,273	53.8	-11.9% ↓	5.8
AB	South Zone	3,215	47.8	6.8% ↑	16.4
SK	Saskatoon	1,384	46.7	34.9% ↑	13.6
ON	Durham Regional	3,545	46.5	8.9% ↑	7.2
QC	Outaouais	3,186	43.3	-0.9% →	11.3
AB	Central Zone	1,575	37.0	17.3% ↑	8.0
ON	Niagara Regional Area	1,943	35.1	18.5% ↑	7.8
SK	North	1,081	33.8	14.5% ↑	17.8
NL	Eastern	1,043	32.5	3.0% ↗	10.4
MB	Interlake-Eastern	873	31.4	12.4% ↑	24.6
SK	Regina	784	29.9	23.5% ↑	10.7



Reported per 100k
0-2
2-5
5-10
10-15
15+

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NOV 30 - Forecast

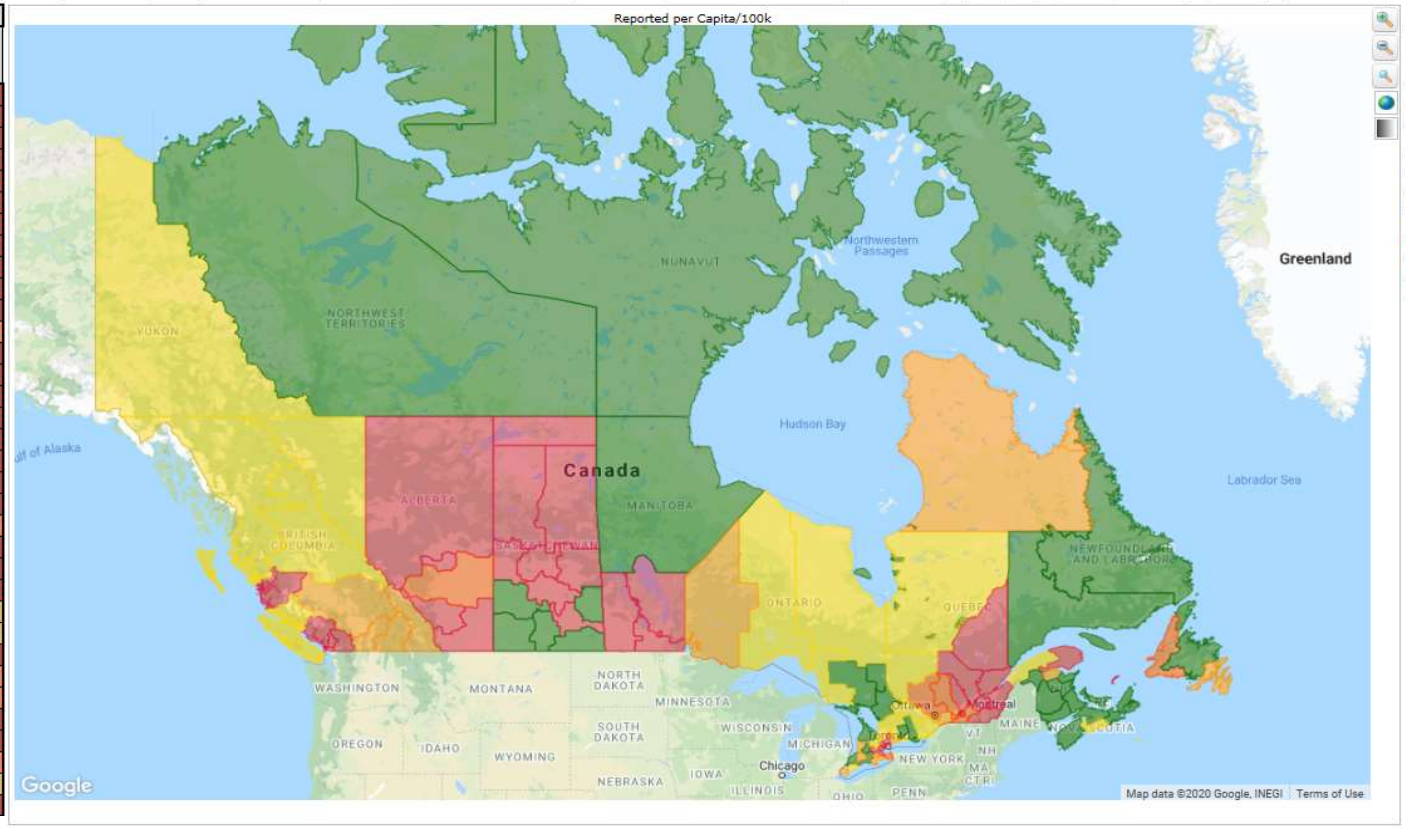
Scarsin Covid-19 DPR DSS V2.20

Health Region Mapping

Scarsin Covid-19 Decision Support System

Province/Territory: Canada | Avg Selection: Last 5 Days | Date: 30 Nov 2020 | Forecast: WIP | Measure: Reported per Capita/100k | Sort By: Last 5 day Avg

Prov.	Health Region	Reported			
		Cumm Reported	Last 5 Days Avg Daily Rpt.	Reported Trend	Reported Per 100k
ON	Peel Regional	27,746	665.6	13.8% ↑	48.2
ON	City of Toronto	42,555	635.4	7.4% ↑	23.3
BC	Fraser	21,139	604.7	10.6% ↑	35.2
AB	Edmonton Zone	21,039	453.3	8.9% ↑	34.3
AB	Calgary Zone	23,187	452.7	10.5% ↑	29.2
QC	Montréal	52,183	447.3	16.2% ↑	23.0
MB	Winnipeg	11,613	327.8	4.9% ↗	45.5
QC	Lanaudière	12,951	241.3	7.4% ↑	48.8
BC	Vancouver Coastal	9,214	213.4	14.0% ↑	18.9
ON	York Regional	11,125	187.5	10.2% ↑	16.9
QC	Saguenay	5,274	169.9	7.1% ↑	61.5
QC	Montérégie	20,428	164.5	1.9% →	12.2
MB	Southern	3,538	133.3	12.8% ↑	69.4
QC	Capitale-Nationale	11,456	130.9	14.1% ↑	17.9
QC	Mauricie	7,041	114.9	7.8% ↑	22.6
ON	Waterloo	4,153	107.9	9.5% ↑	20.2
QC	Laval	9,761	104.8	8.0% ↑	24.8
AB	North Zone	4,131	97.4	14.5% ↑	22.1
QC	Estrie	4,784	95.4	10.1% ↑	20.2
ON	Halton Regional	4,177	91.1	9.5% ↑	16.6
QC	Laurentides	8,407	85.0	4.9% ↗	14.4
ON	City of Hamilton	3,633	84.4	14.8% ↑	15.7
SK	Saskatoon	2,314	82.9	20.6% ↑	24.1
QC	Chaudière-Appalaches	5,700	80.7	6.2% ↑	19.2
ON	City of Ottawa	9,023	64.0	13.2% ↑	6.8
ON	Durham Regional	4,250	57.8	8.6% ↑	9.0
AB	South Zone	3,915	56.5	6.3% ↑	19.4
AB	Central Zone	2,199	53.2	14.0% ↑	11.5
ON	Niagara Regional Area	2,522	48.4	10.9% ↑	10.8
SK	North	1,627	45.1	8.5% ↑	23.7
SK	Regina	1,305	44.5	14.2% ↑	16.0
QC	Outaouais	3,745	42.8	-0.7% →	11.2
BC	Interior	1,592	41.1	7.0% ↑	5.6
MB	Interlake-Eastern	1,340	37.3	4.3% ↗	29.2



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Dec 31 - Forecast

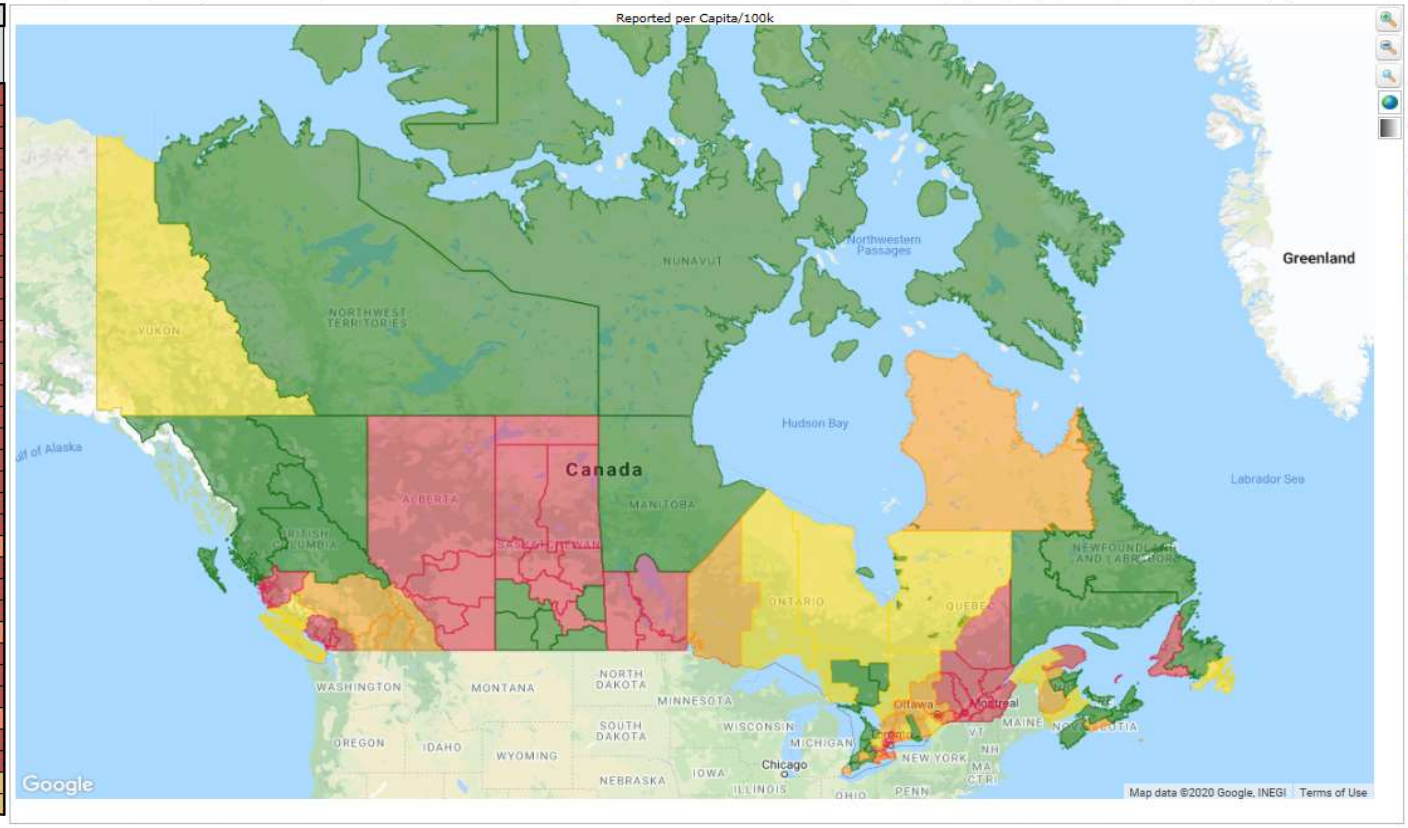
Scarsin Covid-19 DPR DSS V2.20

Health Region Mapping

Scarsin Covid-19 Decision Support System

Province/Territory: Canada | Avg Selection: Last 5 Days | Date: 31 Dec 2020 | Forecast: WIP | Measure: Reported per Capita/100k | Sort By: Last 5 day Avg

Prov.	Health Region	Reported: Cumm Reported	Reported: Last 5 Days Avg Daily Rpt.	Reported: Reported Trend	Reported: Reported Per 100k
BC	Fraser	45,666	885.7	3.0%	51.5
ON	City of Toronto	64,899	778.1	2.4%	28.5
ON	Peel Regional	50,181	727.5	-1.7%	52.7
AB	Calgary Zone	41,723	660.2	0.7%	42.5
QC	Montréal	70,119	604.6	-0.9%	31.1
AB	Edmonton Zone	37,284	550.2	0.6%	41.7
MB	Winnipeg	22,276	318.3	-6.5%	44.2
BC	Vancouver Coastal	17,699	304.4	3.4%	26.9
ON	York Regional	18,889	276.2	0.0%	24.9
QC	Lanaudière	20,792	239.2	-4.2%	48.3
QC	Saguenay	11,341	204.4	0.5%	74.0
QC	Montérégie	26,478	204.2	-0.9%	15.1
QC	Capitale-Nationale	16,739	185.6	0.4%	25.4
QC	Mauricie	11,464	159.7	3.5%	31.4
ON	Waterloo	8,221	136.8	-1.8%	25.6
ON	City of Hamilton	7,344	136.4	1.0%	25.4
AB	North Zone	8,139	134.2	-3.3%	30.4
QC	Estrie	8,497	133.9	3.2%	28.3
QC	Laval	13,489	124.4	-0.8%	29.4
SK	Saskatoon	5,770	121.4	-0.1%	35.2
MB	Southern	7,892	114.9	-12.8%	59.9
ON	City of Ottawa	11,787	107.2	6.2%	11.5
QC	Chaudière-Appalaches	8,596	98.4	-0.3%	23.4
QC	Laurentides	11,334	96.5	-0.9%	16.4
ON	Halton Regional	7,181	84.8	-9.2%	15.5
ON	Durham Regional	6,566	82.9	1.7%	12.8
AB	Central Zone	4,520	82.1	-1.1%	17.8
AB	South Zone	5,930	64.5	-4.4%	22.1
SK	Regina	3,101	62.3	-0.3%	22.4
ON	Niagara Regional Area	4,297	58.8	-1.6%	13.1
SK	North	3,272	50.3	-9.9%	26.5
SK	Far North	2,446	45.4	-10.2%	64.0
BC	Interior	2,941	41.5	-3.3%	5.6
ON	Simcoe Muskoka District	3,092	39.8	1.2%	7.4



Reported per 100k
0-2
2-5
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15+

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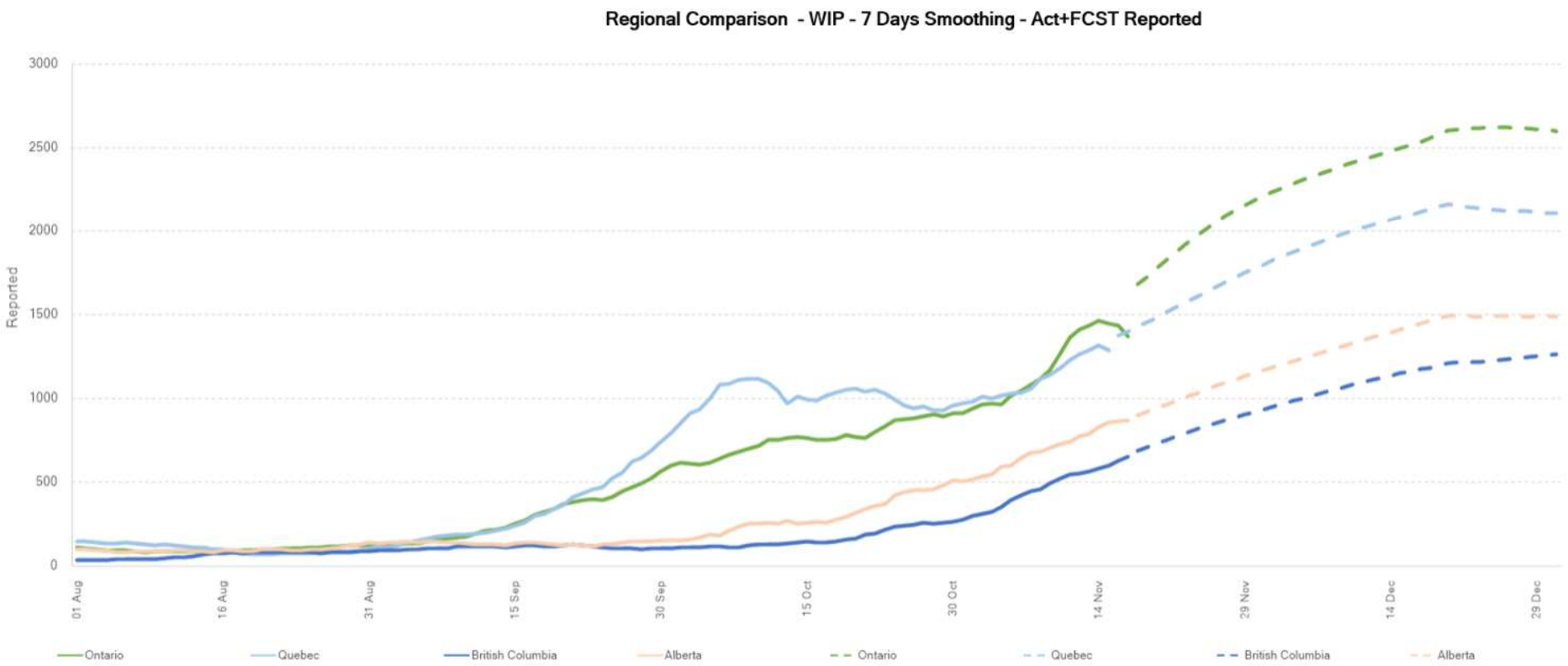
Regional Comparison

Scarsin Covid-19 Decision Support System



View
Act+FCST

Start Date
01 Aug 2020

End Date
31 Dec 2020

Forecast
WIP

Smoothing
7 Days Smoothing

Province
Canada

Health Regions
Canada
Ontario
Central LHIN
York Regional
Central East LHIN
Durham Regional
Haliburton, Kawartha,
Hastings and Prince Ed
Peterborough County-
Central West LHIN
Peel Regional
Champlain LHIN
City of Ottawa
Renfrew County and D
Erie St. Clair LHIN
Chatham-Kent
Lambton
Southwestern

Measure
Reported | Reported per 100K
Deaths | Deaths per 100K
Facebook mobility | Google Workplace

Note: Max 10 Selections

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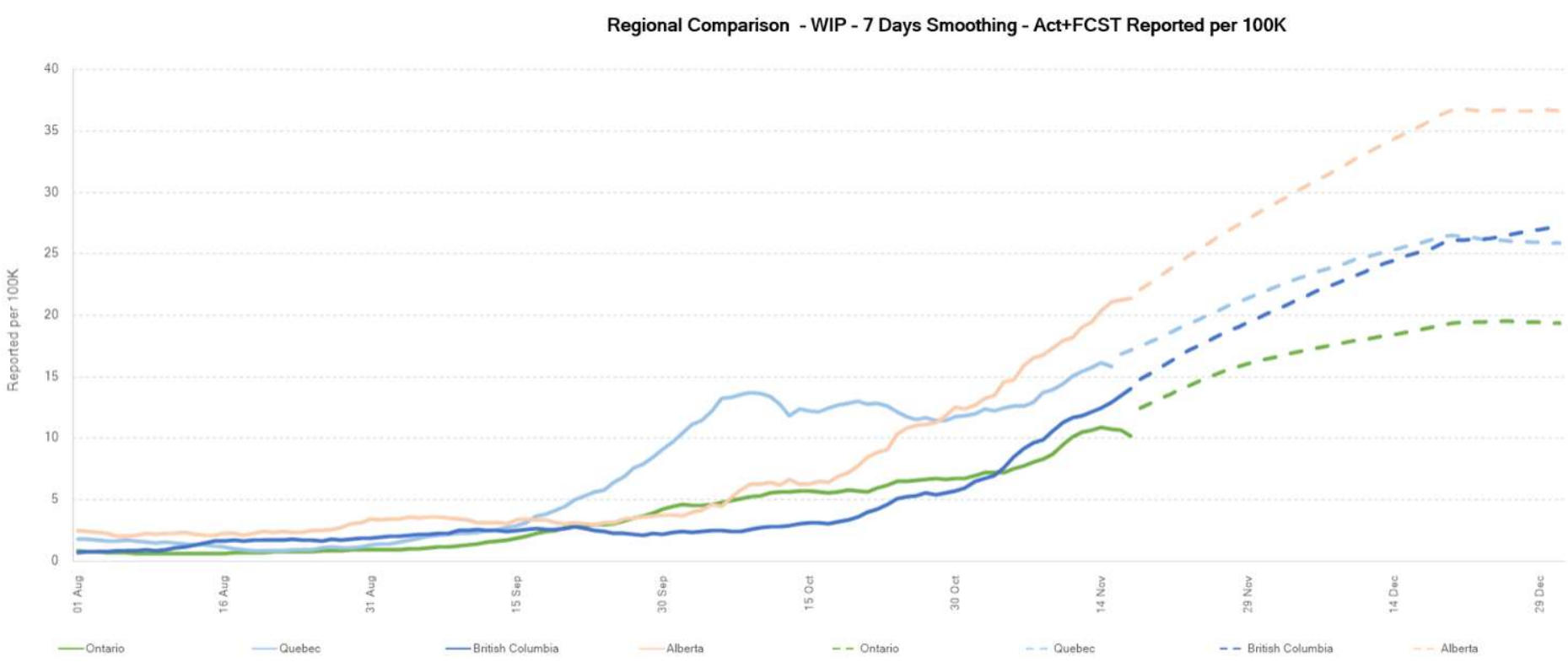
Scarsin Covid-19 DPR DSS V2.20

Regional Comparison

Scarsin Covid-19 Decision Support System



View
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Forecast
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Deaths | Deaths per 100K
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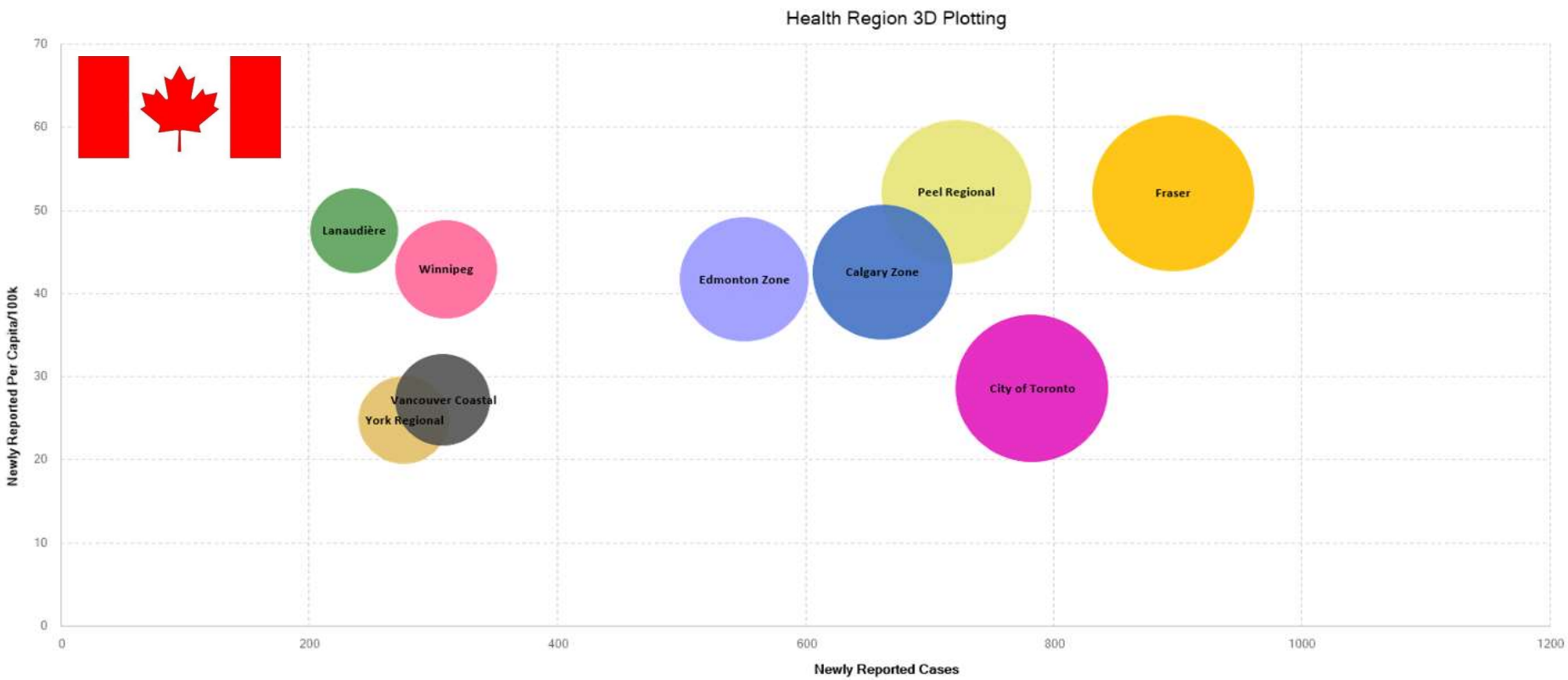
Scarsin Covid-19 DPR DSS V2.20

Health Region 3D Plotting

Scarsin Covid-19 Decision Support System



Date (week ending): 31 Dec 2020

Forecast: WIP

Province: Canada

Health Regions:

- Ontario
  - Central LHIN
    - York Regional
  - Central East LHIN
    - Durham Regional
    - Haliburton, Kawartha,
    - Hastings and Prince E
    - Peterborough County-
  - Central West LHIN
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    - City of Ottawa
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  - Erie St. Clair LHIN
    - Chatham-Kent
    - Lambton
    - Southwestern
    - Windsor-Essex County
  - Hamilton Niagara Haldim
    - Haldimand-Norfolk
    - City of Hamilton
    - Niagara Regional Area
    - Brant County
  - Mississauga Halton LHIN
    - Halton Regional
  - North East LHIN
    - North Bay Parry Sound
    - Porcupine
    - Sudbury and District
    - Timiskaming
  - North Simcoe Muskoka L
    - Grey Bruce
    - Simcoe Muskoka Distri
  - North West LHIN
    - The District of Algoma

All values are a 7-day average

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X-axis Newly Reported Cases **Y-Axis** Newly Reported Per Capita/100 **Z-axis** Active Cases

Size of bubble represents Active Cases

Note: Maximus selection of 18 health regions at one time

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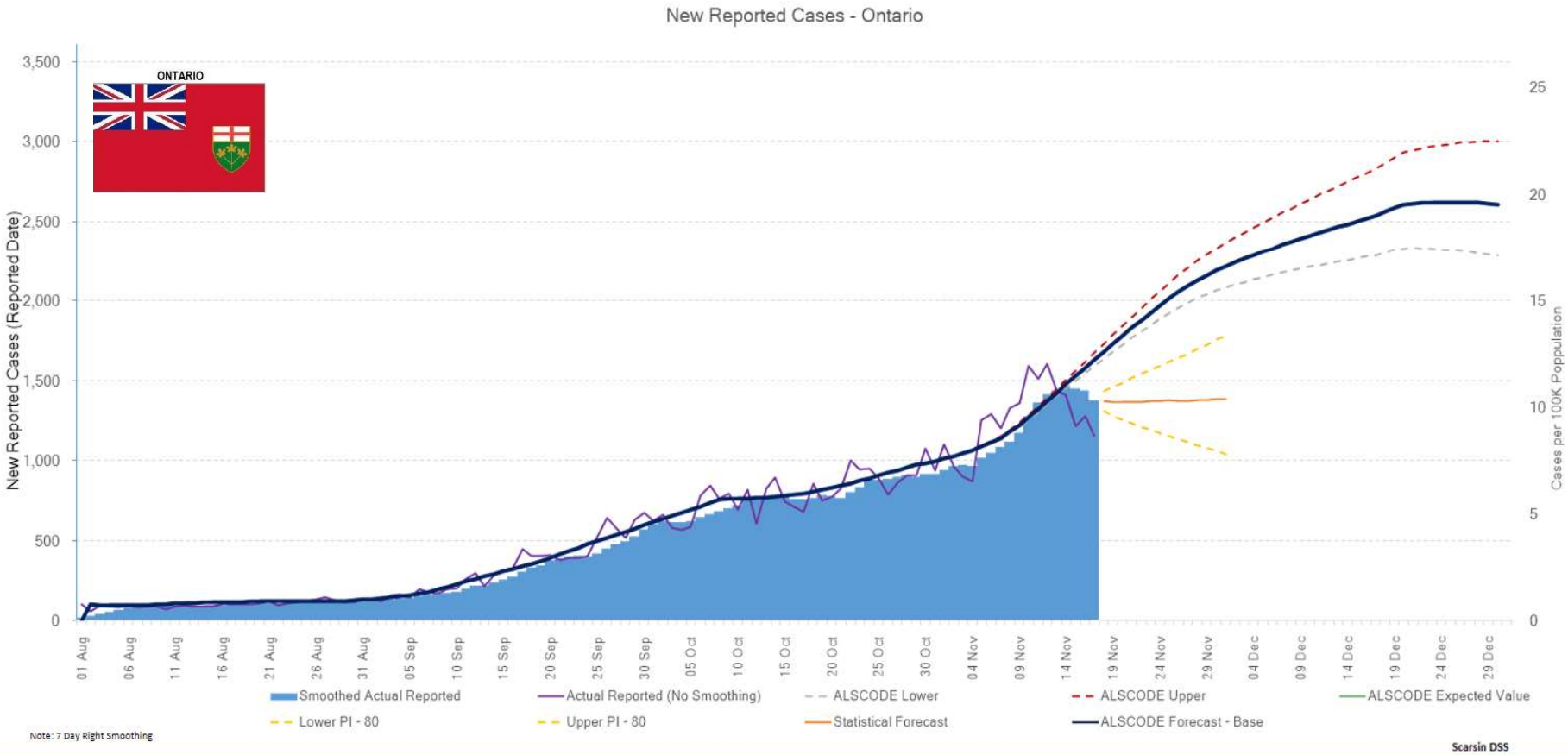
Statistical & ALSCODE Forecast Triangulation - Ontario

Scarsin Covid-19 Decision Support System



Start Date
01 Aug 2020

End Date
31 Dec 2020

Forecast
WIP

Range
- Base
- Lower
- Upper
- Expected Value

Smoothing
No Smoothing

Province
Canada

Health Regions
- Canada
  - Ontario
    - Central LHIN
      - York Regional
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      - Southwestern
      - Windsor-Essex County
    - Hamilton Niagara Haldir
      - Haldimand-Norfolk
      - City of Hamilton
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Scarsin Model – Peel & Toronto Lock Downs

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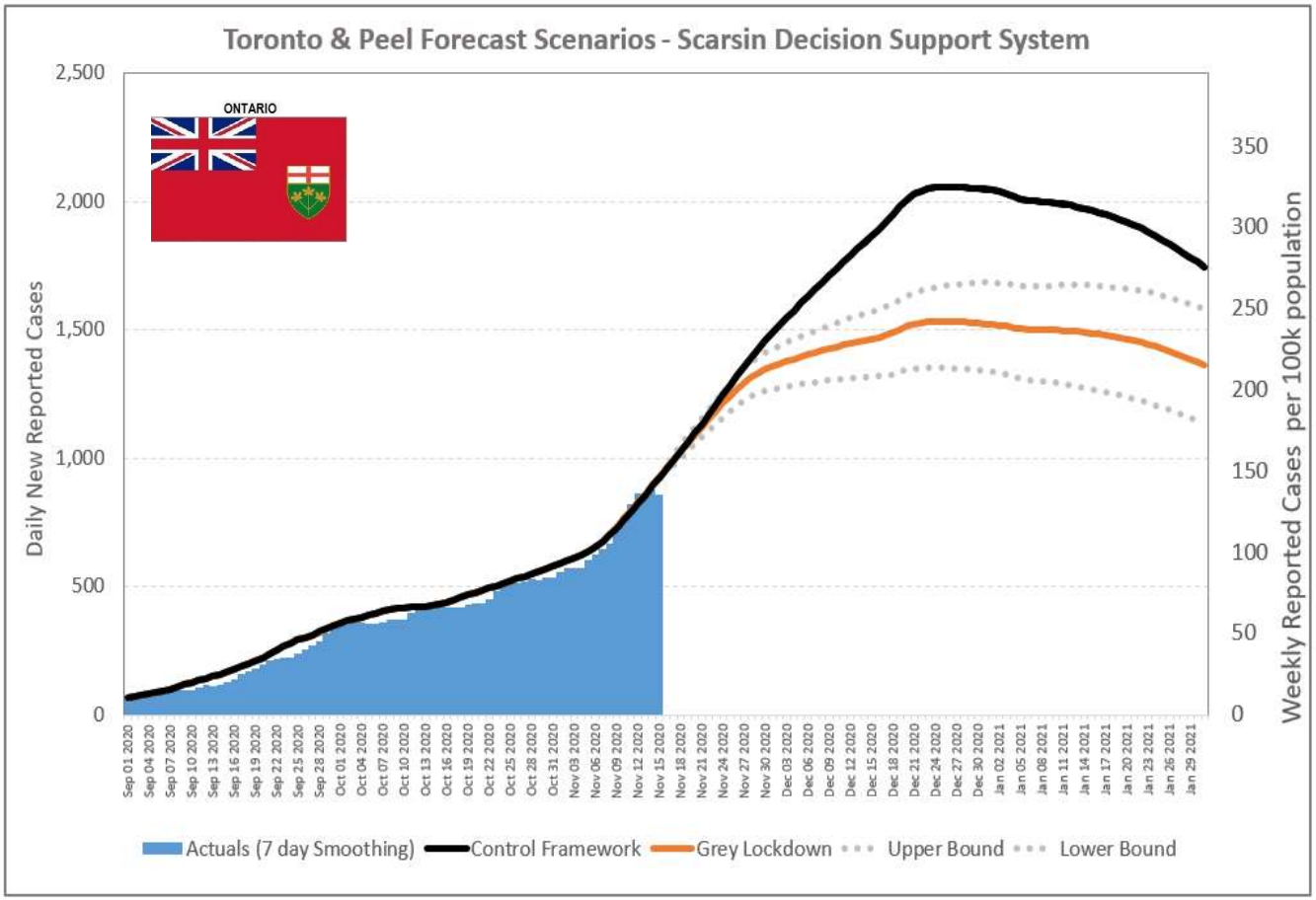
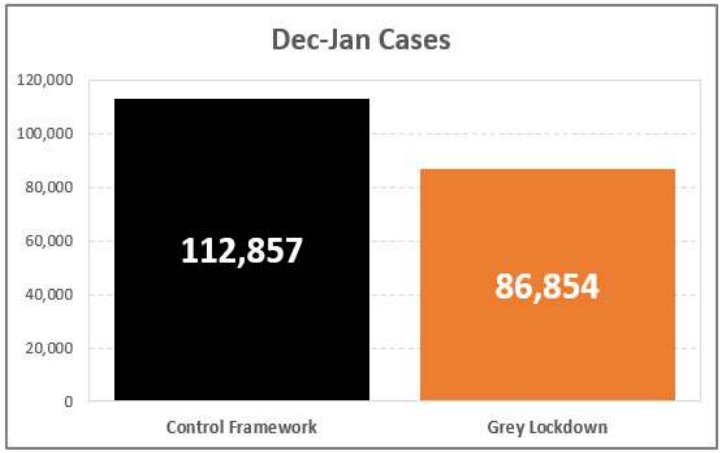
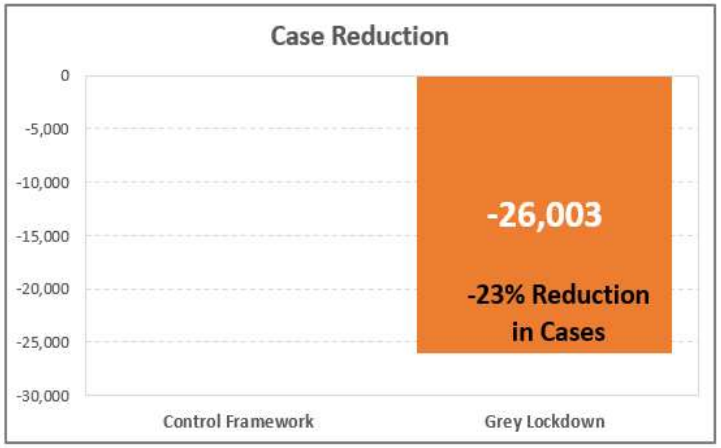
- In alignment to the Nov 20 announcement for Peel & Toronto movement to Lockdown (grey), Scarsin completed the following analysis:
  - Move University and College to full online ↓ 100%
  - Schools remain open, but adjust the online % of students for school ↓ 35%
  - Decrease the community mobility based on closure of retail, restaurants to take out only…
    - However this was less effective than wave I based on "pandemic fatigue" and the ability to mobilize to a nearby open regions (Halton, York, Durham)
    - Stabilize around the ↓ 26-29% compared to ↓ 50% for these regions in wave I, currently around ↓ 12-14%
  - Decrease workplace mobility based on more work from home by ↓ 8-10%
  - Decrease home contacts during lockdown (↓ 10% based on better bubble), reduce the upside contacts during the core holiday break (↑ 30% to ↑ 20% above baseline)
- The new national forecast takes into consideration these critical lockdowns based on <u>a 28 day period</u> as this is the only commitment so far

All numbers expressed as NPI reduction from baseline referenced to 0%

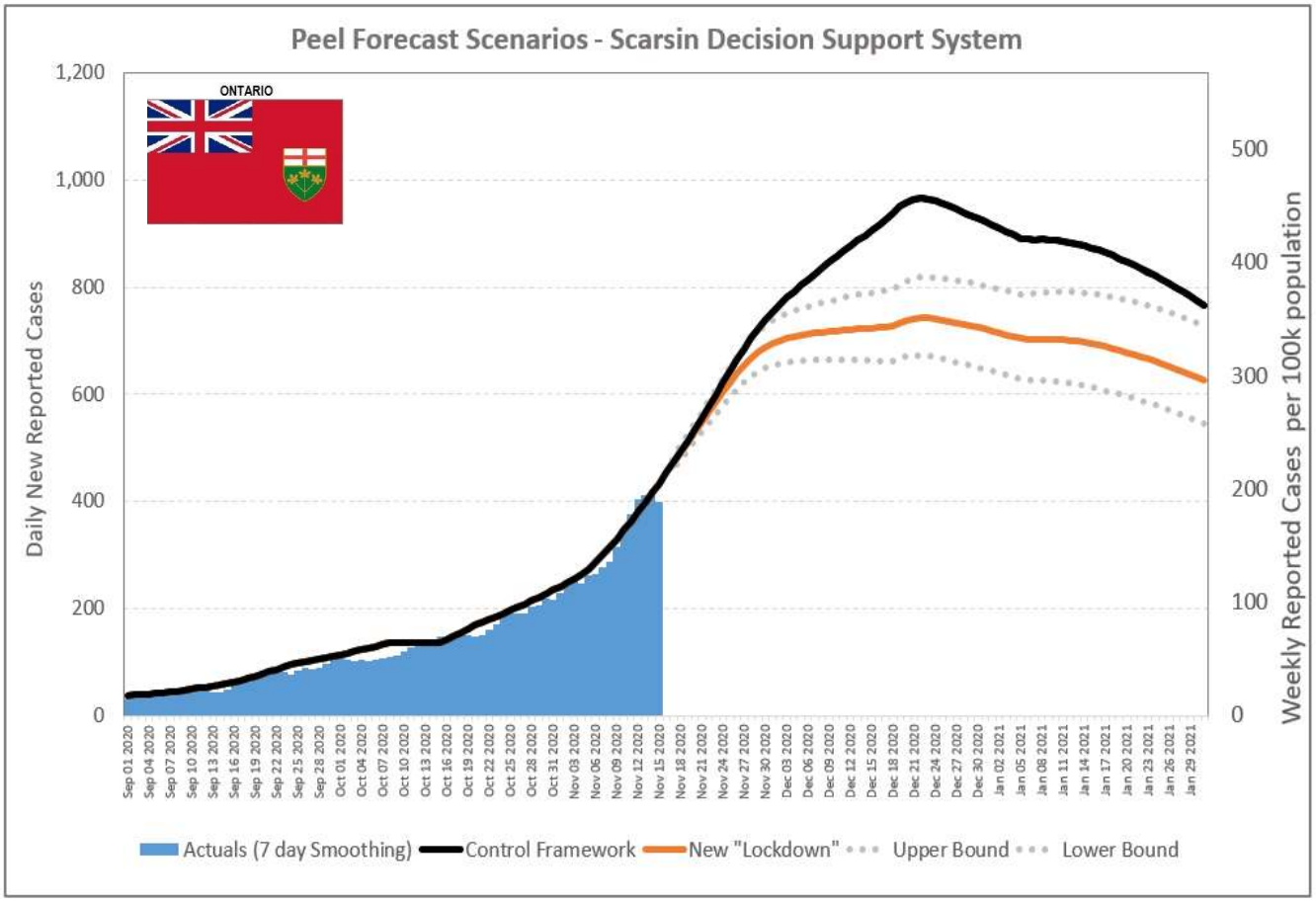
Toronto & Peel Impact

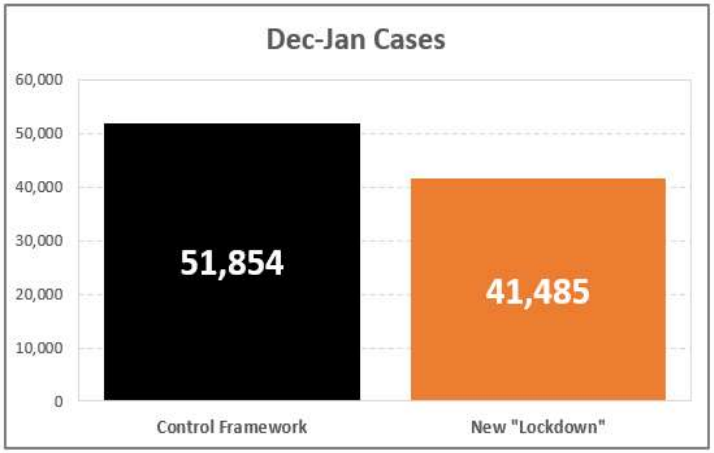


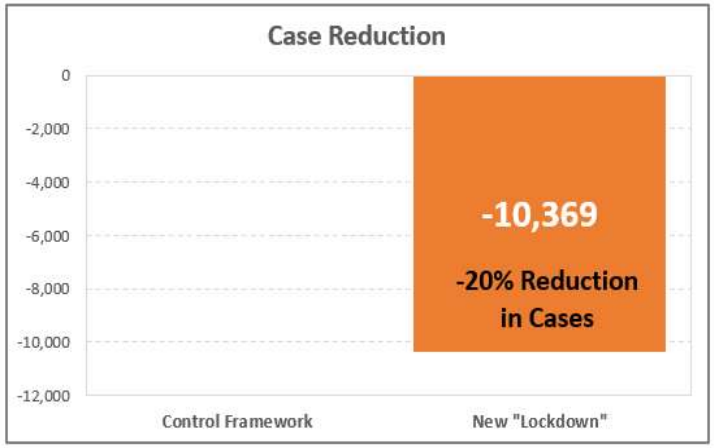




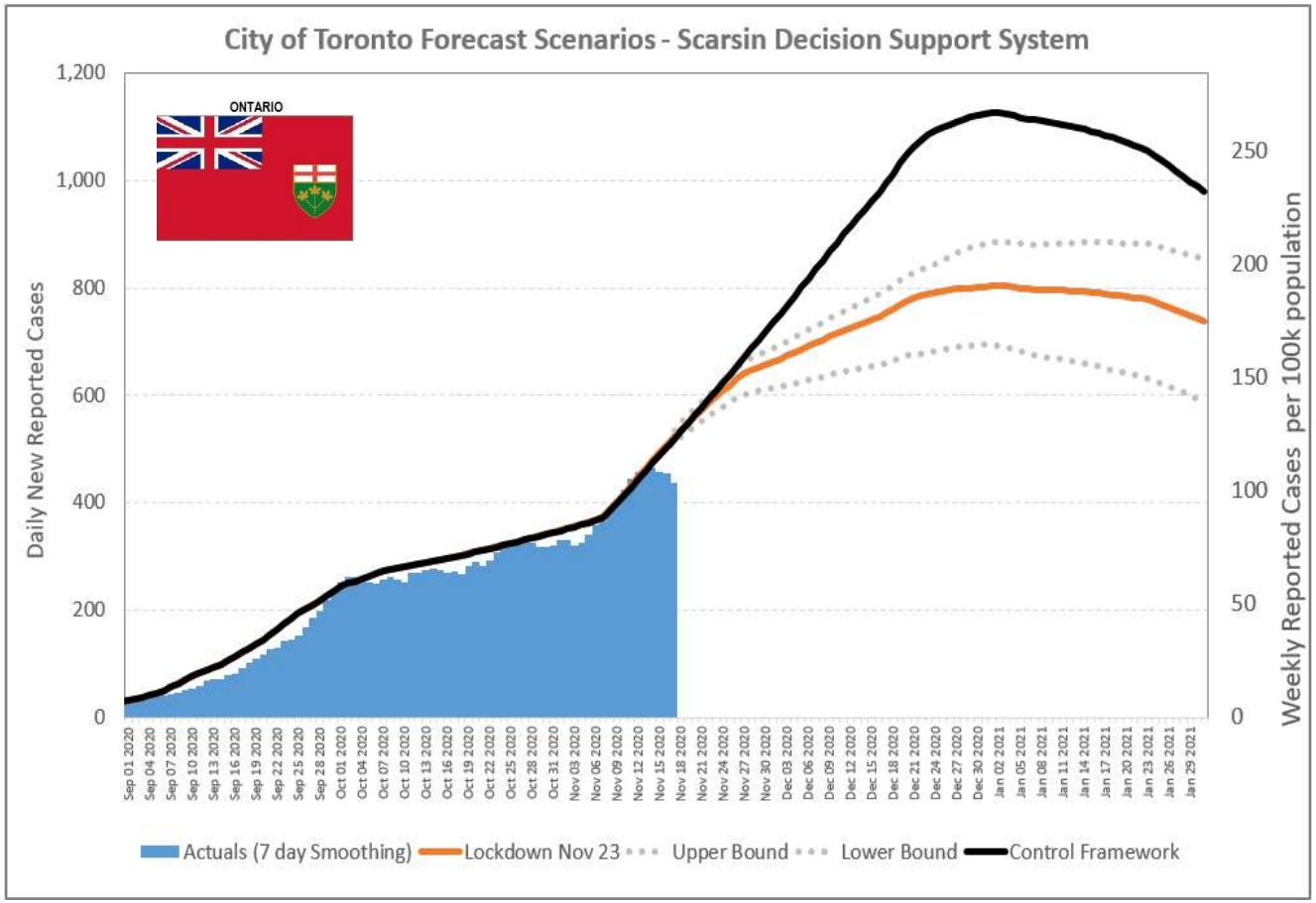
Peel Impact

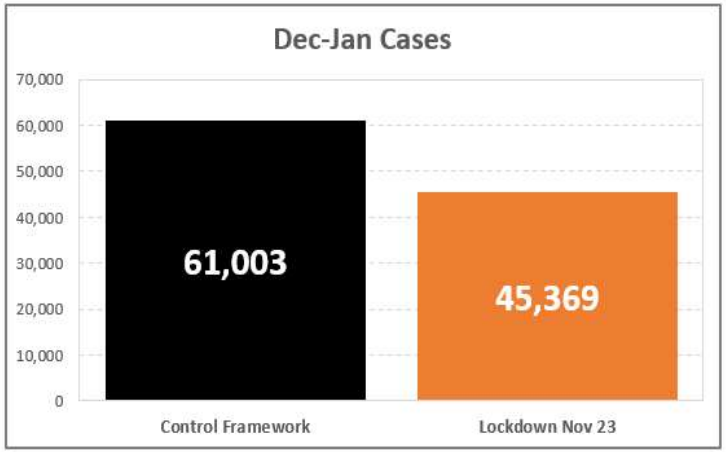

Peel Forecast Scenarios - Scarsin Decision Support System
ONTARIO
Daily New Reported Cases
Weekly Reported Cases per 100k population
1,200
1,000
800
600
400
200
0
500
400
300
200
100
0
Actuals (7 day Smoothing)
Control Framework
New "Lockdown"
Upper Bound
Lower Bound

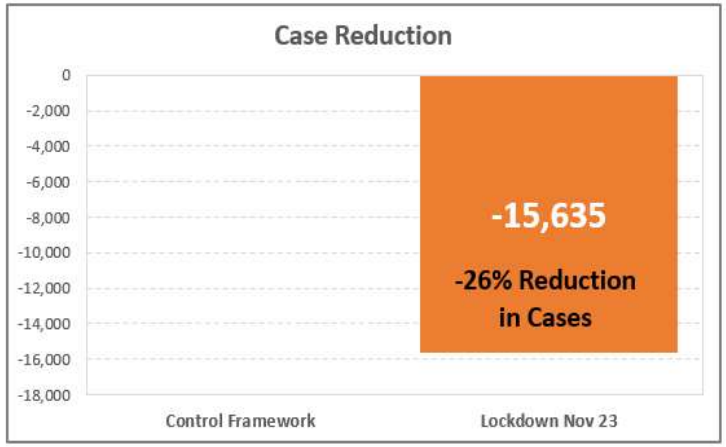

Dec-Jan Cases
60,000
50,000
40,000
30,000
20,000
10,000
0
51,854
41,485
Control Framework
New "Lockdown"

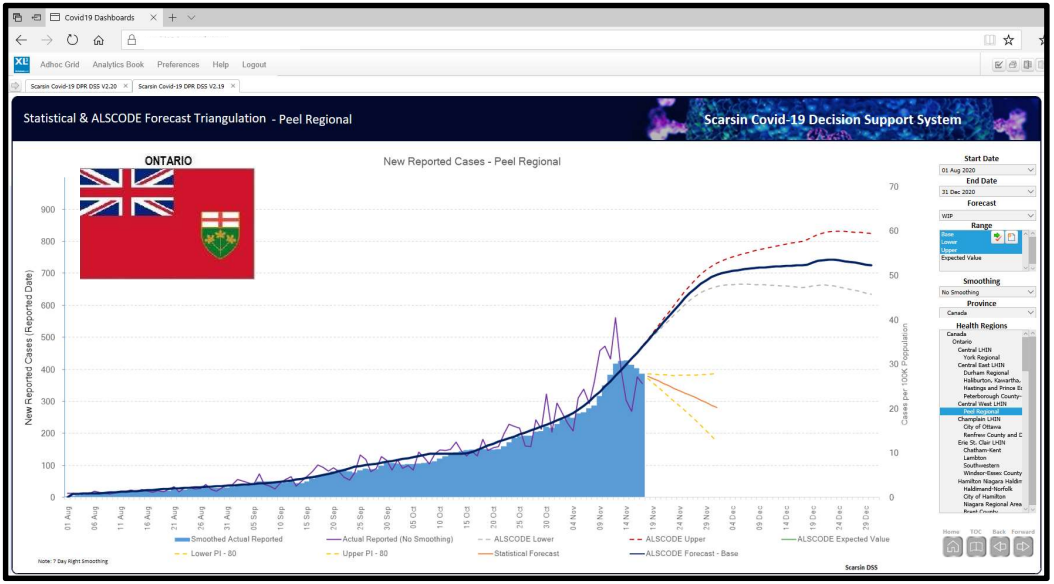

Case Reduction
0
-2,000
-4,000
-6,000
-8,000
-10,000
-12,000
-10,369
-20% Reduction in Cases
Control Framework
New "Lockdown"

Toronto Impact








Covid19 Dashboards
Adhoc Grid
Analytics Book
Preferences
Help
Logout
Statistical & ALSCODE Forecast Triangulation - Peel Regional
Scarsin Covid-19 Decision Support System
ONTARIO
New Reported Cases - Peel Regional
New Reported Cases (Reported Date)
Cases per 100K Population
Start Date
01 Aug 2020
End Date
31 Dec 2020
Forecast
WIP
Range
Smoothing
No Smoothing
Province
Canada
Health Regions
Smoothed Actual Reported
Actual Reported (No Smoothing)
ALSCODE Lower
ALSCODE Upper
ALSCODE Expected Value
Lower PI - 80
Upper PI - 80
Statistical Forecast
ALSCODE Forecast - Base
Note: 7 Day Right Smoothing
Scarsin DSS


Covid19 Dashboards
Adhoc Grid
Analytics Book
Preferences
Help
Logout
Statistical & ALSCODE Forecast Triangulation - City of Toronto
Scarsin Covid-19 Decision Support System
New Reported Cases - City of Toronto
New Reported Cases (Reported Date)
Cases per 100K Population
Start Date
01 Aug 2020
End Date
31 Dec 2020
Forecast
WIP
Range
Smoothing
No Smoothing
Province
Canada
Health Regions
Smoothed Actual Reported
Actual Reported (No Smoothing)
ALSCODE Lower
ALSCODE Upper
ALSCODE Expected Value
Lower PI - 80
Upper PI - 80
Statistical Forecast
ALSCODE Forecast - Base
Note: 7 Day Right Smoothing
Scarsin DSS


Covid19 Dashboards
Adhoc Grid
Analytics Book
Preferences
Help
Logout
Statistical & ALSCODE Forecast Triangulation - City of Ottawa
Scarsin Covid-19 Decision Support System
New Reported Cases - City of Ottawa
New Reported Cases (Reported Date)
Cases per 100K Population
Start Date
01 Aug 2020
End Date
31 Dec 2020
Forecast
WIP
Range
Smoothing
No Smoothing
Province
Canada
Health Regions
Smoothed Actual Reported
Actual Reported (No Smoothing)
ALSCODE Lower
ALSCODE Upper
ALSCODE Expected Value
Lower PI - 80
Upper PI - 80
Statistical Forecast
ALSCODE Forecast - Base
Note: 7 Day Right Smoothing
Scarsin DSS


Covid19 Dashboards
covid19dpr.scarsin.com
Adhoc Grid
Analytics Book
Preferences
Help
Logout
Statistical & ALSCODE Forecast Triangulation - Durham Regional
Scarsin Covid-19 Decision Support System
New Reported Cases - Durham Regional
New Reported Cases (Reported Date)
Cases per 100K Population
Start Date
01 Aug 2020
End Date
31 Dec 2020
Forecast
WIP
Range
Smoothing
No Smoothing
Province
Ontario
Health Regions
Smoothed Actual Reported
Actual Reported (No Smoothing)
ALSCODE Lower
ALSCODE Upper
ALSCODE Expected Value
Lower PI - 80
Upper PI - 80
Statistical Forecast
ALSCODE Forecast - Base
Note: 7 Day Right Smoothing
Scarsin DSS

Covid19 Dashboards

Adhoc Grid | Analytics Book | Preferences | Help | Logout

Scarsin Covid-19 DPR DSS V2.20 | Scarsin Covid-19 DPR DSS V2.19

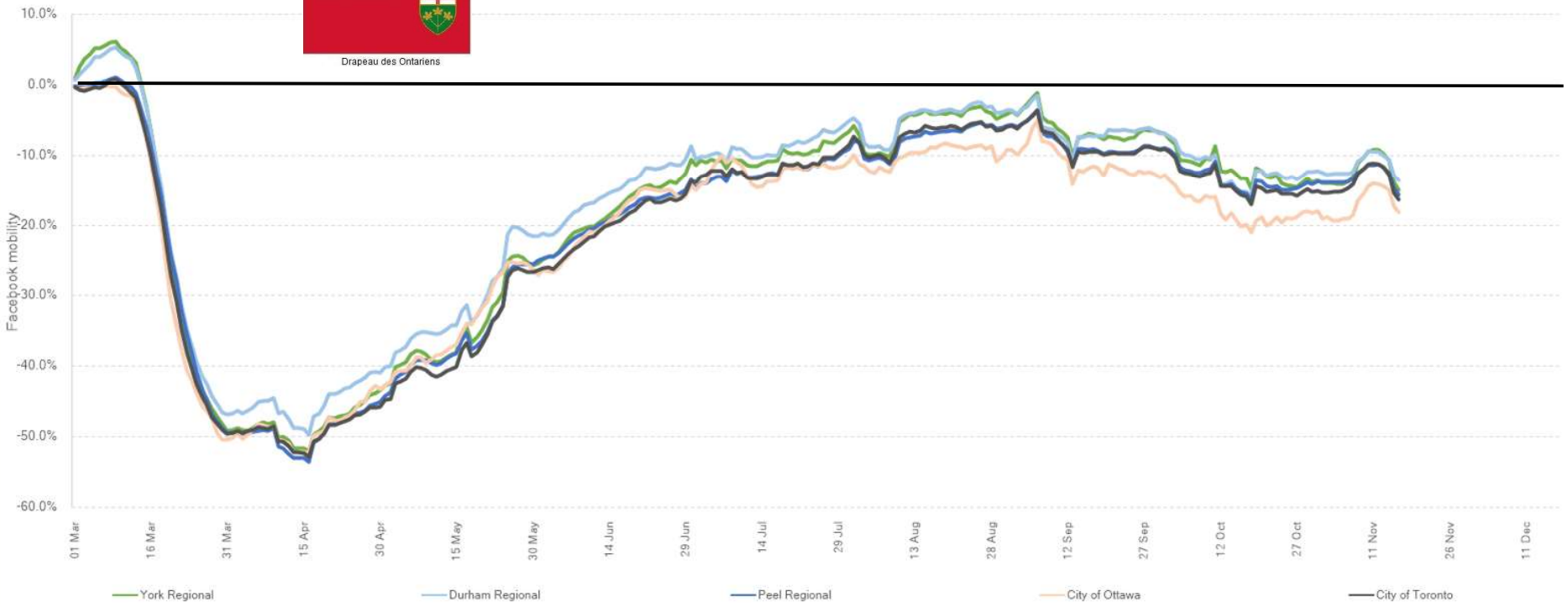
Regional Comparison

Scarsin Covid-19 Decision Support System

ONTARIO

Drapeau des Ontariens

Regional Comparison - WIP - 7 Days Smoothing - Actual Facebook mobility



View: Actual

Start Date: 01 Mar 2020

End Date: 17 Dec 2020

Forecast: WIP

Smoothing: 7 Days Smoothing

Province: Ontario

Health Regions

- Ontario
- Central LHIN
- York Regional
- Central East LHIN
- Durham Regional
- Haliburton, Kawartha,
- Hastings and Prince Ec
- Peterborough County--
- Central West LHIN
- Peel Regional
- Champlain LHIN
- City of Ottawa
- Renfrew County and D
- Erie St. Clair LHIN
- Chatham-Kent
- Lambton
- Southwestern
- Windsor-Essex County

Measure

Reported | Reported per 100K | Deaths | Deaths per 100K | Facebook mobility | Google Workplace

Note: Max 10 Selections

Hom | TOC | Back | Forward

Covid19 Dashboards

Adhoc Grid | Analytics Book | Preferences | Help | Logout

Scarsin Covid-19 DPR DSS V2.20 | Scarsin Covid-19 DPR DSS V2.19

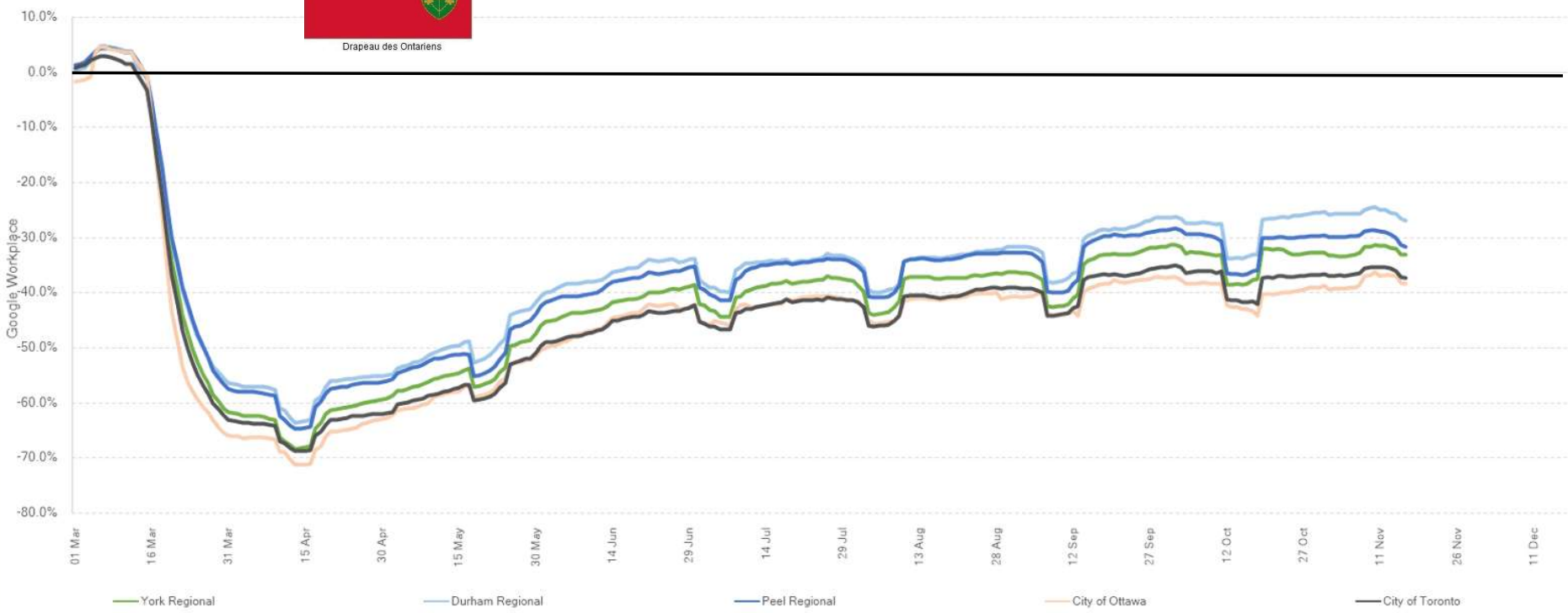
Regional Comparison

Scarsin Covid-19 Decision Support System

ONTARIO

Drapeau des Ontariens

Regional Comparison - WIP - 7 Days Smoothing - Actual Google Workplace



View: Actual

Start Date: 01 Mar 2020

End Date: 17 Dec 2020

Forecast: WIP

Smoothing: 7 Days Smoothing

Province: Ontario

Health Regions

- Ontario
- Central LHIN
- York Regional
- Central East LHIN
- Durham Regional
- Haliburton, Kawartha, Hastings and Prince Ec
- Peterborough County--
- Central West LHIN
- Peel Regional
- Champlain LHIN
- City of Ottawa
- Renfrew County and D
- Erie St. Clair LHIN
- Chatham-Kent
- Lambton
- Southwestern
- Windsor-Essex County

Measure

Reported | Reported per 100K | Deaths | Deaths per 100K | Facebook mobility | Google Workplace

Note: Max 10 Selections

Hom | TOC | Back | Forward

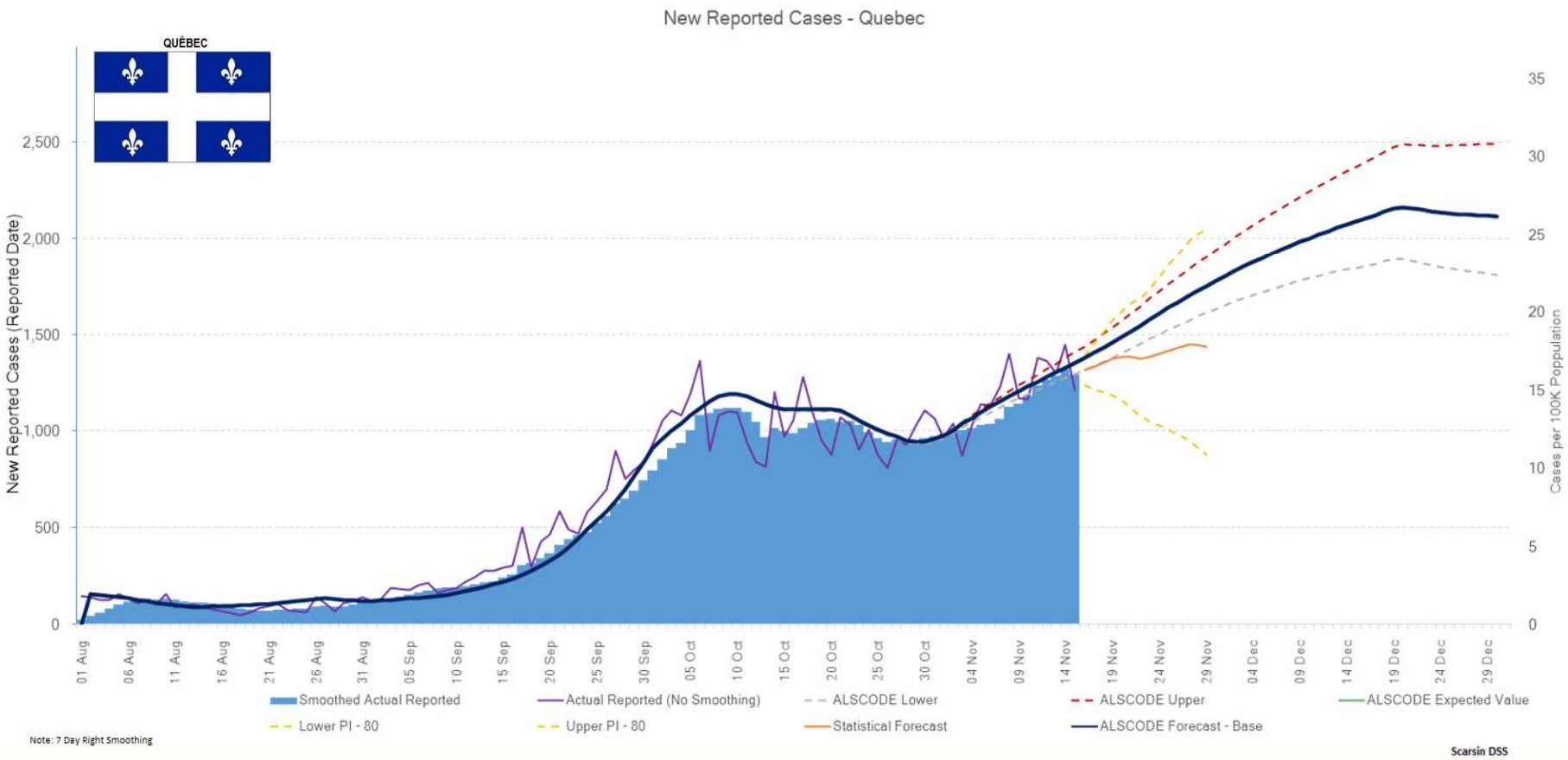
Covid19 Dashboards

Adhoc Grid | Analytics Book | Preferences | Help | Logout

Scarsin Covid-19 DPR DSS V2.20 | Scarsin Covid-19 DPR DSS V2.19

Statistical & ALSCODE Forecast Triangulation - Quebec

Scarsin Covid-19 Decision Support System



Start Date
01 Aug 2020

End Date
31 Dec 2020

Forecast
WIP

Range
Base
Lower
Upper
Expected Value

Smoothing
No Smoothing

Province
Canada

Health Regions
Canada
Ontario
Central LHIN
York Regional
Central East LHIN
Durham Regional
Haliburton, Kawartha,
Hastings and Prince Ec
Peterborough County-
Central West LHIN
Peel Regional
Champlain LHIN
City of Ottawa
Renfrew County and D
Erie St. Clair LHIN
Chatham-Kent
Lambton
Southwestern
Windsor-Essex County
Hamilton Niagara Haldir
Haldimand-Norfolk
City of Hamilton
Niagara Regional Area
Brant County

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Covid19 Dashboards
Adhoc Grid
Analytics Book
Preferences
Help
Logout
Statistical & ALSCODE Forecast Triangulation - Montréal
Scarsin Covid-19 Decision Support System
New Reported Cases - Montréal
New Reported Cases (Reported Date)
Cases per 100K Population
Start Date
01 Aug 2020
End Date
31 Dec 2020
Forecast
WIP
Range
Smoothing
No Smoothing
Province
Quebec
Health Regions
Smoothed Actual Reported
Actual Reported (No Smoothing)
ALSCODE Lower
ALSCODE Upper
ALSCODE Expected Value
Lower PI - 80
Upper PI - 80
Statistical Forecast
ALSCODE Forecast - Base
Scarsin DSS


Covid19 Dashboards
Adhoc Grid
Analytics Book
Preferences
Help
Logout
Statistical & ALSCODE Forecast Triangulation - Lanaudière
Scarsin Covid-19 Decision Support System
New Reported Cases - Lanaudière
New Reported Cases (Reported Date)
Cases per 100K Population
Start Date
01 Aug 2020
End Date
31 Dec 2020
Forecast
WIP
Range
Smoothing
No Smoothing
Province
Quebec
Health Regions
Smoothed Actual Reported
Actual Reported (No Smoothing)
ALSCODE Lower
ALSCODE Upper
ALSCODE Expected Value
Lower PI - 80
Upper PI - 80
Statistical Forecast
ALSCODE Forecast - Base
Scarsin DSS


Covid19 Dashboards
Adhoc Grid
Analytics Book
Preferences
Help
Logout
Statistical & ALSCODE Forecast Triangulation - Montérégie
Scarsin Covid-19 Decision Support System
New Reported Cases - Montérégie
New Reported Cases (Reported Date)
Cases per 100K Population
Start Date
01 Aug 2020
End Date
31 Dec 2020
Forecast
WIP
Range
Smoothing
No Smoothing
Province
Quebec
Health Regions
Smoothed Actual Reported
Actual Reported (No Smoothing)
ALSCODE Lower
ALSCODE Upper
ALSCODE Expected Value
Lower PI - 80
Upper PI - 80
Statistical Forecast
ALSCODE Forecast - Base
Scarsin DSS


Covid19 Dashboards
Adhoc Grid
Analytics Book
Preferences
Help
Logout
Statistical & ALSCODE Forecast Triangulation - Saguenay
Scarsin Covid-19 Decision Support System
New Reported Cases - Saguenay
New Reported Cases (Reported Date)
Cases per 100K Population
Start Date
01 Aug 2020
End Date
31 Dec 2020
Forecast
WIP
Range
Smoothing
No Smoothing
Province
Quebec
Health Regions
Smoothed Actual Reported
Actual Reported (No Smoothing)
ALSCODE Lower
ALSCODE Upper
ALSCODE Expected Value
Lower PI - 80
Upper PI - 80
Statistical Forecast
ALSCODE Forecast - Base
Scarsin DSS

Covid19 Dashboards

Adhoc Grid | Analytics Book | Preferences | Help | Logout

Scarsin Covid-19 DPR DSS V2.20 | Scarsin Covid-19 DPR DSS V2.19

Regional Comparison

Scarsin Covid-19 Decision Support System

QUÉBEC

Drapeau des Québécois

Regional Comparison - WIP - 7 Days Smoothing - Actual Facebook mobility

View: Actual

Start Date: 01 Mar 2020

End Date: 17 Dec 2020

Forecast: WIP

Smoothing: 7 Days Smoothing

Province: Quebec

Health Regions

- Quebec
- Capitale-Nationale
- Chaudière-Appalaches
- Côte-Nord
- Gaspésie-Îles-de-la-Madeleine
- Mauricie
- Montérégie
- Abitibi-Témiscamingue
- Lanaudière
- Laurentides
- Laval
- Estrie
- Outaouais
- Montréal
- Terres-Cries-de-la-Baie-James
- Bas-Saint-Laurent
- Nord-du-Québec
- Nunavik

Measure

Reported | Reported per 100K | Deaths | Deaths per 100K | Facebook mobility | Google Workplace

Note: Max 10 Selections

Hom | TOC | Back | Forward

Covid19 Dashboards

Adhoc Grid | Analytics Book | Preferences | Help | Logout

Scarsin Covid-19 DPR DSS V2.20 | Scarsin Covid-19 DPR DSS V2.19

Regional Comparison

Scarsin Covid-19 Decision Support System

QUÉBEC

Regional Comparison - WIP - 7 Days Smoothing - Actual Google Workplace

View: Actual

Start Date: 01 Mar 2020

End Date: 17 Dec 2020

Forecast: WIP

Smoothing: 7 Days Smoothing

Province: Quebec

Health Regions

- Quebec
- Capitale-Nationale
- Chaudière-Appalaches
- Côte-Nord
- Gaspésie-Îles-de-la-Madeleine
- Mauricie
- Montérégie
- Abitibi-Témiscamingue
- Lanaudière
- Laurentides
- Laval
- Estrie
- Outaouais
- Montréal
- Terres-Cries-de-la-Baie-James
- Bas-Saint-Laurent
- Nord-du-Québec
- Nunavik

Measure

Reported | Reported per 100K | Deaths | Deaths per 100K | Facebook mobility | Google Workplace

Note: Max 10 Selections

Hom | TOC | Back | Forward

Covid19 Dashboards

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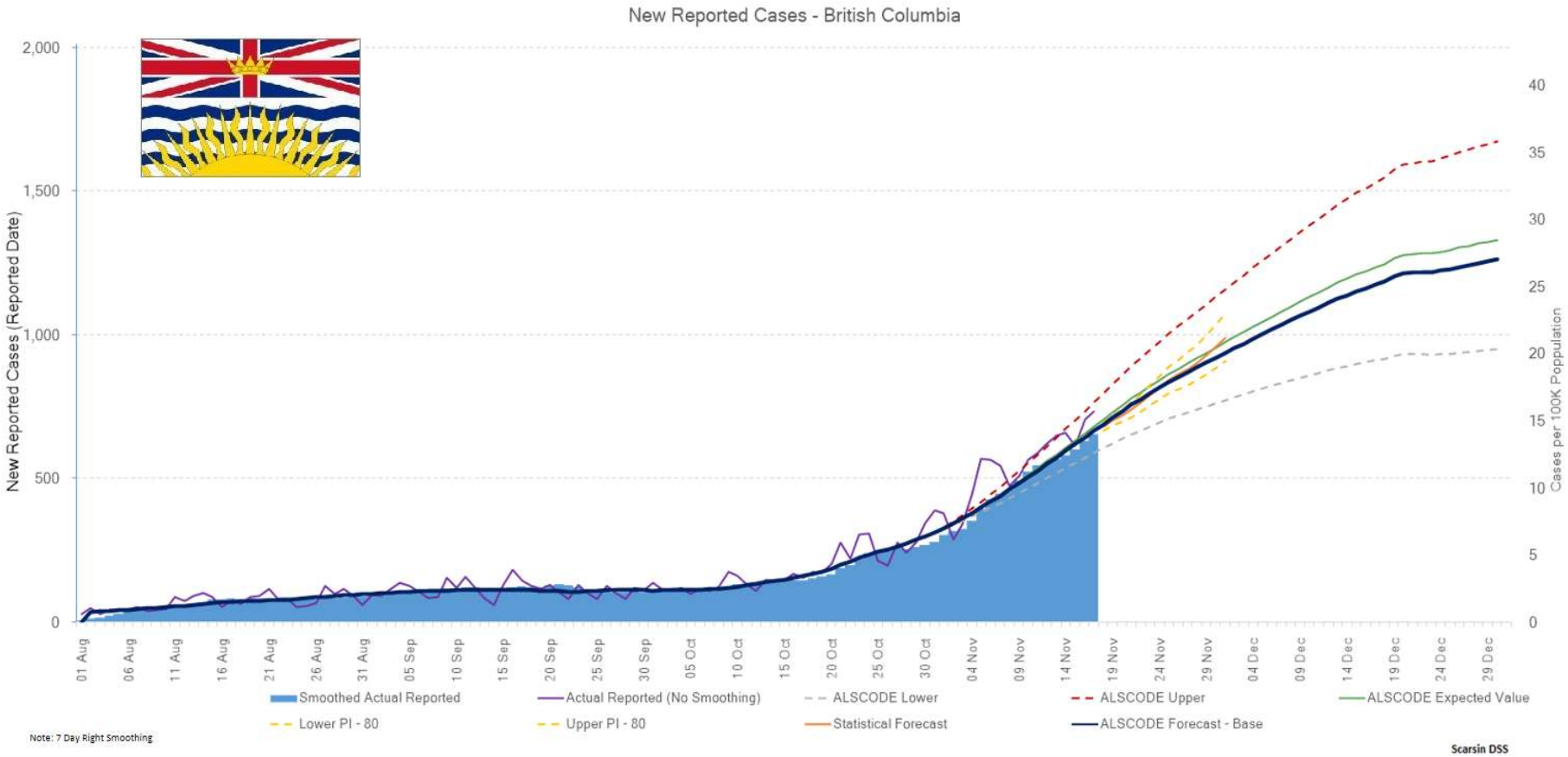
Adhoc Grid | Analytics Book | Preferences | Help | Logout

Scarsin Covid-19 DPR DSS V2.19 | Scarsin Covid-19 DPR DSS V2.20

Statistical & ALSCODE Forecast Triangulation - British Columbia

Scarsin Covid-19 Decision Support System



Start Date
01 Aug 2020

End Date
31 Dec 2020

Forecast
WIP

Range
- Base
- Lower
- Upper
- Expected Value

Smoothing
No Smoothing

Province
British Columbia

Health Regions
- British Columbia
- Interior
- Fraser
- Vancouver Coastal
- Vancouver Island
- Northern BC

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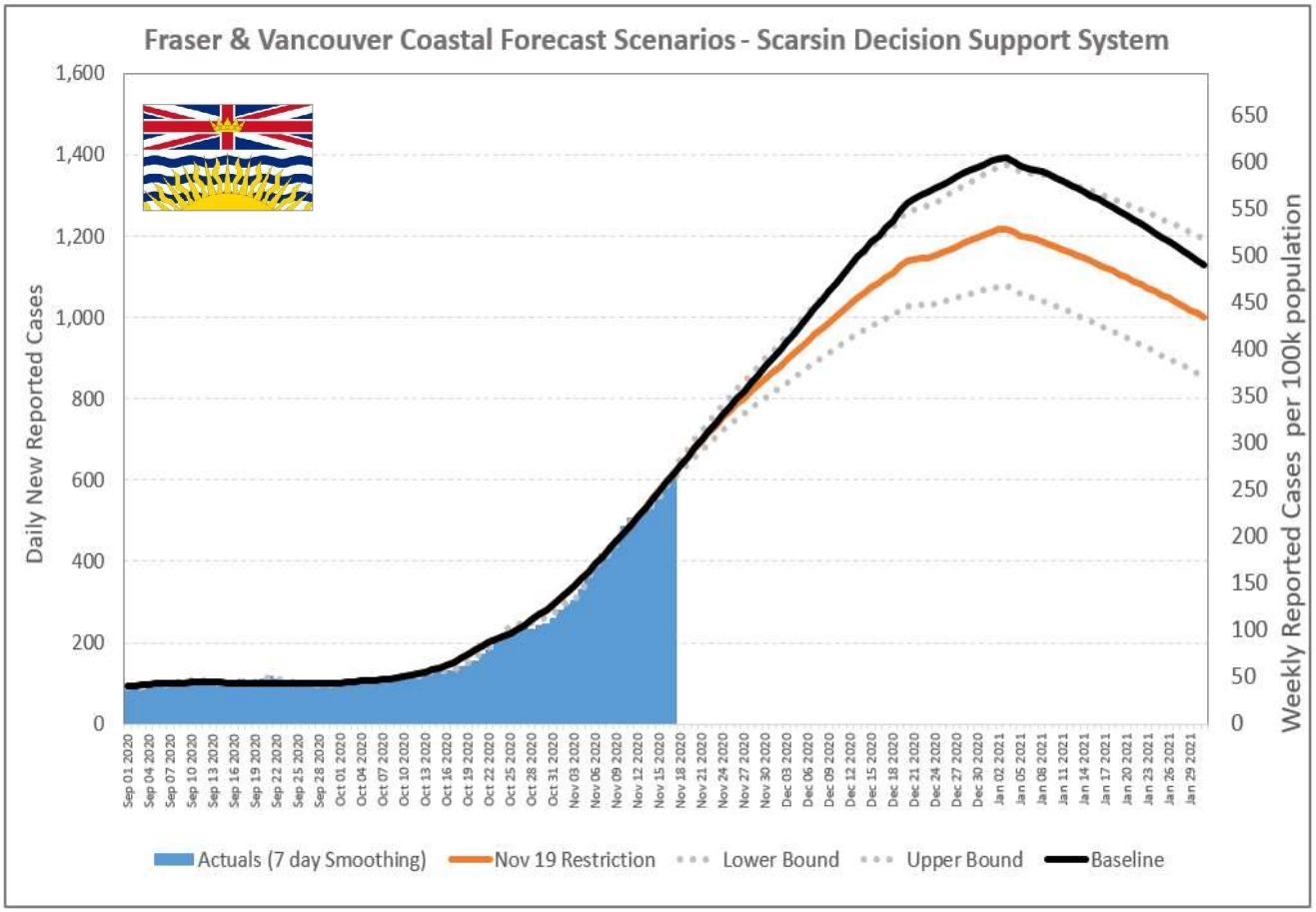
Scarsin Model – Fraser & Vancouver Coastal Restriction

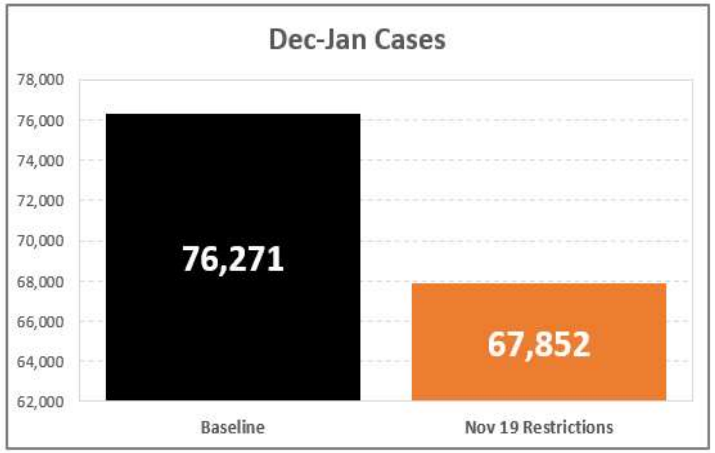
scarsin

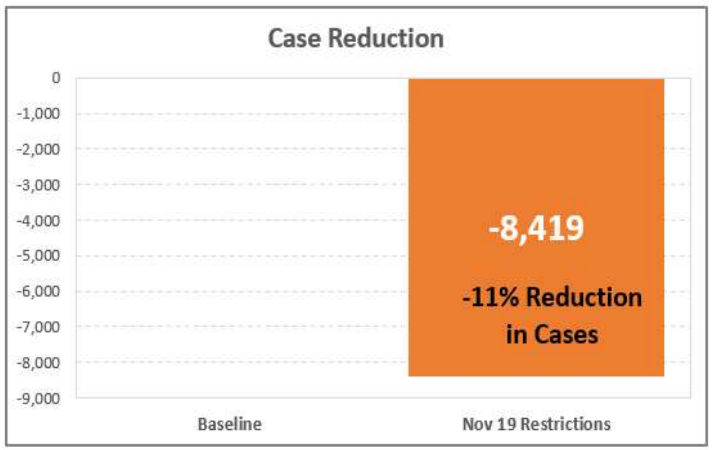
- In alignment to the Nov 19 announcement for province-wide restriction in British Columbia, Scarsin completed the following analysis for Fraser & Vancouver Coastal:
  - Decrease the community mobility based on restriction on social gatherings, funerals, weddings, movie theatres by ↓ 3% for Fraser and ↓ 4% for Vancouver Coastal
  - Decrease workplace mobility based on increase in the number of individuals working from home by ↓ 3%
  - Decrease home contacts by ↓ 5% based on restriction on immediate household (core bubble) interaction

All numbers expressed as NPI reduction from baseline referenced to 0%

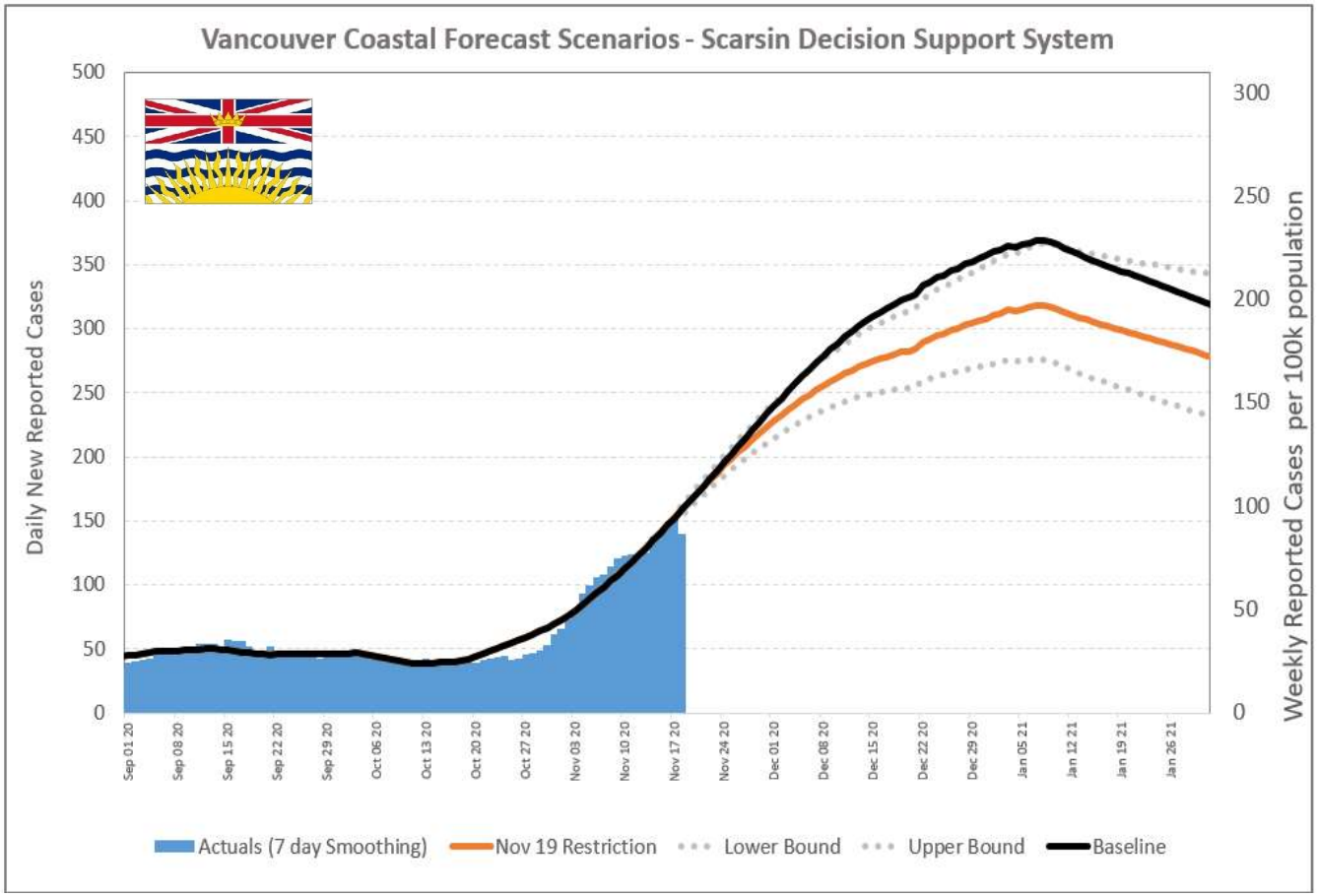
Fraser & Vancouver Coastal Impact

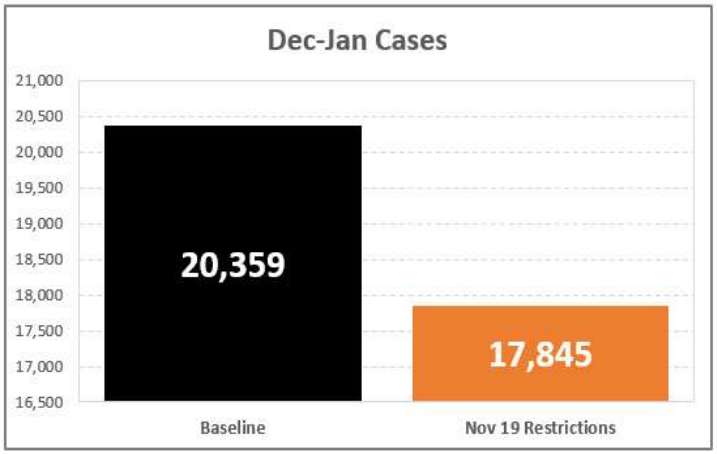


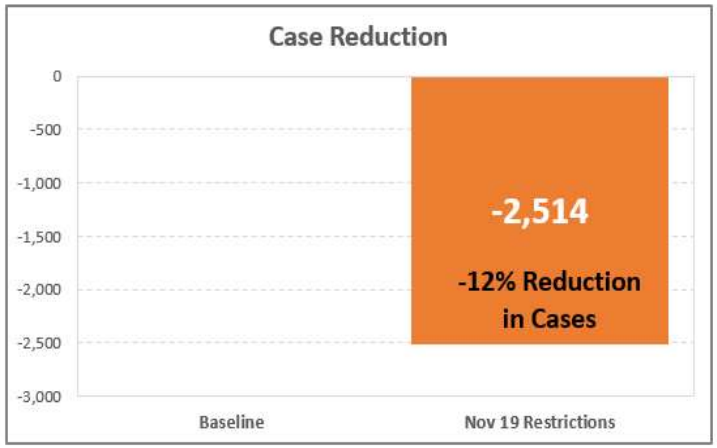




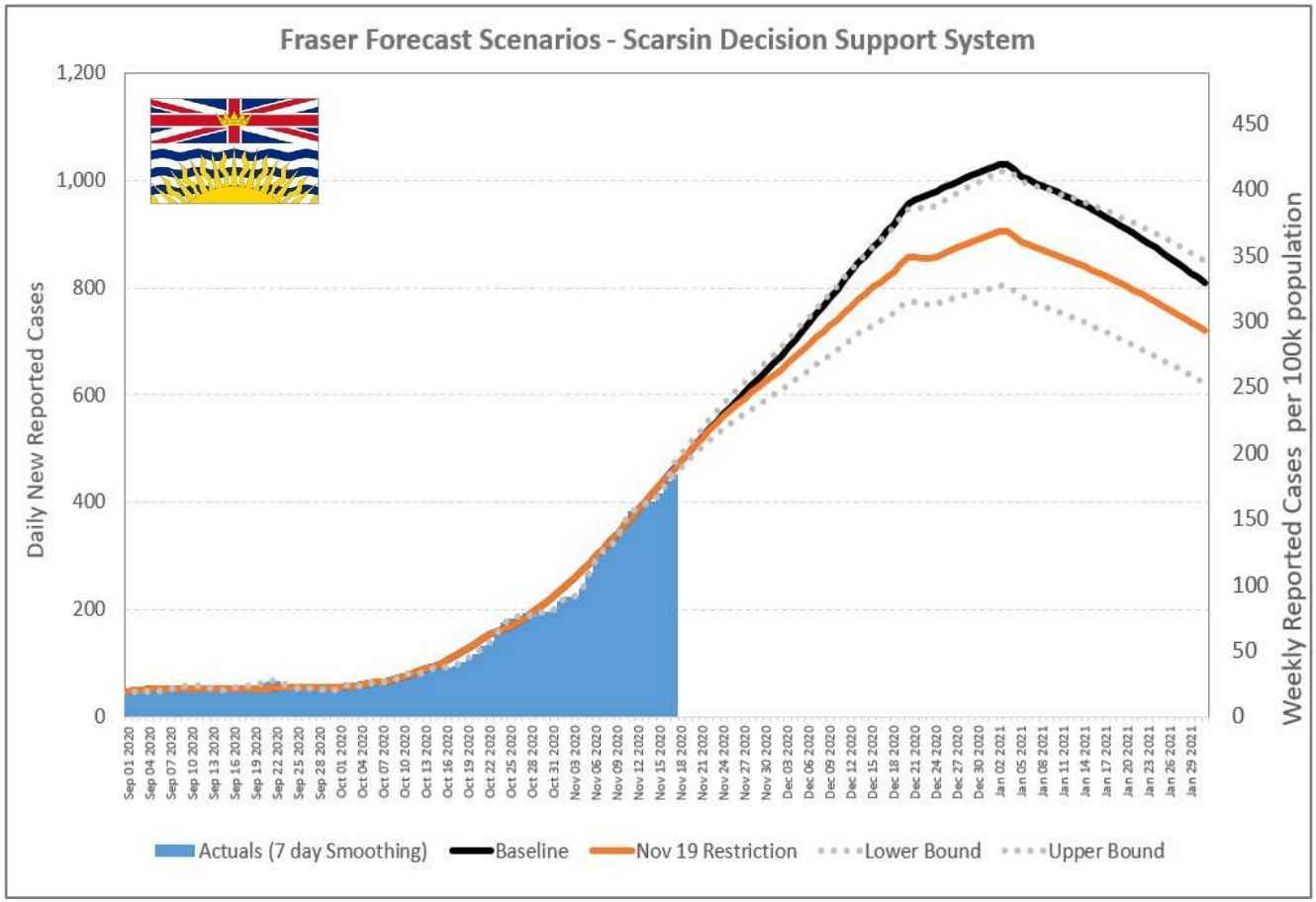
Vancouver Coastal Impact

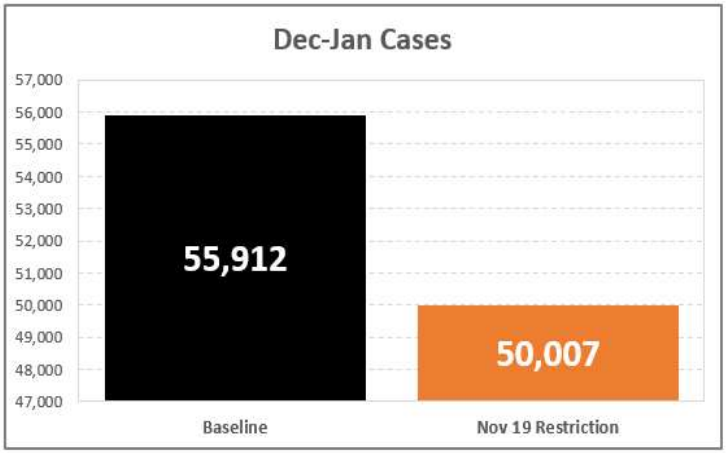


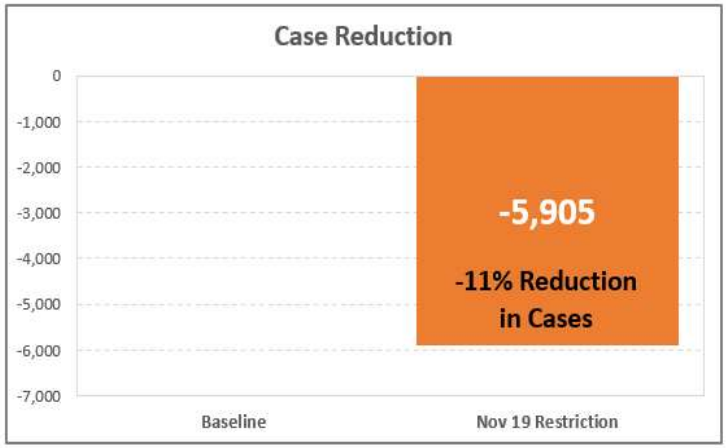




Fraser Impact







Covid19 Dashboards

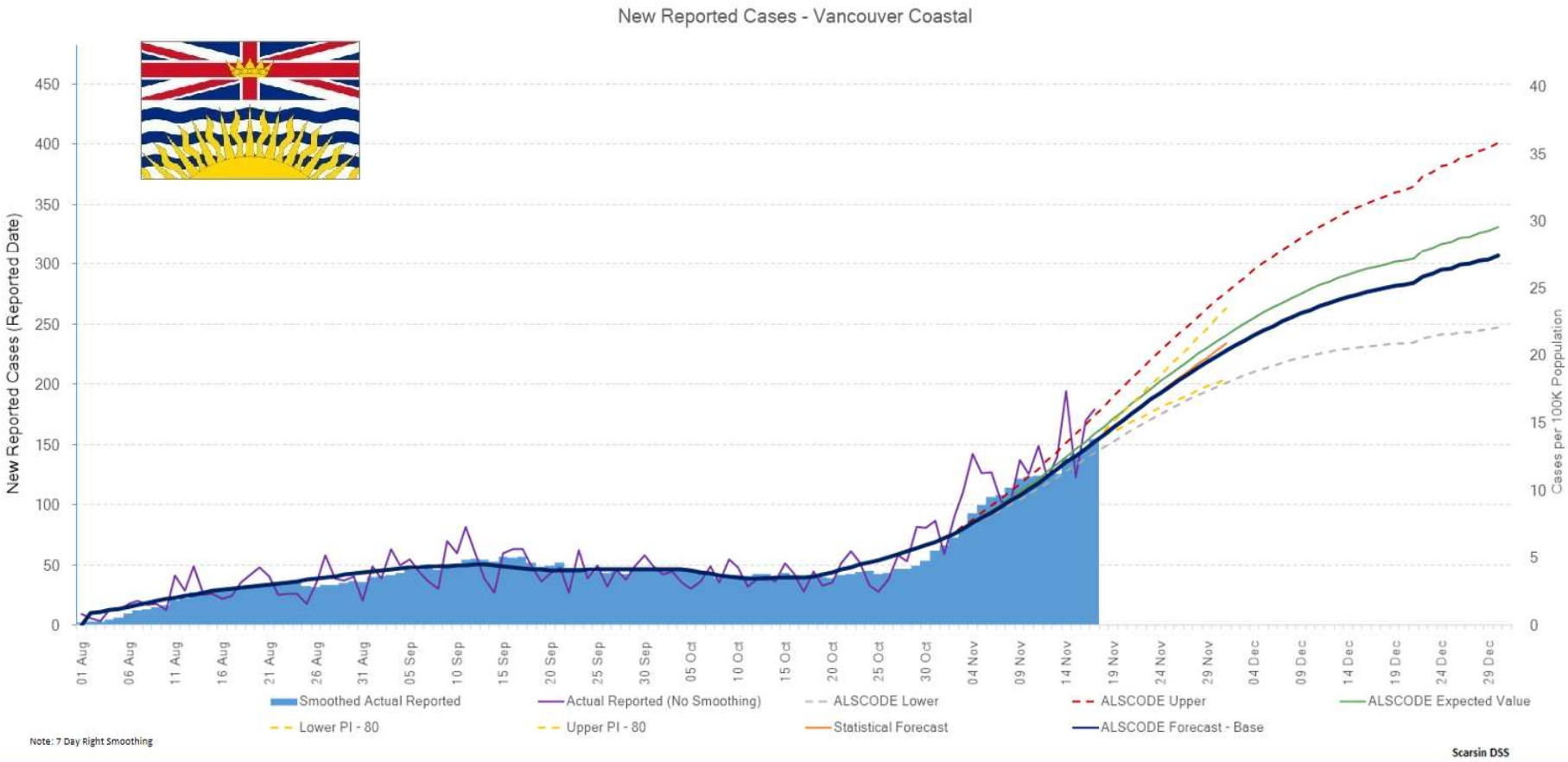
covid19dpr.scarsin.com

Adhoc Grid | Analytics Book | Preferences | Help | Logout

Scarsin Covid-19 DPR DSS V2.19 | Scarsin Covid-19 DPR DSS V2.20

Statistical & ALSCODE Forecast Triangulation - Vancouver Coastal

Scarsin Covid-19 Decision Support System



Start Date
01 Aug 2020

End Date
31 Dec 2020

Forecast
WIP

Range
Base
Lower
Upper
Expected Value

Smoothing
No Smoothing

Province
British Columbia

Health Regions
British Columbia
Interior
Fraser
Vancouver Coastal
Vancouver Island
Northern BC

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Covid19 Dashboards

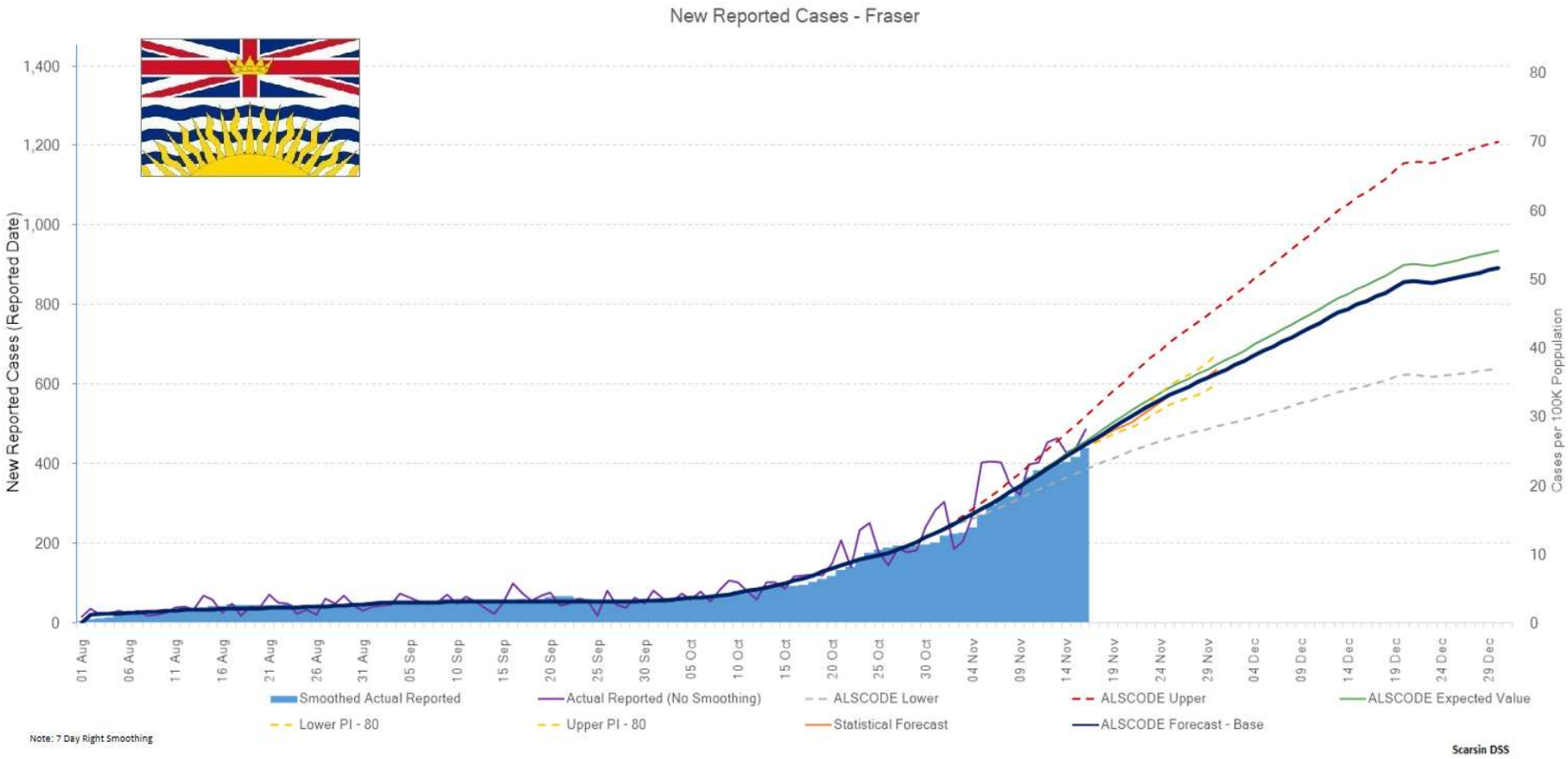
covid19dpr.scarsin.com

Adhoc Grid | Analytics Book | Preferences | Help | Logout

Scarsin Covid-19 DPR DSS V2.19 | Scarsin Covid-19 DPR DSS V2.20

Statistical & ALSCODE Forecast Triangulation - Fraser

Scarsin Covid-19 Decision Support System



Start Date
01 Aug 2020

End Date
31 Dec 2020

Forecast
WIP

Range
- Base
- Lower
- Upper
- Expected Value

Smoothing
No Smoothing

Province
British Columbia

Health Regions
- British Columbia
  - Interior
  - Fraser
  - Vancouver Coastal
  - Vancouver Island
  - Northern BC

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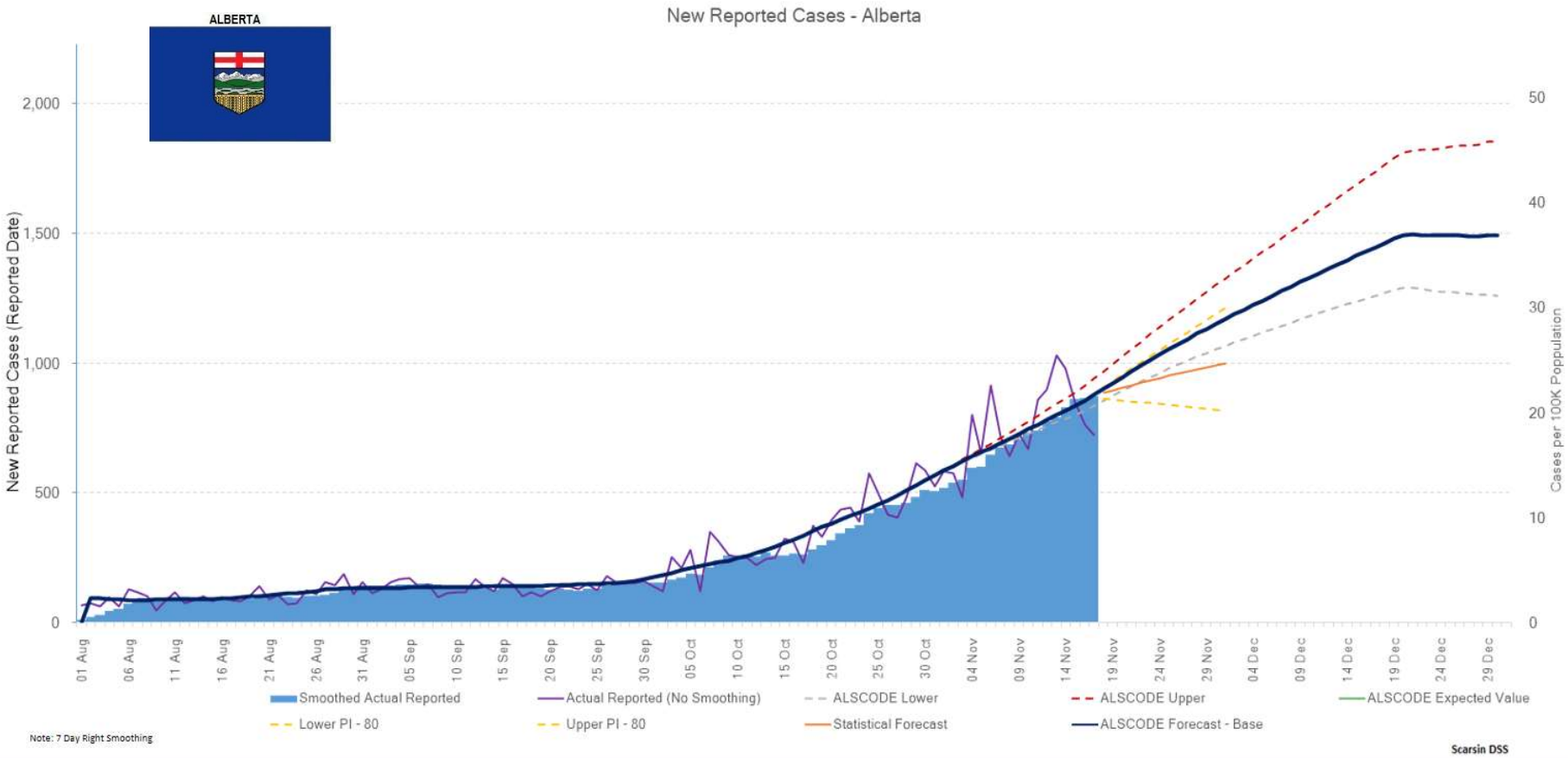
Covid19 Dashboards

Adhoc Grid | Analytics Book | Preferences | Help | Logout

Scarsin Covid-19 DPR DSS V2.20 | Scarsin Covid-19 DPR DSS V2.19

Statistical & ALSCODE Forecast Triangulation - Alberta

Scarsin Covid-19 Decision Support System



Start Date
01 Aug 2020

End Date
31 Dec 2020

Forecast
WIP

Range
- Base
- Lower
- Upper
- Expected Value

Smoothing
No Smoothing

Province
Alberta

Health Regions
- Alberta
- Calgary Zone
- Central Zone
- Edmonton Zone
- North Zone
- South Zone

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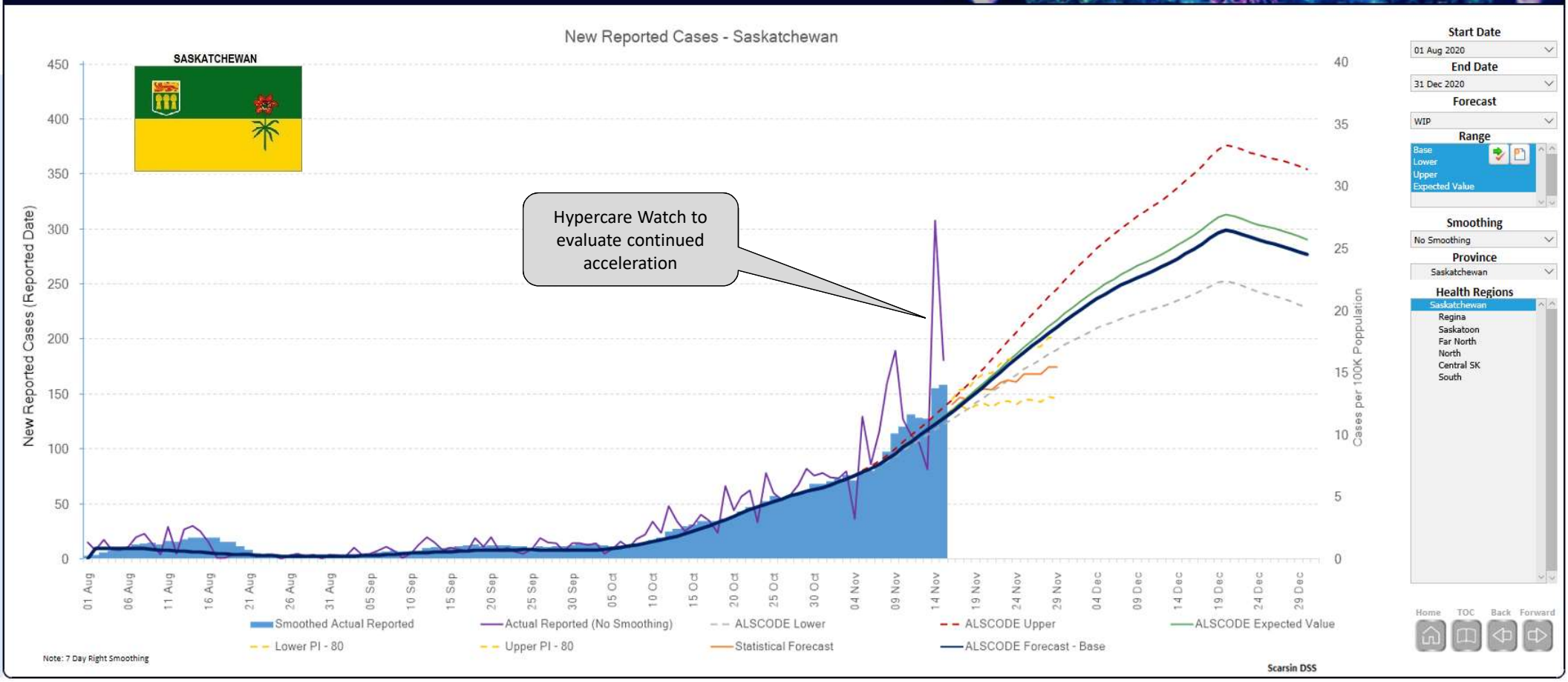
Covid19 Dashboards

Adhoc Grid | Analytics Book | Preferences | Help | Logout

Scarsin Covid-19 DPR DSS V2.19 | Scarsin Covid-19 DPR DSS V2.20

Statistical & ALSCODE Forecast Triangulation - Saskatchewan

Scarsin Covid-19 Decision Support System



Covid19 Dashboards

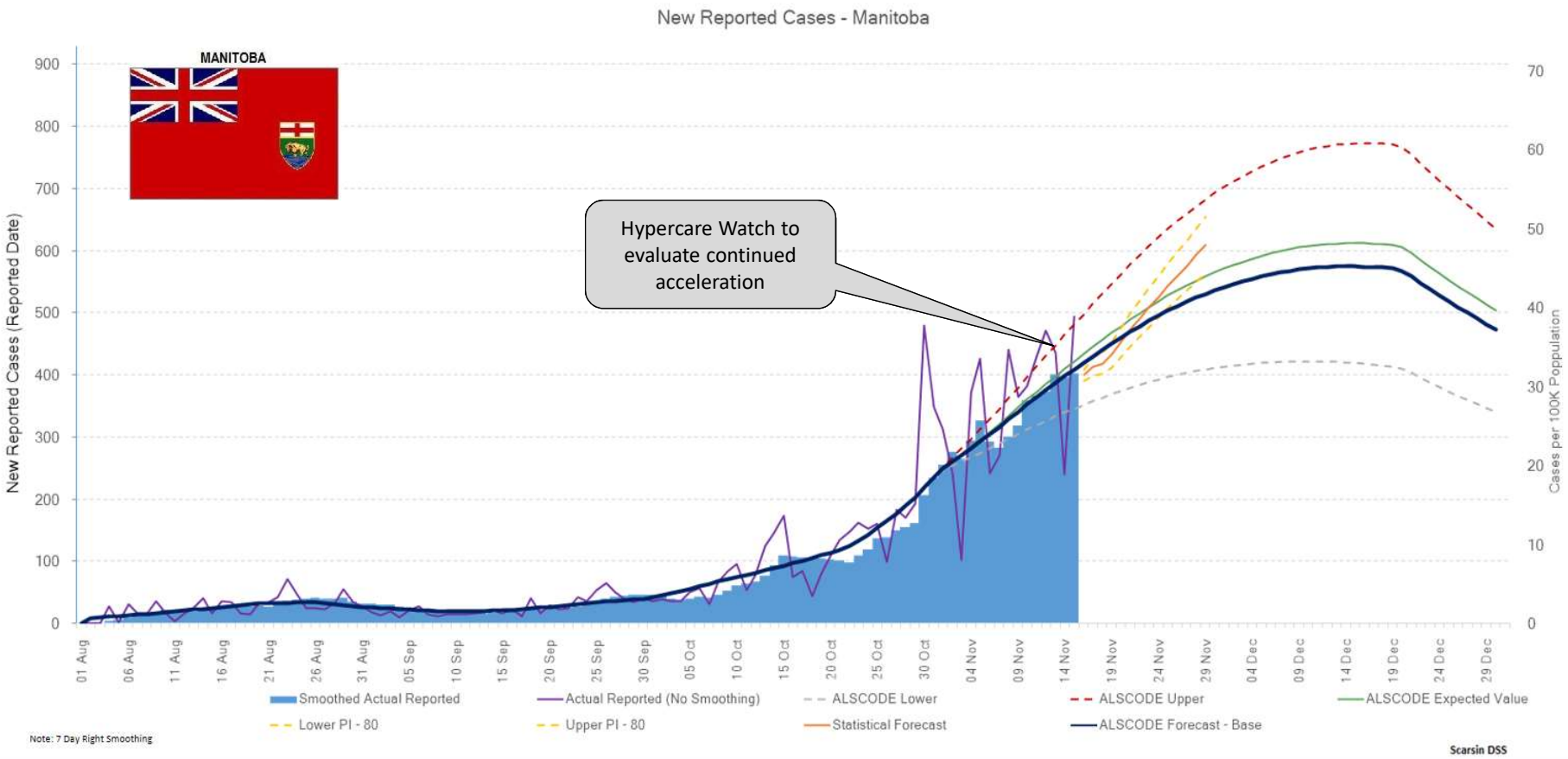
covid19dpr.scarsin.com

Adhoc Grid | Analytics Book | Preferences | Help | Logout

Scarsin Covid-19 DPR DSS V2.19 | Scarsin Covid-19 DPR DSS V2.20

Statistical & ALSCODE Forecast Triangulation - Manitoba

Scarsin Covid-19 Decision Support System



Start Date: 01 Aug 2020

End Date: 31 Dec 2020

Forecast: WIP

Range: Base, Lower, Upper, Expected Value

Smoothing: No Smoothing

Province: Manitoba

Health Regions: Manitoba, Interlake-Eastern, Northern, Prairie, Southern, Winnipeg

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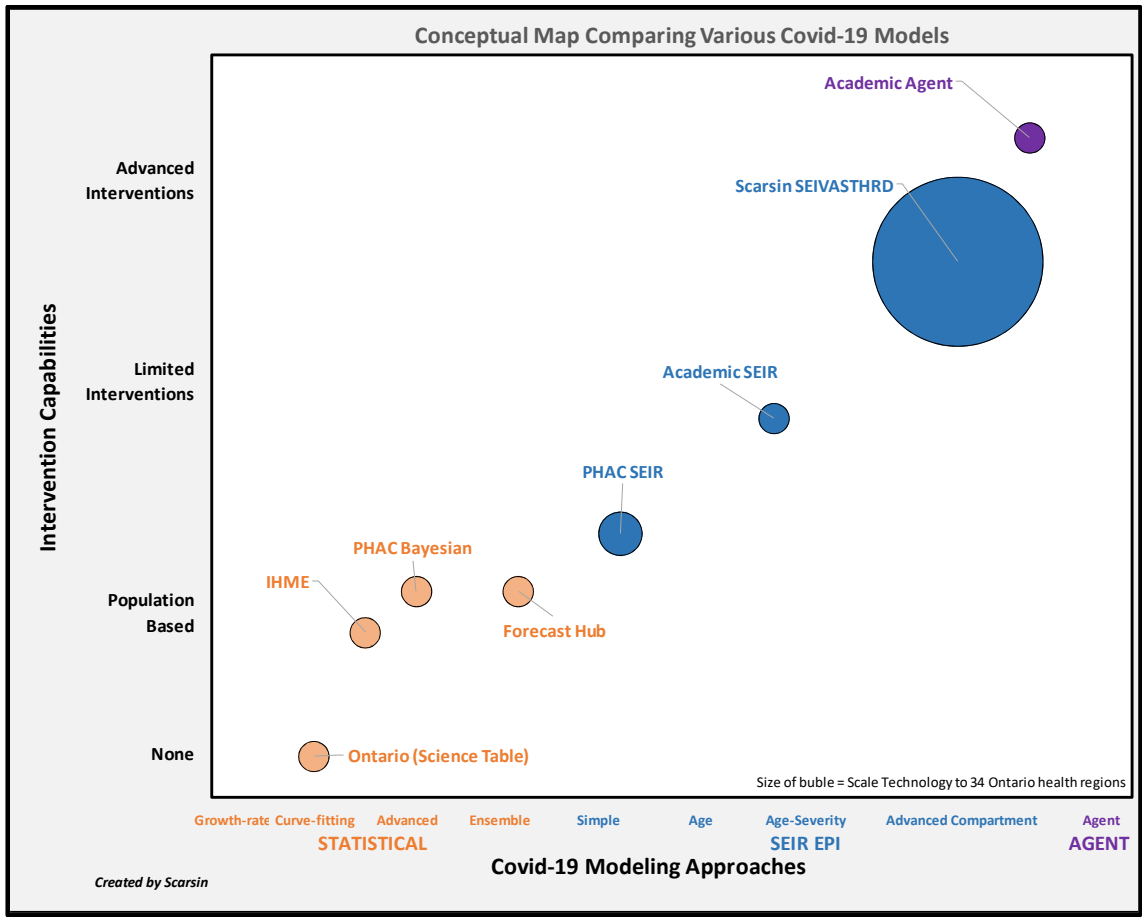
Modeling Approach Continuum

- **Leveraging the right model is very important to support intervention decision making**
  - It determines how much information decision makers have in setting policy and measuring results
  - It also influences how far they can plan ahead which is the difference between reactive and proactive decisions
- **Scarsin's SEIVASTHRD ODE model is capable of advanced intervention planning**
  - Uniquely positioned to efficiently forecast the impact of very discrete interventions (closing schools, adjusting restaurants rules, limiting gatherings, changes in workplace rules…)
  - ONLY solution in Canada that provides a national scaled solution



PHAC SEIR - https://nccid.ca/phac-seir-model-on-covid-19/
PHAC Baynesian - https://www.medrxiv.org/content/10.1101/2020.04.17.20070086v1
IHME - https://covid19.healthdata.org/canada?view=total-deaths&tab=trend
Ontario Science Table - https://covid19-sciencetable.ca/
Forecast Hub - - https://github.com/reichlab/covid19-forecast-hub
Forecast Hub - https://covid19forecasthub.org/#:~:text=The%20COVID%2D19%20Forecast%20Hub,globe%2C%20in%20coordination%20with%20CDC.

Flexible and Pragmatic models

Robust Age – Living Status Compartmental ODE > Hospital Cohorting Model

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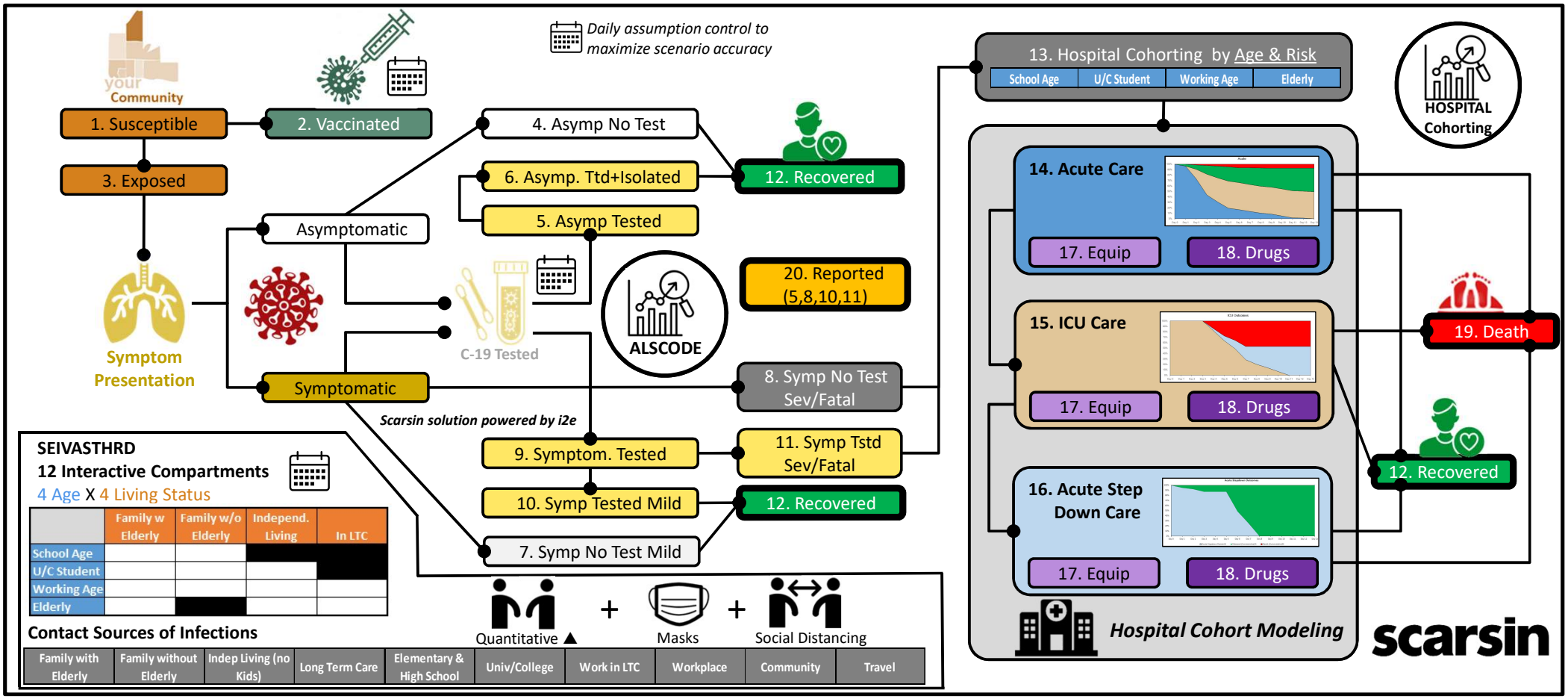

Modeling Interventions is Critical!!!

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ID	Role	Topic	Parameter	Dimension	Time Input
1	Input Parameter	HR Patient Contact	Daily Contact #	4 Age Cohorts + Locations	Constant
2	Input Parameter	HR Patient Contact	Daily Contact Distrubition by Location	4 Age Cohorts	Constant
3	Input Parameter	Covid-19	Duration of immunity acquired by infection.	N/A	Constant
4	Input Parameter	Covid-19	Reduction of infectivity - asymptomatically infected	N/A	Constant
5	Input Parameter	Covid-19	Incubation Period	N/A	Constant
6	Input Parameter	Vaccine	Vaccine efficacy Rate	N/A	Constant
7	Input Parameter	Covid-19	Proportion of Asymptomatically Infected	N/A	Constant
8	Input Parameter	Covid-19	Recovery Time - Asymptomatic	N/A	Constant
9	Input Parameter	Covid-19	Recovery Time - Mild	4 Age Cohorts	Constant
10	Input Parameter	Covid-19	Recovery Time - Severe	4 Age Cohorts	Constant
11	Input Parameter	Covid-19	Recovery Time - Hospitalized	4 Age Cohorts	Constant
12	Input Parameter	Covid-19	Time Until Death	4 Age Cohorts	Constant
13	Input Parameter	Covid-19	Proportion of Infected with Mild Symptoms	4 Age Cohorts	Constant
14	Input Parameter	Covid-19	Proportion of Infected with Severe Symptoms	4 Age Cohorts	Constant
15	Input Parameter	Covid-19	Proportion of Infected with Fatal Symptoms	4 Age Cohorts	Constant
16	Input Parameter	Forecast Risk	Upper/Lower Bounds	4 Age Cohorts	Daily
17	Input Parameter	Forecast Risk	Expected Value U/B/L Probability %	N/A	Constant
18	Input Parameter	HR Patient Contact	Date of Distribution Start	N/A	Daily
19	Input Parameter	Household NPI	Household wo Elderly NPI	N/A	Daily
20	Input Parameter	Household NPI	Household w Elderly NPI	N/A	Daily
21	Input Parameter	Household NPI	Single Homes NPI	N/A	Daily
22	Input Parameter	Living in LTC NPI	Living in LTC - Protocol 1	N/A	Daily
23	Input Parameter	Living in LTC NPI	Living in LTC - Protocol 2	N/A	Daily
24	Input Parameter	Living in LTC NPI	Living in LTC - Protocol 3	N/A	Daily
25	Input Parameter	Living in LTC NPI	Living in LTC - Mask Max Reduction %	N/A	Constant
26	Input Parameter	Living in LTC NPI	Living in LTC - Mask Compliance %	N/A	Daily
27	Input Parameter	Living in LTC NPI	Living in LTC - Social Distancing Reduction %	N/A	Daily
28	Input Parameter	Living in LTC NPI	Living in LTC - Social Distancing %	N/A	Constant
29	Input Parameter	Working in LTC NPI	Working in LTC - Protocol 1	N/A	Daily
30	Input Parameter	Working in LTC NPI	Working in LTC - Protocol 2	N/A	Daily
31	Input Parameter	Working in LTC NPI	Working in LTC - Protocol 3	N/A	Daily
32	Input Parameter	Working in LTC NPI	Working in LTC - Mask Max Reduction %	N/A	Constant
33	Input Parameter	Working in LTC NPI	Working in LTC - Mask Compliance %	N/A	Daily
34	Input Parameter	Working in LTC NPI	Working in LTC - Social Distancing Reduction %	N/A	Daily
35	Input Parameter	Working in LTC NPI	Working in LTC - Social Distancing %	N/A	Constant
36	Input Parameter	Elem/High School NPI	Elem/High School - Protocol 1	N/A	Daily
37	Input Parameter	Elem/High School NPI	Elem/High School - Protocol 2	N/A	Daily
38	Input Parameter	Elem/High School NPI	Elem/High School - Protocol 3	N/A	Daily
39	Input Parameter	Elem/High School NPI	Elem/High School - Mask Max Reduction %	N/A	Constant
40	Input Parameter	Elem/High School NPI	Elem/High School - Mask Compliance %	N/A	Daily

ID	Role	Topic	Parameter	Dimension	Time Input
41	Input Parameter	Elem/High School NPI	Elem/High School - Social Distancing Reduction %	N/A	Constant
42	Input Parameter	Elem/High School NPI	Elem/High School - Social Distancing %	N/A	Daily
43	Input Parameter	College&University NPI	College&University - Protocol 1	N/A	Daily
44	Input Parameter	College&University NPI	College&University - Protocol 2	N/A	Daily
45	Input Parameter	College&University NPI	College&University - Protocol 3	N/A	Daily
46	Input Parameter	College&University NPI	College&University - Mask Max Reduction %	N/A	Constant
47	Input Parameter	College&University NPI	College&University - Mask Compliance %	N/A	Daily
48	Input Parameter	College&University NPI	College&University - Social Distancing Reduction	N/A	Constant
49	Input Parameter	College&University NPI	College&University - Social Distancing %	N/A	Daily
50	Input Parameter	Community NPI	Community - Protocol 1	N/A	Daily
51	Input Parameter	Community NPI	Community - Protocol 2	N/A	Daily
52	Input Parameter	Community NPI	Community - Protocol 3	N/A	Daily
53	Input Parameter	Community NPI	Community - Mask Max Reduction %	N/A	Constant
54	Input Parameter	Community NPI	Community - Mask Compliance %	N/A	Daily
55	Input Parameter	Community NPI	Community - Social Distancing Reduction %	N/A	Constant
56	Input Parameter	Community NPI	Community - Social Distancing %	N/A	Daily
57	Input Parameter	Workplace NPI	Workplace - 10 Segments	Workplace Segment	Daily
58	Input Parameter	Workplace NPI	Workplace - Mask Max Reduction %	N/A	Constant
59	Input Parameter	Workplace NPI	Workplace - Mask Compliance %	N/A	Daily
60	Input Parameter	Workplace NPI	Workplace - Social Distancing Reduction %	N/A	Constant
61	Input Parameter	Workplace NPI	Workplace - Social Distancing %	N/A	Daily
62	Input Parameter	Travel	Travelling rate % - Travellers	US, Int'l, Commuting	Daily
63	Input Parameter	Travel	Out of Region Infection Rate	US, Int'l, Commuting	Daily
64	Input Parameter	Testing	Asymptomatic Testing Rates	4 Age Cohorts	Daily
65	Input Parameter	Vaccine	Symptomatic Testing Rates	4 Age Cohorts	Daily
66	Input Parameter	Vaccine	Vaccination - Supply	N/A	Daily
67	Input Parameter	Vaccine	Vaccination - Daily Injection Capacity	N/A	Daily
68	Input Parameter	Vaccine	Vaccination - Distribution by Age	4 Age Cohorts	Daily
69	Output Results	Model Outputs	Susceptible	4 Age & 4 Living Status	Daily
70	Output Results	Model Outputs	Vaccinated	4 Age & 4 Living Status	Daily
71	Output Results	Model Outputs	Exposed	4 Age & 4 Living Status	Daily
72	Output Results	Model Outputs	Asympt	4 Age & 4 Living Status	Daily
73	Output Results	Model Outputs	Asympt Test-Pending	4 Age & 4 Living Status	Daily
74	Output Results	Model Outputs	Asympt Positive	4 Age & 4 Living Status	Daily
75	Output Results	Model Outputs	Sympt Mild	4 Age & 4 Living Status	Daily
76	Output Results	Model Outputs	Sympt Severe	4 Age & 4 Living Status	Daily
77	Output Results	Model Outputs	Sympt Fatal	4 Age & 4 Living Status	Daily
78	Output Results	Model Outputs	Sympt Test-Pending	4 Age & 4 Living Status	Daily
79	Output Results	Model Outputs	Sympt Positive Mild	4 Age & 4 Living Status	Daily
80	Output Results	Model Outputs	Sympt Positive Severe	4 Age & 4 Living Status	Daily
81	Output Results	Model Outputs	Sympt Positive Fatal	4 Age & 4 Living Status	Daily
82	Output Results	Model Outputs	Recovered	4 Age & 4 Living Status	Daily

SCARSIN IS READY

Covid-19 Technology Overview

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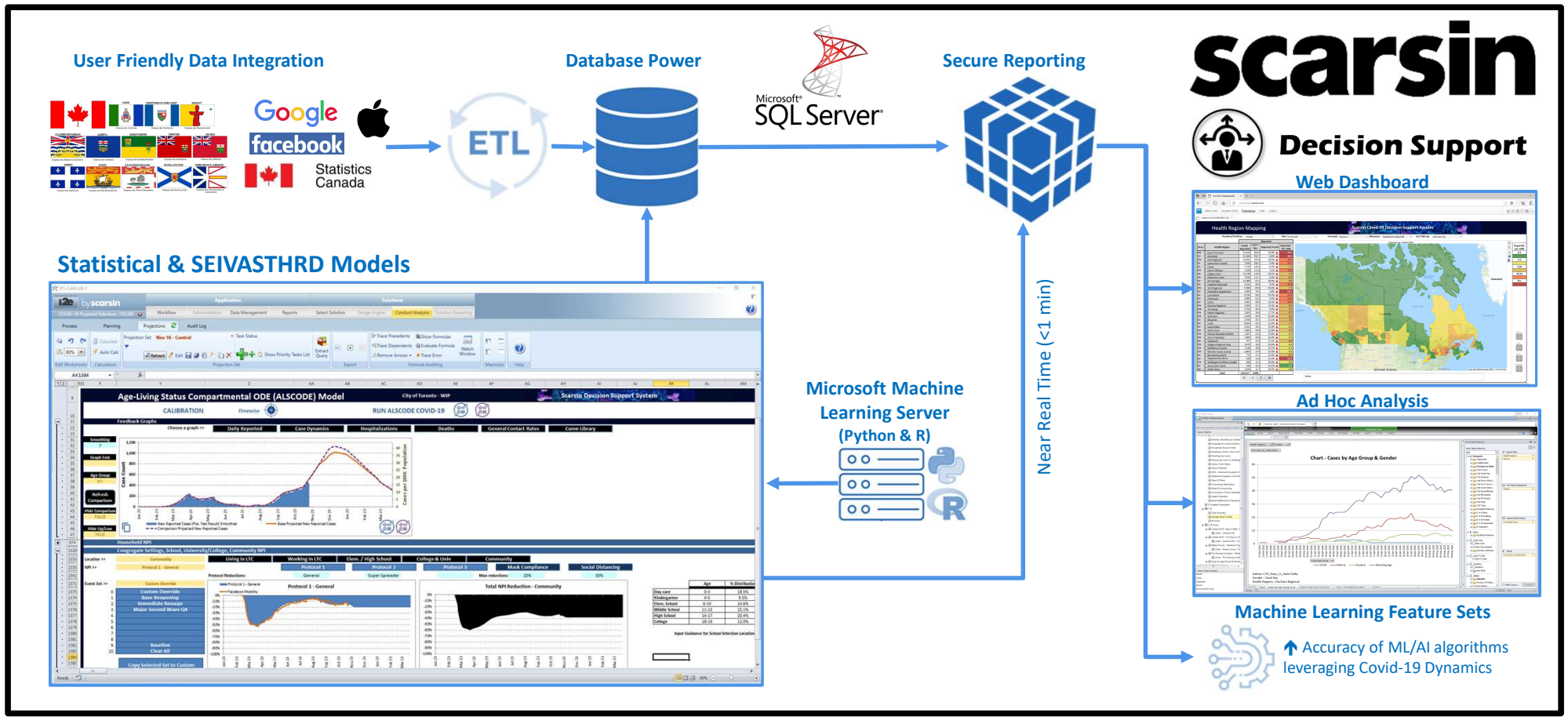


i2e by scarsin

COVID-19 Projected Infections (103.00)

Application | Solutions

Workflow | Administration | Data Management | Reports | Select Solution | Design Engine | Conduct Analysis | Solution Reporting

Process | Planning | Projections | Audit Log

Calculate | Auto Calc | 80% | Edit Worksheets | Calculation

Projection Set: Nov 18 Lockdown V4 28 days | Retract | Edit | Task Status | Show Priority Tasks List | Extract Query | Projection Set

Export

Trace Precedents | Trace Dependents | Remove Arrows | Show Formulas | Evaluate Formula | Trace Error | Watch Window | Formula Auditing

Maximize | Help

Filter	Selected Value
SEVAITHR SCENARIO	WIP
Province	Ontario
Health Region	City of Toronto

Reset Slicer | Load Data

- Inputs
  - ALSCODE Inputs
  - ALS Transmission Matrix
  - Hospital Cohorting
- View Sheets
  - Ensemble Model Diagrams
- Hidden Sheets
  - ALCODE Transf from VSTO
  - NPI & PI Events > ALSCODE
  - Mobility Engine
  - Vacc Engine
  - Hospital Cohort Engine
  - Data Refresh - Infections
  - Data Refresh - Deaths
  - Data Refresh - Population
  - Data Refresh - Hosp Acute

P127

Age-Living Status Compartmental ODE (ALSCODE) Model

City of Toronto - WIP

Scarsin Decision Support System

CALIBRATION | Timewise | RUN ALSCODE COVID-19

Feedback Graphs

Choose a graph >> Daily Reported | Case Dynamics | Hospitalizations | Deaths | General Contact Rates | Curve Library

Smoothing: 1

Graph End: Jan 31 2021

Age Group: All

Refresh Comparison

Hide Comparisc: TRUE

Hide Up/Low: TRUE

Workplace Sectors NPI

Section >> Workplace

Sub Sec >> Sector 1 - All Sectors

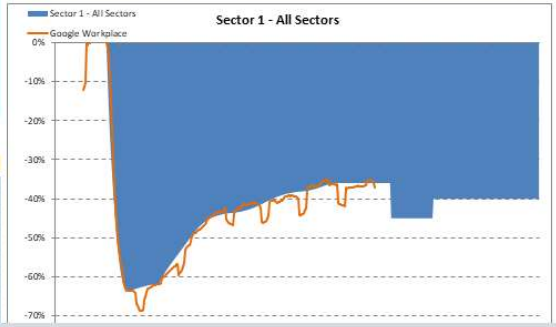
Sector 1 - All Sectors | Sector 2 - | Sector 3 - | Sector 4 - | Sector 5 -
Sector 6 - | Sector 7 - | Sector 8 - | Sector 9 - | Sector 10 -

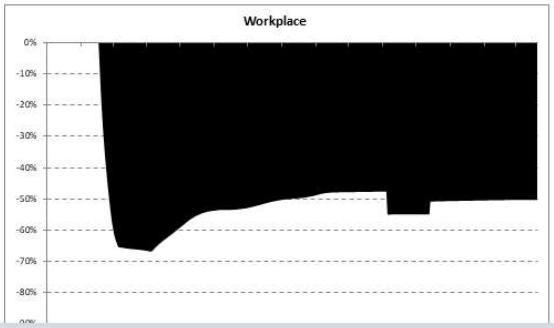
Impact To Q: Sector Name: All Sectors

Sector 1
Sector 2
Sector 3
Sector 4
Sector 5
Sector 6
Sector 7
Sector 8
Sector 9
Sector 10
Mask Compliance
Social Distancing Compliance

Event Set >> Custom Override

0. Custom Override
1. Base Reopening
2. Immediate Resurge
3. Major Second Wave Q4
4.
5.
6.
7.
8.





Ready | 70%

Running a National Decision Support System

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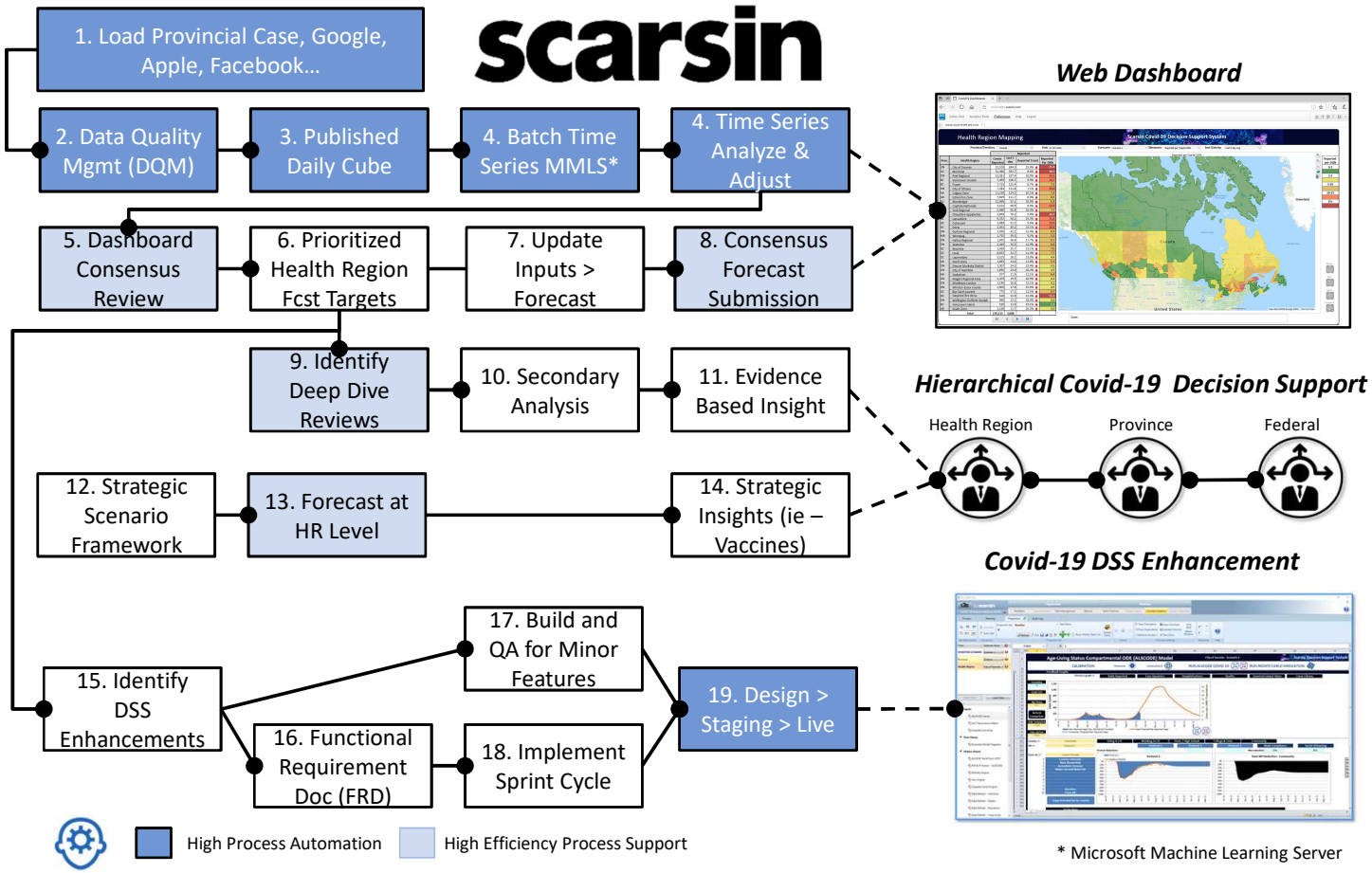
- Scarsin has been stabilizing a daily production cycle to ensure that the Canada solution is ready for immediate end deployment
- Scarsin team can support national requirements while it is transitioned to epidemiology and modeling teams
- **<u>Ready for immediate deployment</u>**



* Microsoft Machine Learning Server

Methodology and Limitations

- Scarsin utilizes the positive reported cases based on Reported date. We will explain why we chose this approach in another blog on communicating current trends. We see this as an important topic as Scarsin feels the current communication of daily cases is confusing and in some ways misleading.

- The data utilized within this analysis is downloaded directly from the public sources

- This report is not meant to provide direct predictions on the health regions. It is meant to provide potential outcomes and draw insights based on varying specific parameters. It is important to note that the Scarsin solution utilizes an active reforecast process on all scenarios as new daily data is loaded which means that even one week of additional data can change the trajectory of the forecasts either up or down.