Circulation Package

Neroutsos Inlet at Port Alice

September 2022

SPERLING HANSEN ASSOCIATES

- Landfill Engineering
- Landfill Gas Management
- Solid Waste Planning
- Environmental Monitoring
- Landfill Fire Control

July 26th, 2022 PRJ-22048b

Attention: Mr. Greg Fletcher
Chief Administrative Officer
Regional District of Mount Waddington
PO Box 729 – 2044 McNeill Rd
Port McNeill, V0N 2R0
Email: gfletcher@rdmw.bc.ca

Dear Mr. Fletcher,

Re: 7 Mile Landfill Wood Waste and Biosolids Composting 2021 Greenhouse Gas Emissions Reduction Quantification Review – Rev01

Sperling Hansen Associates (SHA) is pleased to submit this letter report to the Regional District of Mount Waddington (RDMW) for the *7Mile Landfill 2021 Wood Waste and Biosolids Composting Greenhouse Gas (GHG) Emissions Reduction Quantification Review.*

1. BACKGROUND

In 2011, the Regional District of Mount Waddington (RDMW) developed a biocover system for biological oxidation of methane and reduction of greenhouse gas (GHG) emissions at its 7 Mile Regional Landfill. Initially, the BC Ministry of Environment and Climate Change Strategy (ENV) Gas Generation Model (ENV Tool) was used to predict the baseline methane generation and emission rates and thus the potential for reduction of methane emissions achieved by the biocover system. To address inconsistencies from this approach, Sperling Hansen Associates (SHA) adopted a much more accurate methane emission measurement technique that has been utilized at the landfill since 2014.

The RDMW ceased burning wood waste in 2009 by opting to use wood waste as a matrix for composting biosolids (i.e., sewage sludge) from the six secondary sewage treatment plants in the region. Given the source materials used, it was determined that the compost would be used as a final cover material. This in turn presented a materials management problem that was addressed by moving the compost operation to a portion of the landfill that was in an intermediate closure phase. In addition, previously stockpiled compost was spread over the slopes of this area. SHA noted that this media (biocover) would perform as an enhanced environment for the growth of methanotrophic bacteria that would significantly reduce methane emissions from these areas. As part of the annual reporting, SHA sampled the treated area in 2013, with results confirming the effectiveness of the biocover system with 82% of the methane emissions eliminated in sampled sites.

SHA recently completed the 2021 GHG emission reduction quantification from application of biocover at the landfill, concluding a 550 tonnes of CO_2-e GHG reduction achieved in 2021. Photo 1 shows an aerial view of the composting operation on the crest of 7 Mile Landfill.

Photo 1. Biosolid and Wood Waste Composting at 7 Mile Landfill (April 2022)

In early 2017, a portion of the first phase of the fully engineered expanded landfill (Phase 3A) reached its final fill plan elevations, providing an opportunity to expand the biocover system to a new fully lined landfill. In addition to new biocover systems placed in Phases 1&2 area in 2021, the Phase 3A biocover was also further expanded to south slopes of Phase 3B in this year, reaching a total biocover footprint of 2.4 ha.

The compost biocover system is key to 7 Mile Landfill operation. More than 2,700 tonnes of organic wastes that would otherwise be buried and decomposed anaerobically to generated methane are instead used to help reduce methane emissions as well as extend the life of the landfill. The proposed project is an integral part of the RDMW 7 Mile biocover methane reduction project which was initiated in 2011 and has been approved as an Option 2 project since 2014. Sufficient carbon offset credits were generated for the RDMW to be carbon neutral by reducing GHG emissions through the application of biocover on the landfill. Hence, the RDMW initially did not make any claim for the credits for the GHG emissions reduction from the composting operation which provided feedstock for the biocover system.

2. GHG EMISSIONS REDUCTION QUANTIFICATION

2.1. Guidance Document and Tools

SHA is aware that there is a guidance document for estimating the amount of GHG emissions that can be reduced by diverting organic waste into a centralized community composting system rather than sending it to a landfill. The ENV has also issued a spreadsheet Tool to calculate GHG reductions from kitchen scraps and yard waste (Option 1).

The RDMW has sought ENV's suggestions as to how they can claim credits for the composting of

biocover feedstock. As per ENV's suggestions, the RDMW estimated GHG emissions reduction using the spreadsheet ENV provides for Option 1 projects. In addition, ENV advised that the steps mentioned in Table 1 be followed to complete a project submission (Option 2).

Table 1. Implementation Steps for Option 2

Step	For more information
1. **Review** the information on Option 2 Projects and the seven Project Eligibility Requirements.	Section 2.3 and Appendix 1
2. (Optional) Complete a **Preliminary Review Template** to assist in determining if the project is likely to generate measurable GHG reductions under the Carbon Neutral Framework.	See sample in Appendix 9
3. Complete, sign and make public a **Project Plan Template** for the project. As part of this process, the local government will need to engage qualified professionals to provide **third party validation** of the project approach and methodology, to sign off on the Project Plan Template ensuring that it meets all seven Project Eligibility Requirements.	See sample in Appendix 10
4. **Calculate** the project GHG emission reductions as determined by third party validated approach and methodology outlined in the Project Plan Template.	Appendix 10
5. Complete, sign and make public a **Third Party Verification Template** to verify that the required work was completed in the specified time frame to result in the GHG reductions being claimed.	See sample in Appendix 11
6. Prepare the annual **Climate Action Revenue Incentive Program (CARIP) Report** and include information on progress towards carbon neutrality. Retain all project paperwork on file in accordance with local government administrative policy procedures.	See Section 3 and Appendix 12 for information on revised CARIP report

(Source - Becoming Carbon Neutral: Guidebook for Local Governments; Table 4: Implementing Option 2)

2.2. Calculation Assumptions and Parameters

SHA has been retained by the RDMW to verify their calculations for the GHG Emissions Reduction using the Spreadsheet Tool. The following input parameters (T1-Inputs) were reviewed:

Diversion of Waste – Mass of diverted organic wastes namely wood chips and biosolids (in tonnes) were provided by the RDMW in 2021.

Previous Disposal Location and Landfill Parameters – SHA analyzed the landfill parameters of different landfills provided in the Tab "Landfill Parameters" to select a landfill from the list that would represent 7 Mile Landfill. Figure 1 below shows that the methane generation rate (k) of 0.11 for the decomposable waste (kitchen scraps and yard waste) remains more or less the same for a range of precipitation from 1,200 mm to around 2,200 mm. Thus, Campbell River with annual precipitation of 1,618.3 mm would represent the 7 Mile Landfill having an annual precipitation of approximately 1,900 mm.

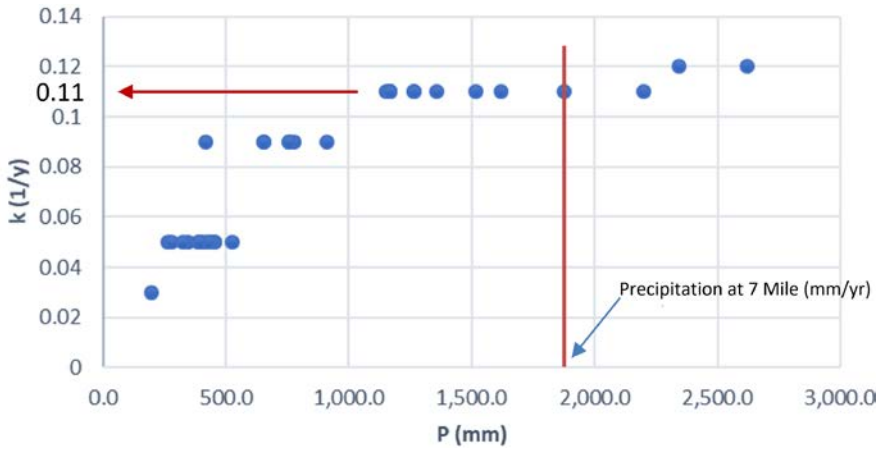

Figure 1. Precipitation vs. Decay Rate for kitchen scraps and yard waste

Table 2 shows the full data set of the Calculation Spreadsheet Landfill Parameters.

Table 2. Landfill Parameters, GHG Emissions Reduction using the Spreadsheet Tool

Landfill Name	Climate Station	Annual Precipitation (mm)	Methane Generation Rate (k) Values
Alberni Valley	Port Alberni (AUT) (#1036B06)	2,198.5	0.11
Armstrong	Vernon (#1128551)	428.1	0.05
Bailey	Sardis (#1107080)	1,515.8	0.11
Bessborough	Dawson Creek A (#1182285)	453.2	0.05
Cache Creek	Spences Bridge Nicola (#1167637)	263.7	0.05
Campbell Mtn	Penticton A (#1126150)	346.0	0.05
Campbell River	Quinsam River Hatchery (#1026639)	1,618.3	0.11
Central	Castlegar A (#1141455)	755.2	0.09
Central Subregion	Cranbrook City (#1152J02)	398.6	0.05
Columbia Regional	Kootenay NP West Gate (#1154410)	441.1	0.05
Comox Valley	Comox A (#1021830)	1,153.6	0.11
Ecowaste	Richmond Nature Park (#1106PF7)	1,262.4	0.11
Foothills	Prince George 15NW (#1096458)	654.1	0.09
Ft. Nelson	Fort Nelson A 1192940	452.0	0.05
Ft. St. John	Fort St.John A (#1183000)	444.7	0.05
Gibraltar	McLeese Lake FraserView (#1095015)	416.8	0.09
Glenmore	Kelowna A (#1123970)	386.9	0.05
Hartland	Saanichton CDA (#1016940)	908.2	0.09
Heffley Creek	Heffley Creek (#1163400)	409.0	0.05
Knockholt	Fraser Lake North Shore (#109C0LF)	525.8	0.05
Lower Nicola	Merritt STP (#1125079)	322.1	0.05
McKelvey Creek	Warfield(#1148700)	774.9	0.09
Mini's Pit	Mission West Abbey (#1105192)	1,875.6	0.11
Mission Flats	Kamloops A (#1163780)	279.0	0.05
Nanaimo	Nanaimo A (#1025370)	1,165.4	0.11
Ootischenia	Castlegar A (#1141455)	755.2	0.09
Prince Rupert	Prince Rupert A (#1066481)	2,619.1	0.12
Roosevelt	Kennewick USHCN Site#454154	196	0.03
Salmon Arm	Salmon Arm A (#1166R45)	653.0	0.09
Sechelt	Gibsons Gower Point (#1043152)	1,354.5	0.11
Squamish	Squamish Upper (#1047672)	2,341.9	0.12
Terrace	Terrace PCC (#1068131)	1,168.9	0.11
Thornhill	Terrace PCC (#1068131)	1,168.9	0.11
Vancouver	Richmond Nature Park (#1106PF7)	1,262.4	0.11
Vernon	Vernon Bella Vista (#1128553)	428.1	0.05
Westside	Peachland (#1126070)	393.4	0.05

Source:

Environment Canada, National Climate Data and Information Archive, www.climate.weatheroffice.ec.gc.ca (Canadian Climate Normals or Averages 1981-2010)

Environment Canada, Station Information Map Viewer, http://scitech.pyr.ec.gc.ca/climhydro/welcome_e.asp

SHA also conducted a literature review to determine Methane Generation Potential (L_o, m^3 per tonne of waste) and Methane Generation Rate (k, $year^{-1}$) values for the diverted materials (wood waste and biosolid) that were aerobically composted at the landfill. Data suggests that the L_o and k values of landfill biosolids will vary based on the level of treatment that the biosolids have received before disposal. For primary solids, the volatile solids (VS) content would be high and hence the L_o value would be high. Materials that undergo digestion would have lower VS content and thus a lower L_o value.

For determining the methane generation rates, a first-order decay constant, k is used. SHA has used L_o values in other projects and selected values of L_o based on our previous experience and EPA reference. Intergovernmental Panel on Climate Change (IPCC) in its 2006 Guidelines for National Greenhouse Gas Inventories used k values for different types of waste. Our recommended values based on our previous project experience, the EPA document and the IPCC guidelines are summarized in Table 3 below.

Table 3. Recommended k and L_o Values for Wood Waste and Biosolids

Waste Type	L_o (m^3 methane/tonne)	Reference	K (yr^{-1})	Reference
Wood Waste	120	SHA[a]	0.02	IPCC[b]
Biosolids	75	EPA[c]	0.20	IPCC[b]

a: SHA previous Projects
b: 2006 IPCC Guidelines for National Greenhouse Gas Inventories
c: The Benefits of Anaerobic Digestion of Food Waste at Wastewater Treatment Facilities

Landfill Gas Collection Efficiency - A default value of 75% has been used
Project Emissions – Turned Compost (basic) option with Emission Factors of 0.09 tonnes CO_2e/tonnes of eligible waste for both CH_4 and N_2O was used.

2.3. GHG Emissions Reduction Quantification

Diversion of organic waste from landfilling results in a long-term methane generation avoidance, hence, GHG emissions reduction from the site. Therefore, the total GHG offset credits that can be claimed as a result of these composting activities are equivalent to the cumulative quantity of the methane emission avoidance that would occur in the following years. Net GHG offset credits are calculated taking into account methane collection and combustion efficiencies required by regulation (i.e. 75%), as well as GHG emissions that are resulted from project activities.

Based on the results on the Spreadsheet (Tool), RDMW is eligible to claim 430 tonnes of CO_2-e/year GHG emissions reduction through ex-ante methane generation avoidance as a result of the organic waste diversion and composting activities at 7 Mile Landfill in 2021. Table 4 and Figure 2 summarize the historical calculation Tool results for the 7 Mile landfill organic waste diversion and composting activities. Please note that previously calculated GHG emission reduction quantifications (i.e. 2010 to

2020) were based on different set of assumptions for biosolid methane generation potential. The 2021 calculations are based on new information that became available to SHA.

Table 4. Annual GHG Emissions Reduction Calculations Summary[1]

Year	Year Number	Total 100 year ex-ante carbon credits from diverted organics (tonnes CO_2-e)	Project Emissions (tonnes CO_2-e)	Net 100 year ex-ante carbon credits from diverted organics (tonnes CO_2-e)
2007	1	0	0	0
2008	2	0	0	0
2009	3	0	0	0
2010	4	1,370	273	1,097
2011	5	1,274	300	974
2012	6	1,380	404	976
2013	7	1,199	378	822
2014	8	1,120	337	783
2015	9	1,154	383	771
2016	10	1,256	443	813
2017	11	1,353	472	882
2018	12	1,513	529	983
2019	13	1,818	633	1,185
2020	14	1,668	618	1,050
2021	**15**	**923**	**493**	**430**
2022	16	0	0	0

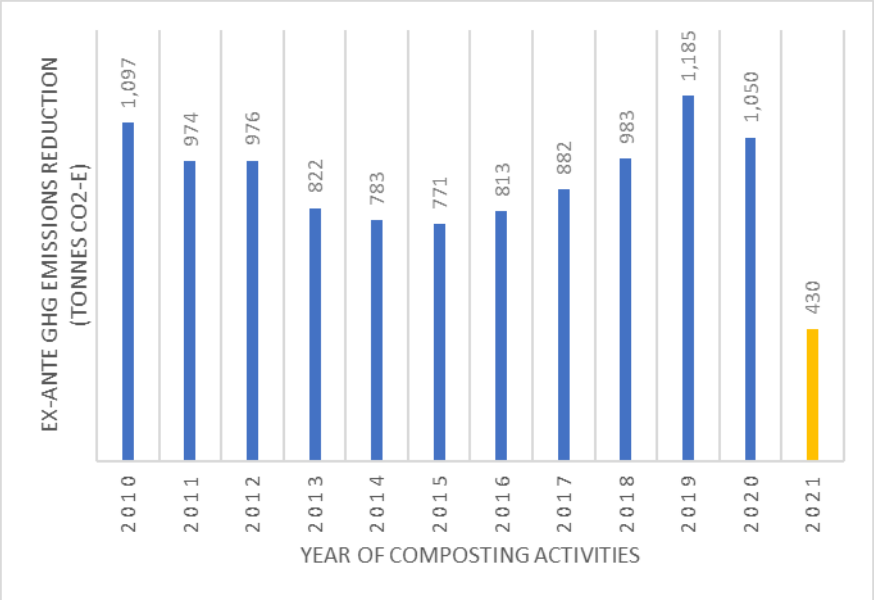

Figure 2. Annual GHG Emissions Reduction Calculations for 7 Mile Landfill Composting Project[1]

[1] The 2021 Modeling parameters revised based on new information acquired during the course of the current project

The Spreadsheet (Tool) has been presented in Appendix A and the Third-Party Verification Form is presented in Appendix B.

3. CONCLUSION AND RECOMMENDATIONS

The RDMW has been successfully implementing a unique organic waste management strategy at its 7 Mile landfill since 2010 resulting in landfill's airspace consumption optimization, methane generation avoidance, and methane emission reduction. The initiative includes diversion of wood waste from landfilling and use of the chipped wood as a matrix for composting biosolids (i.e., sewage sludge) from the six secondary sewage treatment plants in the region.

The produced compost is then used on site as a fabricated biocover media placed over the final surfaces of the landfill providing an enhanced environment for growth of methanotrophic bacteria (methanotrophs). Our previous studies at the 7 Mile landfill have shown that this biocover medium supports and maintains meaningful methanotrophic microbial populations that convert CH_4 to CO_2 while LFG diffuses or is advected through the cover.

Based on the acquired information regarding the quantity and quality of the composted material at the 7 Mile landfill in 2021, and the assumed methane generation potential for wood waste and biosolids received at this facility, we estimated that a methane generation avoidance equivalent to 430 tonnes of CO_2-e GHG has been achieved through the composting process at this site in 2021. Taking into account that we adopted a conservative approach in estimation of the 2021 GHG offset credits for composting of biosolids at 7 Mile landfill, we recommend a set of lab analysis for determination of a site-specific methane generation potential for the biosolids received at 7 Mile Landfill composting facility to be completed.

4. LIMITATIONS

This report has been prepared by Sperling Hansen Associates (SHA) on behalf of the Regional District of Mount Waddington (RDMW) following generally accepted engineering practices to a level of care and skill normally exercised by other members of the engineering and science professions currently practicing under similar conditions in British Columbia, subject to the time limits and financial and physical constraints applicable to the services.

The report, which specifically includes all tables and figures, is based on engineering analysis by SHA staff of data compiled during the course of the project. Except where specifically stated to the contrary, the information on which this study is based has been obtained from external sources including RDMW. This external information has not been independently verified or otherwise examined by Sperling Hansen Associates to determine its accuracy and completeness. Sperling Hansen Associates has relied in good faith on this information and does not accept responsibility of any deficiency, misstatements or inaccuracies contained in the reports as a result of omissions,

misinterpretation and/or fraudulent acts of the persons interviewed or contacted, or errors or omissions in the reviewed documentation.

The report is intended solely for the use of RDMW for the management of 7 Mile Landfill. Any use which a third party makes of this report, or any reliance on, or decisions to be made based on it, are the responsibilities of such third parties. Sperling Hansen Associates does not accept any responsibility for other uses of the material contained herein nor for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. Copying of this intellectual property for other purposes is not permitted.

The findings and conclusions of this report are valid only as of the date of this report. The interpretations presented in this report and the conclusions and recommendations that are drawn are based on information that was made available to Sperling Hansen Associates during this project. Should additional new data become available in the future, Sperling Hansen Associates should be requested to re-evaluate the findings of this report and modify the conclusions and recommendations drawn, as required.

Sperling Hansen Associates would like to thank the RDMW for the opportunity to review their application for the GHG credits for composting wood waste and biosolids at the 7 Mile Landfill.

Yours truly,

SPERLING HANSEN ASSOCIATES

Report prepared by:

Ali R. Abedini, Ph.D., P.Eng.
Senior Civil & Environmental Engineer
Landfill Gas Specialist

APPENDICES

APPENDIX A:

2021 spreadsheet for type 2 project-profile_compost 7 mile_SHA

landfill location Campbell River <-Enter Former Receiving Landfill

Lag time before start of gas production, lag =	0	years	*Note GHG credits are not seen till the following year*
Methane (density) - 1atm, 25C	0.6557	kg/m^3	(25C,SP)
Carbon dioxide (density)	1.7988	kg/m^3	(25C,SP)
Biosolids			
Methane Generation Rate, k =	0.2	<- Locked	
Gas Production potential, Lo =	75	m^3 CH4/tonn	
Wood Waste			
Methane Generation Rate, k =	0.02	<-Locked	
Gas Production potential, Lo =	120	m^3 CH4/tonne	

Notes:
Input values only in the shaded cells.
(1) If the landfill selected does not have a landfill gas collection system, input zero as the Collection Efficiency for each year.

Net Tonnes Diverted From Landfill

INSTRUCTIONS: Enter tonnes of organic waste diverted, project type, and LFG collection efficiency. (1)

Year	*Biosolids (tonnes)*	*Salvaged Wood& Yard Waste (tonnes)*	*Project type*	*Landfill Gas Collection Efficiency (%) (1)*
2007	0	0	1. DEFAULT - Turned Compost (basic	0%
2008	0	0	1. DEFAULT - Turned Compost (basic	0%
2009	0	0	1. DEFAULT - Turned Compost (basic	0%
2010	1048	466	1. DEFAULT - Turned Compost (basic	20%
2011	1075	590	1. DEFAULT - Turned Compost (basic	20%
2012	1331	912	1. DEFAULT - Turned Compost (basic	60%
2013	1104	995	1. DEFAULT - Turned Compost (basic	60%
2014	1317	557	1. DEFAULT - Turned Compost (basic	60%
2015	1338	788	1. DEFAULT - Turned Compost (basic	60%
2016	1661	801	1. DEFAULT - Turned Compost (basic	75%
2017	1857	764	1. DEFAULT - Turned Compost (basic	75%
2018	2051	890	1. DEFAULT - Turned Compost (basic	75%
2019	2504	1012	1. DEFAULT - Turned Compost (basic	75%
2020	1864	1567	1. DEFAULT - Turned Compost (basic	75%
2021	1675	1065	1. DEFAULT - Turned Compost (basic	75%
2022	0	0	1. DEFAULT - Turned Compost (basic	75%
2023	0	0	1. DEFAULT - Turned Compost (basic	75%
2024	0	0	1. DEFAULT - Turned Compost (basic	75%
2025	0	0	1. DEFAULT - Turned Compost (basic	75%
2026	0	0	1. DEFAULT - Turned Compost (basic	75%
2027	0	0	1. DEFAULT - Turned Compost (basic	75%
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2039	0	0	1. DEFAULT - Turned Compost (basic	75%
2040	0	0	1. DEFAULT - Turned Compost (basic	75%
2041	0	0	1. DEFAULT - Turned Compost (basic	75%
2042	0	0	1. DEFAULT - Turned Compost (basic	75%
2043	0	0	1. DEFAULT - Turned Compost (basic	75%

Year	*Total Landfill emissions avoided*	*Project emissions (e.g. composting)*	*Amount you can claim (tonnes)*	
2007	0.0	0.0	0.0	
2008	0.0	0.0	0.0	
2009	0.0	0.0	0.0	
2010	1369.7	272.5	1097.2	Previous Modeling Parameters
2011	1273.8	299.7	974.1	
2012	1380.2	403.7	976.4	
2013	1199.4	377.8	821.6	
2014	1119.9	337.3	782.6	
2015	1154.0	382.7	771.3	
2016	1255.9	443.2	812.8	
2017	1353.3	471.8	881.5	
2018	1512.5	529.4	983.1	
2019	1817.8	632.9	1184.9	
2020	1667.7	617.6	1050.1	
2021	922.9	493.2	429.7	new parameters
2022	0.0	0.0	0.0	
2023	0.0	0.0	0.0	
2024	0.0	0.0	0.0	
2025	0.0	0.0	0.0	
2026	0.0	0.0	0.0	
2027	0.0	0.0	0.0	
2028	0.0	0.0	0.0	
2029	0.0	0.0	0.0	
2030	0.0	0.0	0.0	
2031	0.0	0.0	0.0	
2032	0.0	0.0	0.0	

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The Labor Shortage Will Get Worse and May Last for Decades

By Megan Cassella Follow Updated Sept. 2, 2022 4:04 pm ET / Original Sept. 2, 2022 3:44 pm ET

Illustration by Guillem Casasus

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13 minutes

In the summer of 2020, Mike Zaffaroni, the owner of Liberty Landscape Supply in Jacksonville, Fla., needed to start staffing up to fulfill a pair of contracts to plant trees around the city. At first the hiring went relatively smoothly, but as fall approached, things started to change: A growing number of candidates were failing to make it to their scheduled interviews. He would sometimes expect 10 people, but only one would show. "It's one of the most alarming things I've seen in my working career," he says.

In the two years since, Zaffaroni has raised his starting wages by nearly 40%. He expanded his benefits program, shortened his interview process, and began considering a broader pool of workers, including those with limited experience or a spotty work history. But none of it has been enough: His 112-person company still has 19 current openings and few prospects to fill them.

Now, Zaffaroni is applying for a set of visas that would allow him to hire 10 foreign temporary workers next year—a first for his 15-year-old business. "I really think that's

the only way to solve the problem in the short term," Zaffaroni says. "Because I don't know that we're going to pull a whole bunch of workers back into the workforce."

As the labor market settles into a postpandemic normal, Zaffaroni is among millions of employers across the country still bending over backward to try to hire from a pool of workers that appears increasingly dry. In July alone, U.S. companies posted 11.2 million job openings for a market that has just six million unemployed workers to fill them, a vast disconnect that has been trending wider for more than a year. For all of the Great Resignation talk, the workforce has already surpassed its pre-Covid size—but the economy has continued to grow in the meantime, creating fresh waves of unquenchable demand.

Now, the hiring challenges that many expected would fade as the worst of the Covid shocks dissipated look less like a passing trend and more like a new reality. Economists warn that the U.S. is staring down what will become one of the biggest economic challenges of the next several decades: a permanent—or at least deeply entrenched—labor shortage. At its worst, the depleted workforce could sandbag productivity and economic growth, hinder the Federal Reserve's efforts to tame inflation, and even threaten the nation's status as a global superpower.

READ MORE

Going Long on the Tight Labor Market

Taming Inflation Will Put Americans Out of Work. Here's How Many.

4 Tips for Young, White-Collar Workers at Risk of Being Laid Off

Commentary: In Defense of Quiet Quitting

"I think a lot of companies are still like, 'We've got to make it through this little blip,' " says Ron Hetrick, a senior labor economist with Lightcast who led a 2021 economic report on the forthcoming workforce challenges called "The Demographic Drought." "And I'm like, 'Blip? Are you kidding?' "

Average annual growth of the U.S. prime working-age population is projected to slow sharply to just 0.2% over the next three decades, down from 1% average annual growth over the past 40 years. By 2100, as much as two-thirds of the country could be out of the workforce and financially dependent on the remaining one-third, according to an estimate from Hetrick and his co-authors. For companies, persistent labor shortages mean hobbled growth, and for consumers, fewer high-touch services and 24-hour or next-day options.

“It’s not just a matter of having to do more with less,” says Zaffaroni, the landscape-supply company owner. “It’s having less, and doing less, and productivity actually dropping because you don’t have those resources.”

Mike Zaffaroni’s 112-person Liberty Landscape Supply still has 19 current openings and few prospects to fill them. Photograph by Malcolm Jackson

The concern that the U.S. would one day run short on workers has been circulating for decades, as economists braced for baby boomers to begin retiring around 2010. As far back as 2001, the Federal Reserve Bank of Boston organized a conference focused entirely on the economic impact of demographic change, which included research that found the country would need a 40% jump in labor productivity by the mid-2030s just to maintain then-current living standards.

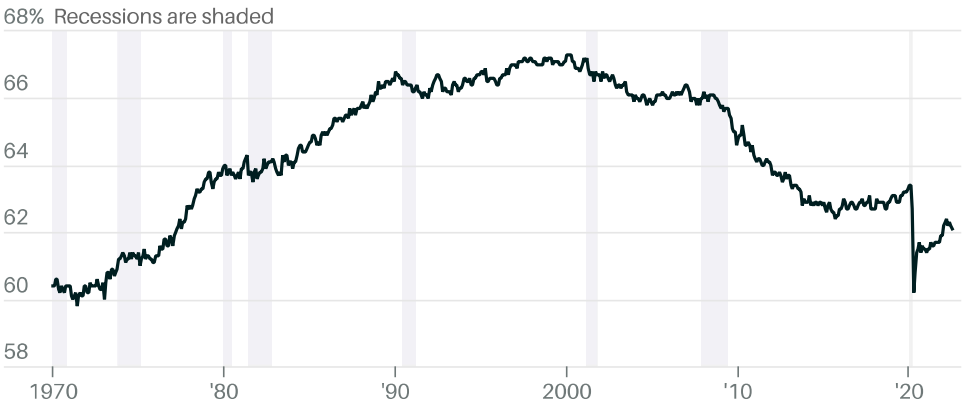
But since those early warnings, two phenomena have emerged, seemingly tailor-made to take the situation from bad to worse. The first was that net immigration began to fall, peaking in 2016 before entering a slide it has yet to recover from, eating away at the usual influx of both highly educated scientists and engineers and manual laborers.

A handful of factors drove the decline. U.S. border enforcement increased at the same time that economic development in Mexico and Central America meant that fewer people there were looking to leave the region, says Giovanni Peri, a labor economist with the University of California, Davis. A shift in immigration policy and rhetoric under President Donald Trump—including lower caps on refugees and a litany of attacks on the H-1B visa program, which provides green cards for highly skilled workers—also contributed.

Recipe for a Shortage

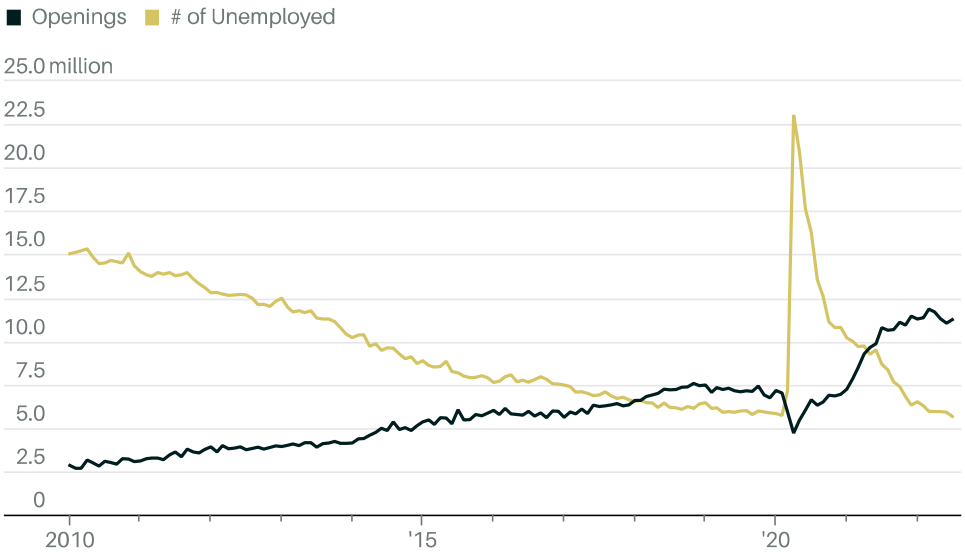
The current workforce crisis has been decades in the making, and owes its stickiness to a collision of demographic, economic, and geopolitical factors.

The labor-force participation rate has been on the downswing since 2000.



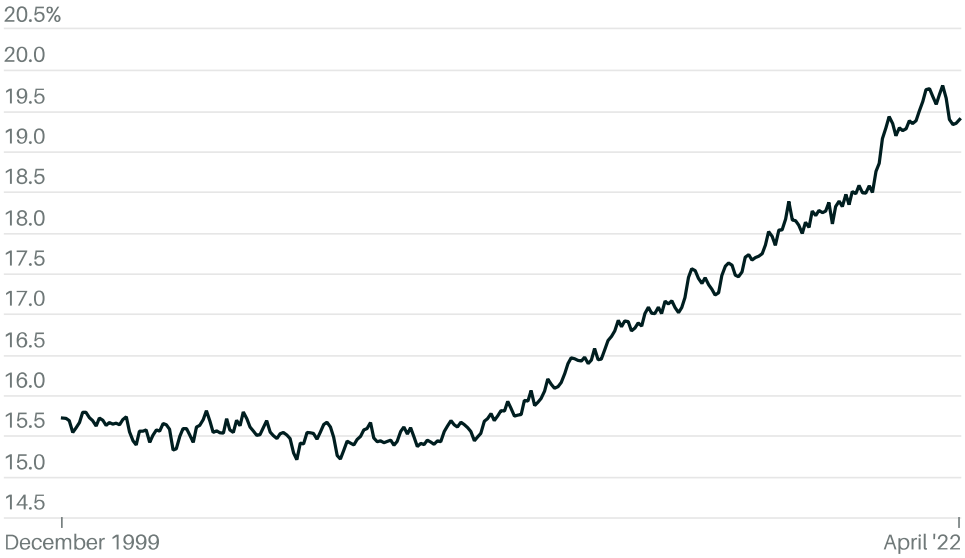
Note: percent, monthly, seasonally adjusted
Source: Department of Labor data, accessed via Federal Reserve Bank of St. Louis

Job openings have risen.



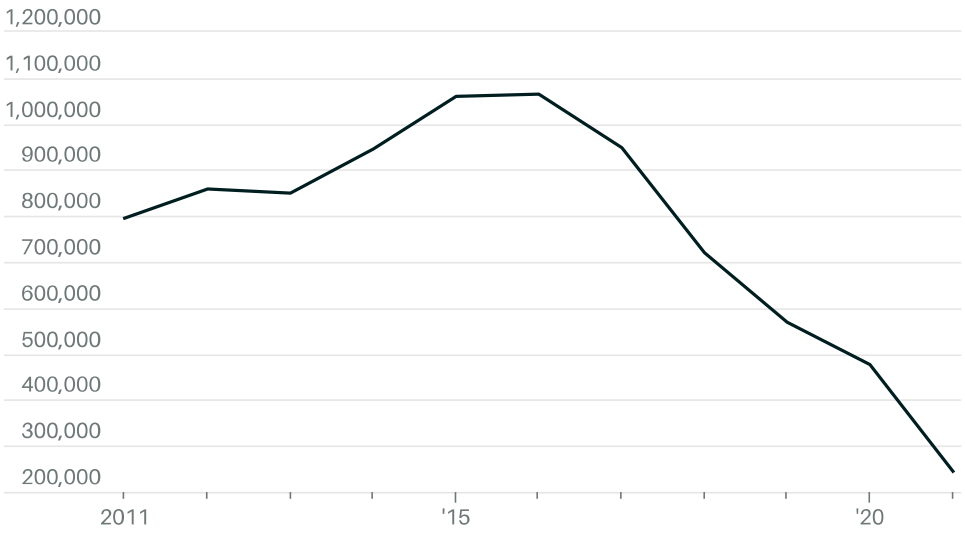
Source: Department of Labor data, accessed via Federal Reserve Bank of St. Louis

Retirees as a % of the population has climbed.



Sources: U.S. Census Bureau and calculations by the Federal Reserve Bank of Kansas City

Immigration to the U.S. has declined.



Note: Data for fiscal year ended June; includes armed forces movement.
Source: U.S. Census Bureau

Then came Covid. As the pandemic drove up the death rate and dragged down the birthrate, it inflamed the pre-existing demographic trends: From July 2020 to July 2021, the U.S. population grew just 0.12%, according to an analysis of U.S. Census Bureau data by demographer and Brookings Institution senior fellow William Frey—the lowest annual rate since World War I.

The virus also hit the workforce on other fronts: Kansas City Fed researchers estimate there were 2.1 million "excess" retirements during the pandemic, meaning those above the expected trend. And as more Americans have stayed home for reasons ranging from long Covid to caretaking responsibilities, the labor-force participation rate has dropped from 63.4% just before the pandemic to 62.4% in August, the Department of

Labor said on Friday; the agency forecasts that the rate will slide to 60.4% by the end of this decade.

Covid exacerbated the immigration problem, too. The combination of closed borders and shutdowns at U.S. consulates overseas led to massive visa backlogs that remain today, pushing net migration to its lowest level in decades. Peri's research found that by the end of 2021, there were roughly two million fewer working-age immigrants in the U.S. than there would have been had prepandemic trends continued, half of which would have been in highly educated science, technology, engineering, and math, or STEM, fields.

Illustration by Guillem Casasús

“When we look at the trend lines, and the difficulty that we’re going to have getting the workforce participation rate back to where it was even prepandemic—the demographic trends and the shortfalls in legal immigration—we think all of that kind of points to this being a long-term challenge for the American economy,” says Neil Bradley, chief policy officer with the U.S. Chamber of Commerce.

The Chamber is among a growing chorus of major businesses, lobbying groups, and economists calling on lawmakers to take steps to ease the labor crisis, with proposals for comprehensive child-care, federal investments in job training and reskilling, and a host of other policies. But some of the loudest calls are for Congress to find ways to boost legal immigration, either by raising the annual cap on temporary work visas or passing wholesale reforms to offer more pathways into the U.S.

Immigration has been thrust to the forefront because many employers see it as the most efficient way to increase the pool of workers quickly and substantially. (Efforts to increase the domestic birthrate, for example, would be of little help to them for another 20 or so years.) Foreign-born workers also play an outsize role in specific industries that, without substantial policy changes, could face a crisis in the coming years.

Take healthcare. As of 2018, immigrants constituted 17% of the overall U.S. workforce but 38% of home health aides, according to the Migration Policy Institute. And the Bureau of Labor Statistics sees the home health-aide industry growing by 33% from 2020 to 2030—a spike driven by the aging population. Already, however, the healthcare and social-assistance industry has nearly two million unfilled jobs and, at 8.8%, one of the highest rates of open jobs anywhere in the economy.

“You have not only a retiring population, but a retiring population that really needs advanced services…that an immigrant typically fills,” says Hetrick, the “Demographic Drought” economist. “They’re just not there, at the time when we probably need them more than ever.”

Construction is another sore spot. In July, there were 375,000 job openings in the industry for 359,000 unemployed construction workers, Department of Labor data show. And that’s poised to balloon: McKinsey estimates that the Bipartisan Infrastructure Law, which Congress passed in November, could create 300,000 to 600,000 new jobs a year for the next decade. Failing to meet that demand will hold back progress on modernizing the country’s infrastructure—which the Biden

administration has argued is necessary for easing supply-chain issues—and on replenishing the U.S. housing supply, where lack of availability is keeping rent and shelter costs elevated.

But the situation is perhaps most damaging in STEM professions because of the impact that innovation has on U.S. productivity and broader economic growth—and because of the way foreign-born workers dominate these fields. Immigrant students receive more than half of all master's degrees and 44% of all doctorates in STEM fields, the Congressional Research Service found in 2019. And despite headlines about tech layoffs or hiring freezes, the industry remains desperate for skilled workers: On the job-search site Indeed, postings in software development alone are up 92% since February 2020, while listings in industrial, civil, and electrical engineering are all up roughly 80% during the same period. Overall, the Department of Labor estimates that the STEM sector will need 1.1 million additional workers by 2030.

Leaving these positions vacant hurts more than just the tech industry. Peri cited research out of the University of California, Berkeley, that finds that every new job in high-skill fields, including STEM, creates 2.5 more jobs for the local economy. "From an economic point of view, this is the driver of American productivity," he says. "The shortages in this group will generate, eventually, smaller economic growth for everybody else."

Liberty Landscape Supply is looking to hire foreign temporary workers.
Photograph by Malcolm Jackson

Opening the immigration spigots would require significant action from Congress on an issue that lawmakers have failed to address in a comprehensive way since 1986, when President Ronald Reagan granted amnesty to nearly three million people. Since then, President Barack Obama used executive power in 2012 to offer work permits and renewable deportation deferrals to undocumented immigrants who arrived in the U.S. as children. But the last attempt at broad reform came in 2013, when the Senate's "Gang of Eight" passed a sweeping bill that died in the Republican-led House.

In the absence of wholesale reform, advocacy groups are pushing for a piecemeal approach, including creating a pathway to citizenship for undocumented workers, raising visa caps on a temporary basis, and better securing the border, in part to win participation from lawmakers focused on illegal immigration. They're forming alliances and pressing Congress to make progress on immigration, working to make an economic case on an issue that has become a political third rail.

In the interim, some companies that rely on immigrant labor are taking their own steps to lure workers. Meat processor Tyson Foods (ticker: TSN), which made headlines early in the pandemic when it was forced to close several plants due to Covid-19 outbreaks, has 120,000 U.S. employees who hail from 160 different countries and speak 50 different languages. Some are permanently in the U.S., while others are on temporary work visas.

Over the past year, Tyson has spent an additional roughly $500 million on wage increases and bonuses for its front-line workers; the company says its average hourly pay is now more than $18, or $24 including benefits. But it isn't just about wages: To increase the availability of workers, the company also helps employees with child-care, housing, and transportation. It has programs to pay for employees' education, offers immigration-related legal services, and provides free medical care at its own health centers. And it holds regular conversations with elected officials on ways to update the country's immigration system and provide pathways to citizenship.

"Pay and benefits are still at the top of the list, but in my view, they're table stakes," says Hector Gonzalez, Tyson's head of labor and team-member relations. "Employers have to go beyond that."

But there is a limit to just how much help the company can provide to workers who need things like permanent work authorization that only Congress could provide, says Gonzalez: "We can't do it alone."

Nicholas Jasinski contributed reporting to this article.

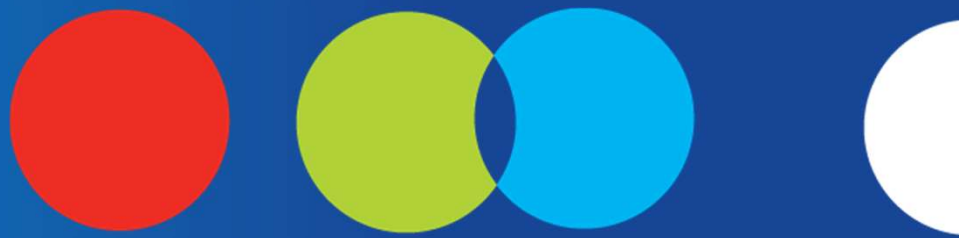
Write to Megan Cassella at megan.cassella@dowjones.com

The Conference Board of Canada

Canada's Labour Market

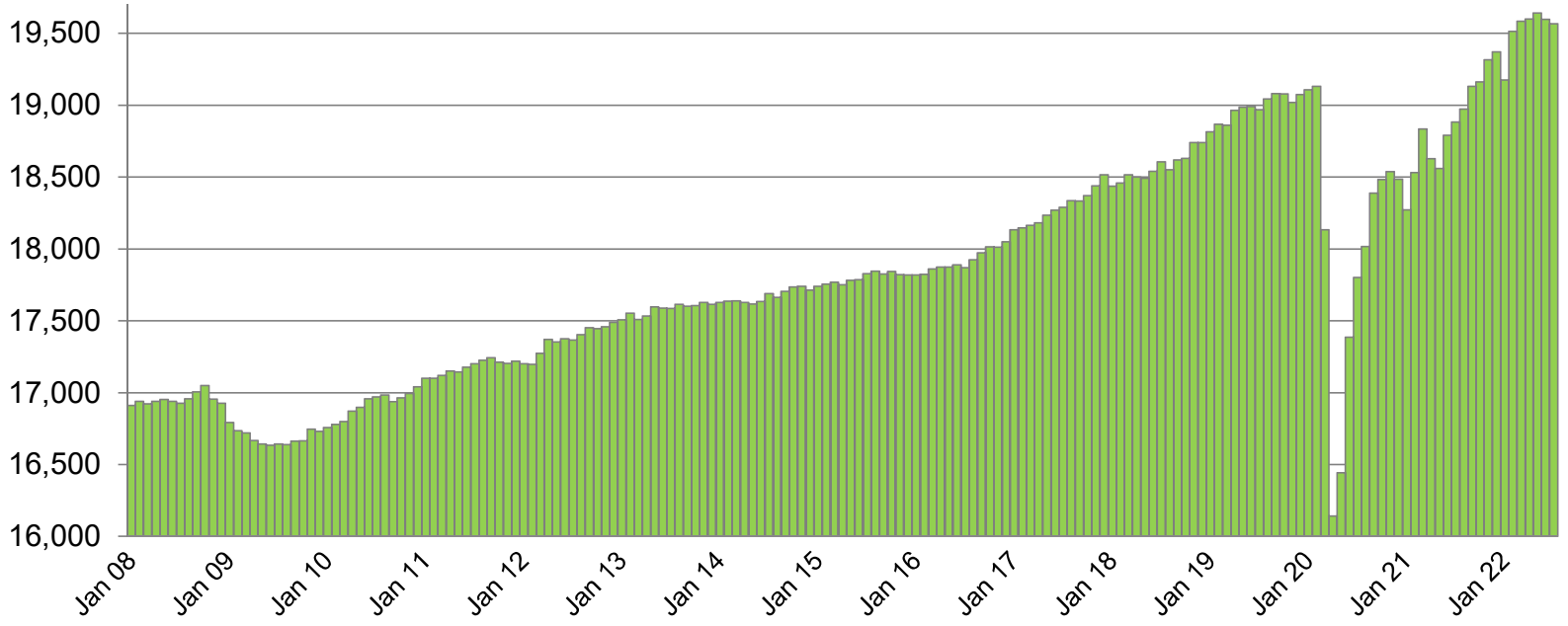
Stretched to the Brink

Pedro Antunes, Chief Economist



Employment Recovers

Canada's employed, thousands

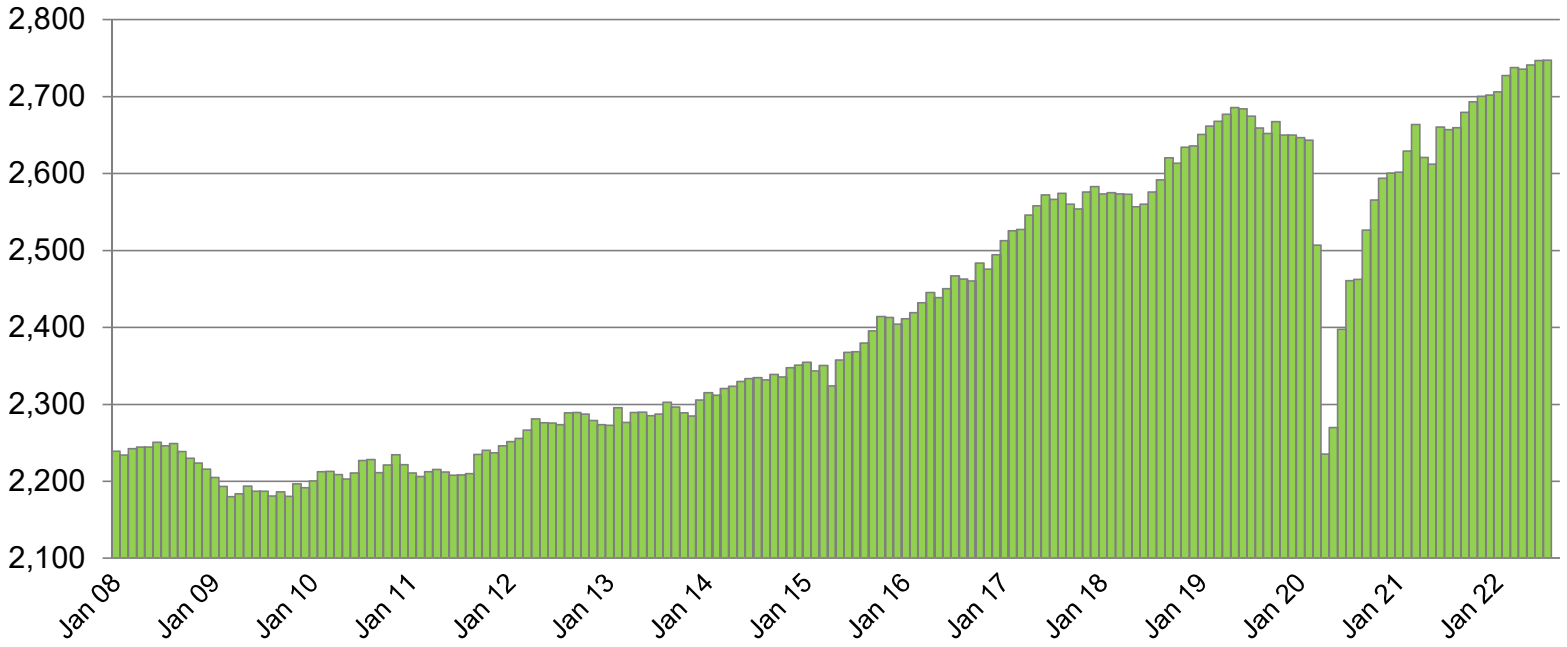


Source: Statistics Canada Table: 14-10-0287-01.

The Conference Board of Canada

Growth Rekindled in British Columbia

British Columbia's employed, thousands

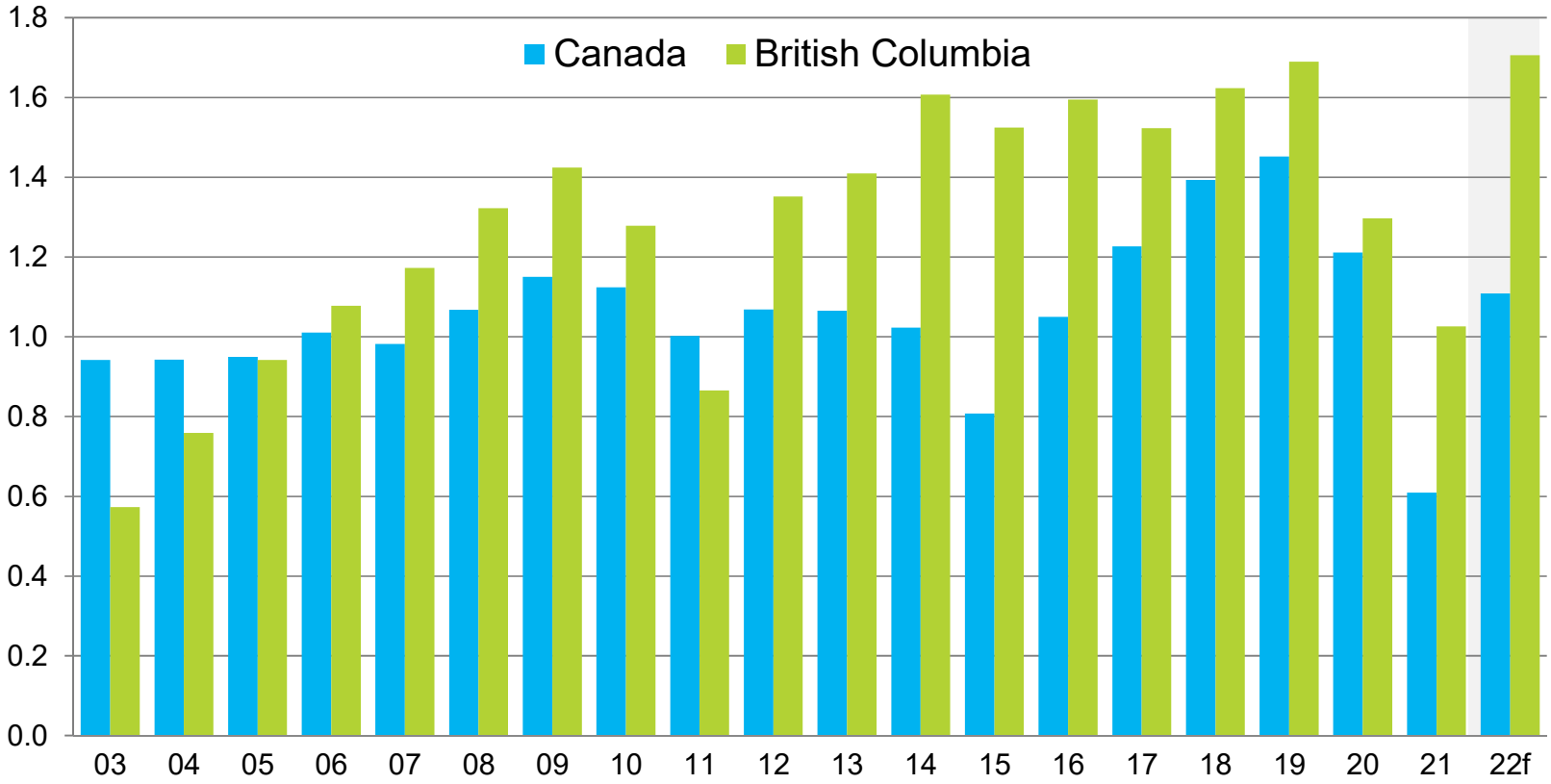


Source: Statistics Canada Table: 14-10-0287-01.

The Conference Board of Canada

COVID-19 put a Halt to Immigration

annual population growth

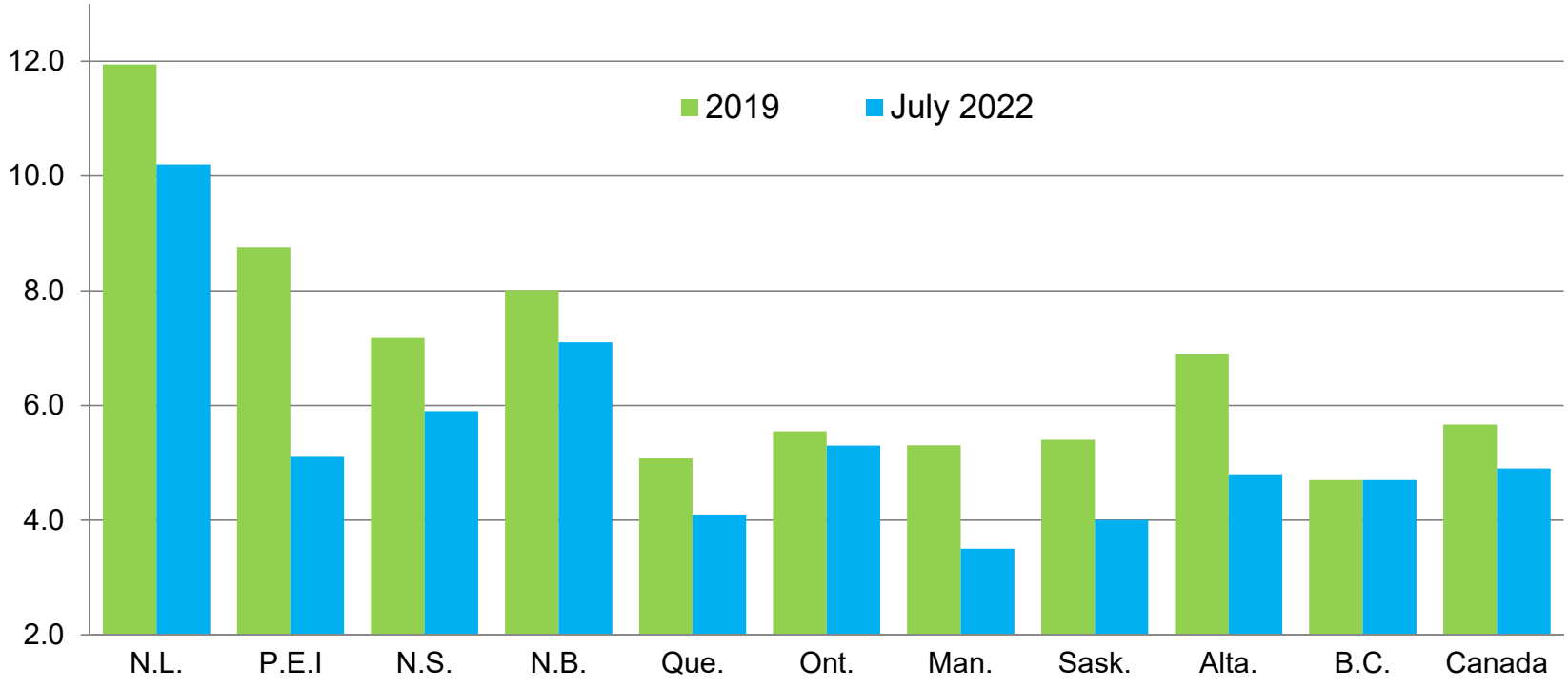


Sources: Statistics Canada; The Conference Board of Canada.

The Conference Board of Canada

Labour Markets as Tight as Ever in Most Provinces

Unemployment rates by province, per cent



Source: Statistics Canada Table: 14-10-0287-01.

The Conference Board of Canada

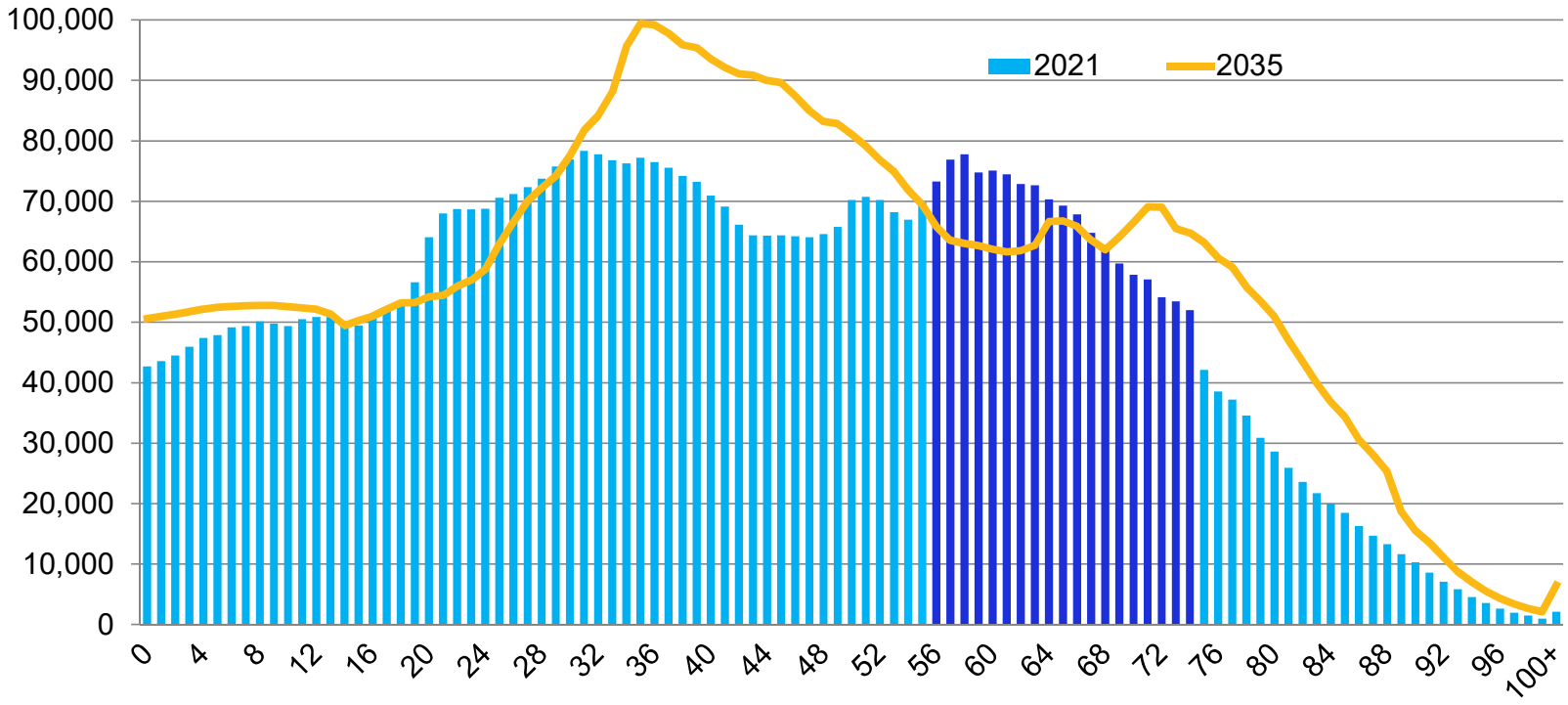
Job Vacancies On the Rise Across the Board

Selected job vacancies in British Columbia,
number of vacancies and per cent change from 2019 to 2022Q1

	Average 2019	2022 Q1	per cent change
Total, all occupations	101,615	149,190	46.8
Business, finance and administration occupations	9,626	14,570	51.4
Health occupations	5,366	9,695	80.7
Occupations in education, law and social, community and government services	6,150	10,010	62.8
Trades, natural resources and manufacturing	28,492	43,010	51.0
Sales and service occupations	36,425	50,910	39.8

Sources: Statistics Canada Table 14-10-0356-01; The Conference Board of Canada.

BC's Population distribution by age, 2021 and 2035

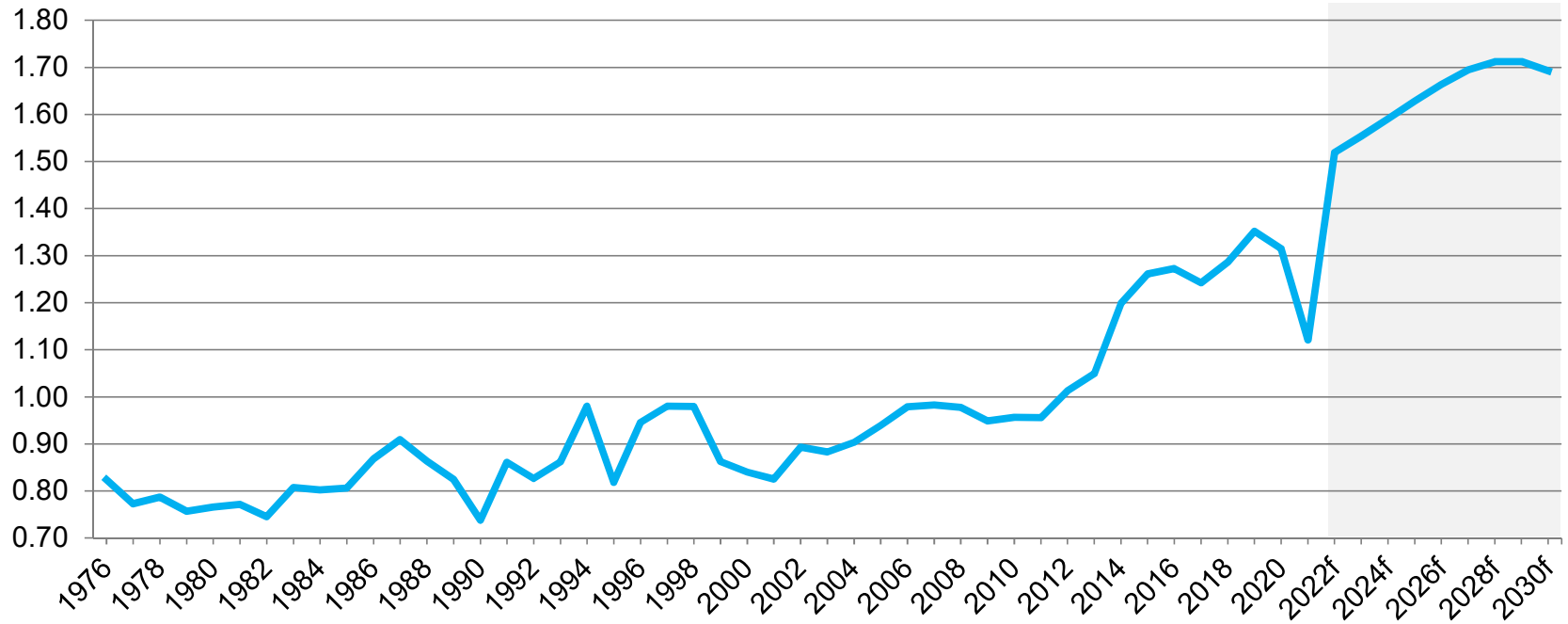


Sources: Statistics Canada; The Conference Board of Canada.

The Conference Board of Canada

2022—The Year of the Retiree

retirements as a share of labour force, Canada, per cent



Sources: Statistics Canada; The Conference Board of Canada.

The Conference Board of Canada

The Conference Board of Canada

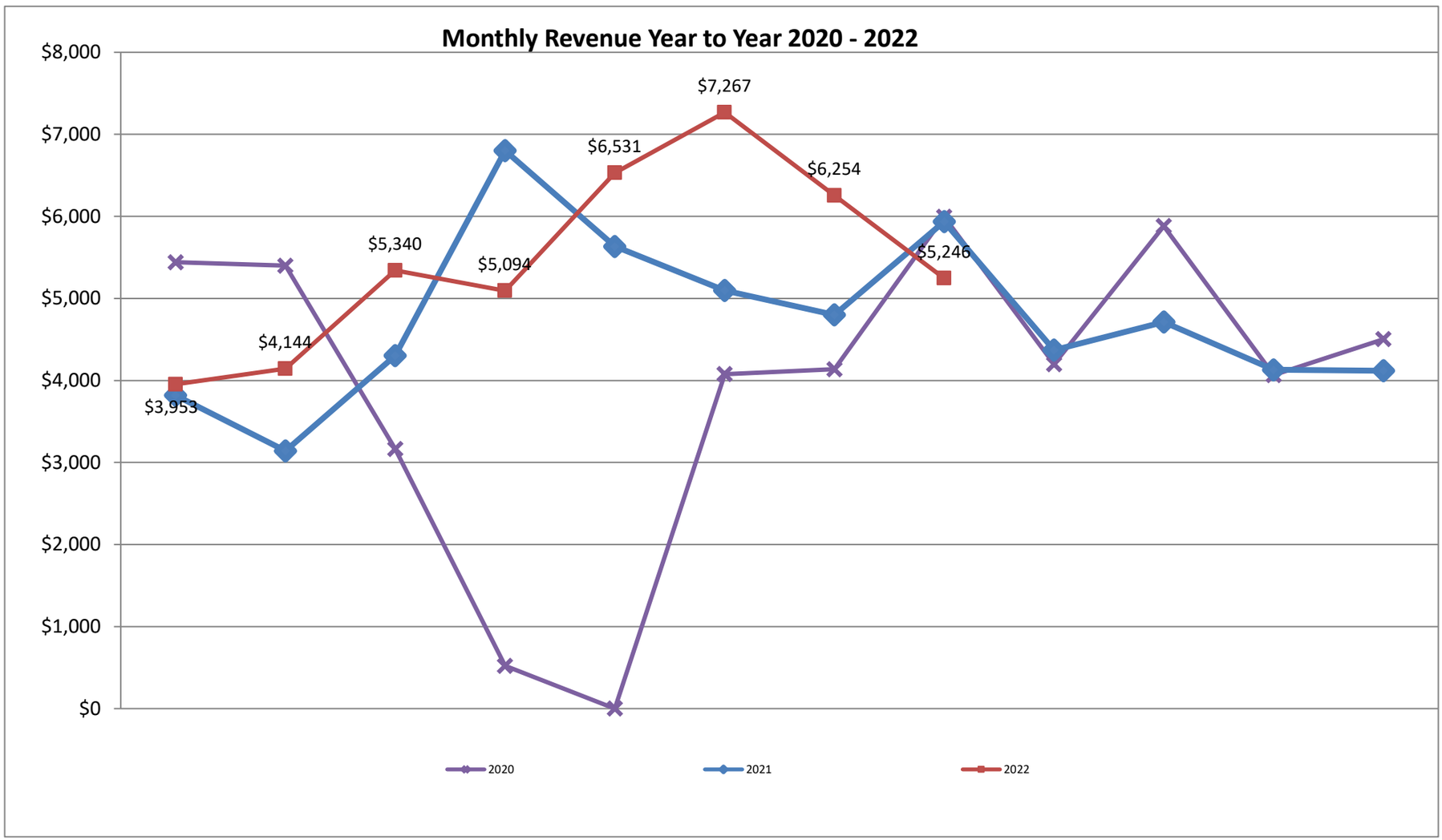
conferenceboard.ca

2022 Volunteer Transportation Network/HandyDart Trip Summary

Month	Total Trips	Total Clients	Lift Van	Community - Trips (T) /Clients (C)														Int w/ Transit	HandyDART				Int w/ VTN
				Port Hardy		Port McNeill		Alert Bay		Malcolm Island		Woss		Fort Rupert		Port Alice			Port Hardy		Port McNeill		
				T	C	T	C	T	C	T	C	T	C	T	C	T	C		AM	PM	AM	PM	
January	30	72	4	2	2	16	35	0	0	1	1	3	26	0	0	8	8	0	0	0	0	0	1
February	26	64	5	0	0	11	23	0	0	0	0	5	31	0	0	10	10	0	0	0	0	0	0
March	34	79	4	2	2	14	26	0	0	0	0	5	38	0	0	13	13	0	0	2	0	0	0
April	32	89	5	1	1	13	29	0	0	0	0	6	47	0	0	12	12	0	0	0	2	0	0
May	35	155	5	1	1	17	39	0	0	0	0	8	106	0	0	7	7	0	0	0	1	0	0
June	21	61	6	0	0	14	30	0	0	0	0	4	27	0	0	3	4	0	0	0	2	0	0
July	32	120	1	1	1	18	65	0	0	0	0	2	36	0	0	11	18	0	1	0	6	2	0
August	15	62	7	2	2	10	37	0	0	0	0	3	23	0	0	0	0	1	0	1	7	4	0
September	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
October	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
November	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
TOTAL	225	702	37	9	9	113	284	0	0	1	1	36	334	0	0	64	72	1	1	3	18	6	1
Riders/trip		3.1			1.0		2.5		0		1.0		9.3		0		1.1	1.0					
Projected	*338*	*1053*	*56*	*14*	*14*	*170*	*426*	*0*	*0*	*2*	*2*	*54*	*501*	*0*	*0*	*96*	*108*	*2*	*2*	*5*	*27*	*9*	*2*
Change	*9%*	*44%*	*79%*	*-44%*	*-44%*	*23%*	*81%*	*-100%*	*-100%*	*-50%*	*-75%*	*-30%*	*27%*	*-100%*	*-100%*	*45%*	*64%*	*-25%*	*0*	*-10%*	*59%*	*800%*	*0*

Average Monthly Revenue

	2020	2021	2022	
August	$5,995	$5,936	$5,246	
Annual	$47,386	$56,853	*$65,744*	*Projected*
Change	-29.0%	20.0%	*15.6%*	*Projected*



Mount Waddington Transit Revenue Trends

2022

Revenue Source	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year to Date	*Projected*
Farebox	$1,767	$1,566	$2,127	$1,615	$2,110	$2,512	$2,526	$2,576	$0	$0	$0	$0	$16,800	*$25,199.25*
Ticket Sales	$126	$63	$788	$872	$1,313	$2,258	$1,313	$0	$0	$0	$0	$0	$6,731	*$10,096.50*
Pass Sales	$480	$935	$846	$1,028	$1,528	$918	$835	$1,090	$0	$0	$0	$0	$7,658	*$11,487.00*
BC Bus Passes	$1,580	$1,580	*$1,580*	*$1,580*	*$1,580*	*$1,580*	*$1,580*	*$1,580*	$0	$0	$0	$0	$12,641	*$18,960.84*
Total	$3,953	$4,144	$5,340	$5,094	$6,531	$7,267	$6,254	$5,246	$0	$0	$0	$0	**$43,829**	***$65,743.59***

**estimate/average*

Projected: *15.6%*

2021

Revenue Source	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year to Date
Farebox	$1,934	$1,386	$1,706	$2,276	$1,838	$2,235	$2,542	$2,366	$2,201	$2,237	$1,934	$2,063	$24,718
Ticket Sales	-$126	$0	$126	$2,426	$1,764	$672	$525	$1,575	$0	$0	$0	$0	$6,962
Pass Sales	$886	$731	$1,283	$887	$846	$975	$465	$809	$694	$1,001	$929	$788	$10,290
BC Bus Passes	$1,124	$1,025	$1,186	$1,213	$1,186	$1,213	$1,268	$1,187	$1,474	*$1,474*	*$1,267*	*$1,267*	$14,884
Total	$3,818	$3,142	$4,301	$6,801	$5,634	$5,095	$4,800	$5,936	$4,369	$4,712	$4,129	$4,117	**$56,853**

**estimate/average*

20.0%

2020

Revenue Source	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year to Date
Farebox	$2,681	$2,372	$1,296	$281	$0	$2,169	$2,426	$1,734	$1,725	$1,940	$1,648	$1,678	$19,951
Ticket Sales	$1,008	$819	$0	$0	$0	$84	$0	$2,184	$0	$1,418	$0	$903	$6,416
Pass Sales	$538	$940	$470	$240	$0	$397	$496	$475	$1,074	$1,153	$991	$464	$7,235
BC Bus Passes	$1,216	$1,268	$1,399	$0	$0	$1,427	$1,216	$1,603	$1,399	$1,372	$1,426	$1,459	$13,785
Total	$5,442	$5,399	$3,165	$521	$0	$4,077	$4,138	$5,995	$4,198	$5,882	$4,065	$4,504	**$47,386**

**estimate/average*

Cash and passes were sold in March, but returned after cutoff date for March Reports

No collection of fares (COVID-19) from March 21 - May 31

-29.0%

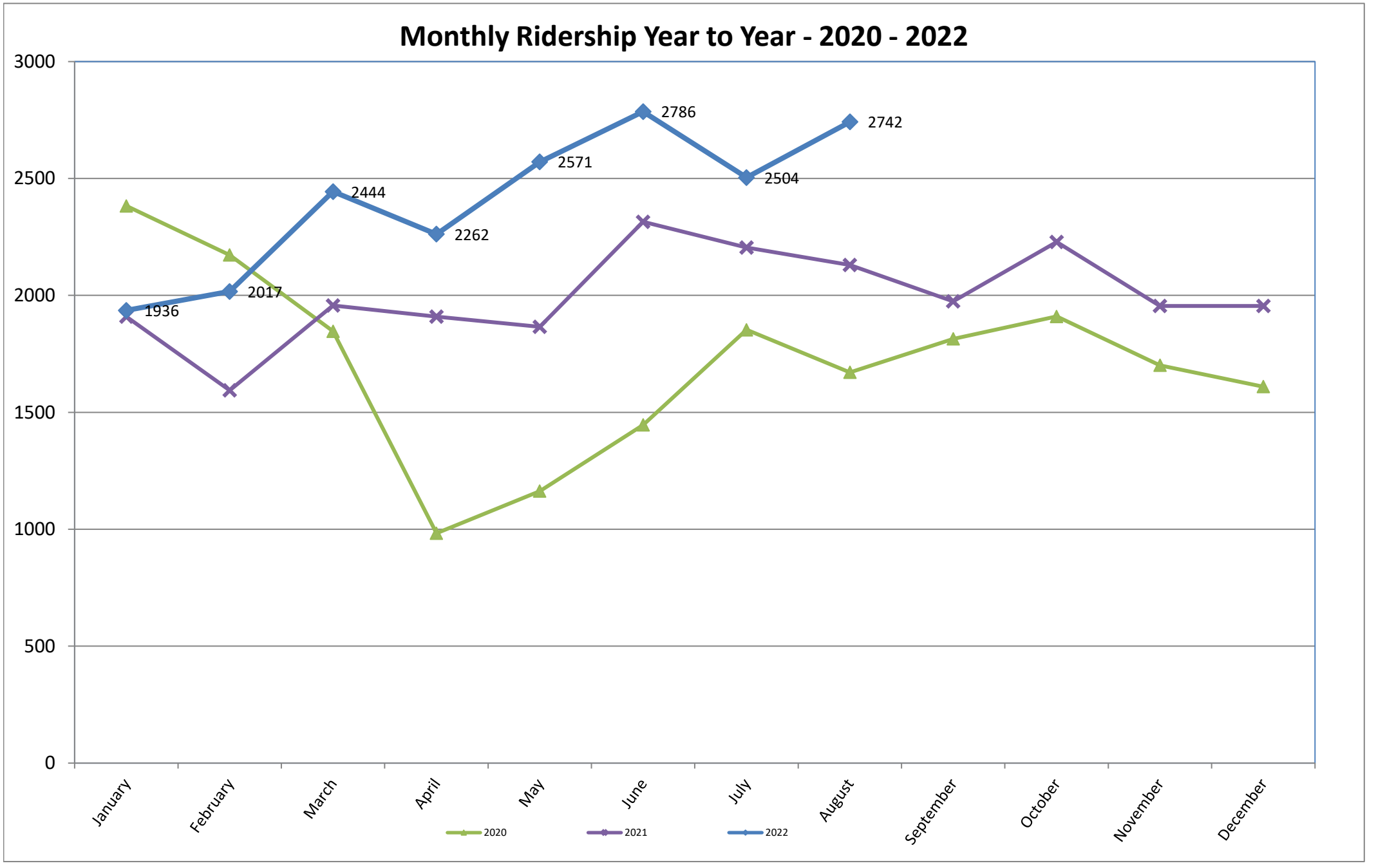
2019

Revenue Source	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Farebox	$3,017	$2,814	$2,922	$3,154	$3,115	$2,841	$3,385	$3,027	$2,456	$2,866	$2,827	$2,577	$35,002
Ticket Sales	$32	$1,780	$84	$432	$2,879	$189	$262	$52	$53	$63	$126	$568	$6,518
Pass Sales	$746	$1,142	$1,054	$976	$538	$913	$834	$674	$417	$736	$532	$866	$9,426
BC Bus Passes	$1,083	$1,186	$1,265	$1,265	$1,369	$1,370	$1,344	$1,345	$1,345	$1,397	$1,448	$1,424	$15,840
Total	$4,878	$6,922	$5,324	$5,826	$7,900	$5,313	$5,825	$5,097	$4,270	$5,062	$4,933	$5,435	**$66,786**

-6.0%

Average Passengers per Month:

	2020	2021	2022	
July	1671	2130	*2742*	
Annual	20554	23999	*28893*	*Projected*
Change	-26%	17%	*20%*	*Projected*



Mount Waddington Transit Ridership Trends

2022	January	February	March	April	May	June	July	August	September	October	November	December	2022 Total	*Projected 2022 Total*
Route 1 to Port McNeill	375	384	497	441	487	550	506	577					3817	*5726*
Route 1 Saturdays	0	0	0	10	9	9	8	15					51	*77*
Route 2 to Port Hardy	500	515	587	578	663	634	467	516					4460	*6690*
Route 2 Saturdays	0	0	0	9	5	15	11	4					44	*66*
Route 4-Ft Rupert	350	342	439	401	485	526	468	396					3407	*5111*
Route 4-Airport Extension	3	11	11	12	17	20	9	13					96	*144*
Route 5-Coal Harbour/Quatsino	351	404	539	395	470	565	543	682					3949	*5924*
Route 5-Coal Harbour Saturdays	13	18	27	20	39	27	30	35					209	*314*
Route 6-Woss/Mount Cain	16	14	18	-	-	-	-	-					48	*72*
Route 11-PH Local	160	181	192	244	268	281	249	297					1872	*2808*
Route 12-PM Local	168	148	132	150	127	157	204	195					1281	*1922*
HandyDART-PH	0	0	2	0	0	0	1	1					4	*6*
HandyDART-PM	0	0	0	2	1	2	8	11					24	*36*
2022 Monthly Total	1936	2017	2444	2262	2571	2786	2504	2742	0	0	0	0	19262	*28893*

2021	January	February	March	April	May	June	July	August	September	October	November	December	2021 Total
Route 1 to Port McNeill	364	326	418	416	344	432	425	380	375	470	386	400	4736
Route 1 Saturdays	0	0	0	7	2	20	17	1	8	12	12	0	79
Route 2 to Port Hardy	500	388	483	531	497	629	443	426	527	654	543	470	6091
Route 2 Saturdays	0	0	0	6	14	12	21	22	6	15	6	0	102
Route 4-Ft Rupert	245	252	301	327	316	440	418	401	298	312	354	342	4006
Route 4-Airport Extension	0	0	2	6	9	4	28	19	3	6	1	3	81
Route 5-Coal Harbour/Quatsino	408	267	346	291	367	442	508	563	436	429	310	392	4759
Route 5-Coal Harbour Saturdays	44	17	31	6	47	21	36	41	21	35	29	27	355
Route 6-Woss/Mount Cain	23	24	19	-	-	-	-	-	-	0	-	22	88
Route 11-PH Local	183	200	210	211	172	205	169	142	180	165	165	162	2164
Route 12-PM Local	139	117	144	108	98	110	139	133	115	127	146	133	1509
HandyDART-PH	1	1	2	0	0	0	1	1	1	0	0	0	7
HandyDART-PM	2	2	1	0	0	0	0	1	5	4	3	4	22
2021 Monthly Total	1909	1594	1957	1909	1866	2315	2205	2130	1975	2229	1955	1955	23999

2020	January	February	March	April	May	June	July	August	September	October	November	December	2020 Total
Route 1 to Port McNeill	486	421	400	171	212	273	305	296	365	385	301	287	3902
Route 1 Saturdays	0	0	0	7	8	17	8	20	10	13	7	0	90
Route 2 to Port Hardy	519	425	342	135	190	230	325	265	333	398	370	308	3840
Route 2 Saturdays	0	0	0	5	7	4	15	25	14	12	12	0	94
Route 4-Ft Rupert	368	361	299	218	253	310	400	323	284	295	252	267	3630
Route 4-Airport Extension	7	8	4	0	0	0	0	4	0	0	3	1	27
Route 5-Coal Harbour/Quatsino	515	484	440	244	261	386	488	446	444	462	402	425	4997
Route 5-Coal Harbour Saturdays	34	38	25	24	35	24	51	38	54	48	18	24	413
Route 6-Woss/Mount Cain	42	59	32	-	-	-	-	-	-	0	-	13	146
Route 11-PH Local	186	181	144	50	87	85	129	132	153	163	189	161	1660
Route 12-PM Local	211	178	151	129	106	117	132	122	155	134	147	123	1705
HandyDART-PH	4	10	6	0	4	0	0	0	1	0	0	1	26
HandyDART-PM	11	8	4	0	0	0	0	0	1	0	0	0	24
2020 Monthly Total	2383	2173	1847	983	1163	1446	1853	1671	1814	1910	1701	1610	20554

7-MILE LANDFILL MONTHLY TONNAGE SUMMARY FOR August 2022

MONTH	8	PROJECTIONS NOT SEASONALLY ADJUSTED				
MATERIALS MANAGED IN THE LANDFILL AREA - TONNES	August 1 to August 31 (2022)	2022 UP TO August 31, 2022	PRO-RATED ANNUAL PROJECTION	BUDGET ANNUAL PROJECTION	VARIANCE	% WASTE STREAM
LANDFILL	767.42	5314.97	7972	7000	13.9%	64%
GENERAL REFUSE FROM BELLA BELLA	47.58	317.24	476	464	2.6%	4%
GENERAL REFUSE FROM KLEMTU	10.38	73.66	110	136	-18.8%	1%
GENERAL REFUSE FROM WUIKINUXV	1.51	2.77	4			
OTHER MATERIAL LANDFILLED FROM OUTSIDE OF RDMW	0.00	0.00	0	100		0%
FEE EXEMPT PUBLIC CLEANUP (***NOT ACCOUNTED IN LANDFILL TONNAGE***)	3.33	13.83	20.74	100	-79.3%	0%
VOLUME BASED LOADS CONVERTED TO TONNES	0.00	8.01	12			
TOTAL AMOUNT SENT TO ACTIVE LANDFILL FACE	**830.22**	**5722.47**	**8583.70**	**7800.00**		
RECYCLABLES AND STEWARDSHIP MATERIALS DIVERTED AT LANDFILL FACE	0.00	0.00	0	50	-100.0%	0%
WOODWASTE DIVERTED AT LANDFILL FACE	0.00	12.56	19	200	-90.6%	0%
METAL DIVERTED AT LANDFILL FACE	2.07	14.94	22	50	-55.2%	0%
OTHER MATERIALS DIVERTED AT LANDFILL	0.00	0.00	0	200	-100.0%	0%
TOTAL AMOUNT OF MATERIAL DIVERTED AT THE ACTIVE LANDFILL FACE	**2.07**	**27.50**	**41.25**	**500.00**	-91.8%	
TOTAL AMOUNT ACTUALLY LANDFILLED	**828.15**	**5694.97**	**8542.45**	**7300.00**	17.0%	
MATERIALS DIVERTED FROM THE LANDFILL - TONNES						
TOTAL AMOUNT OF MATERIAL DIVERTED AT THE ACTIVE LANDFILL FACE	2.07	27.50	41	500	-91.8%	0%
OUTBOUND METAL	0.00	332.61	499	150	232.6%	4%
SALVAGED MATERIALS	0.05	29.80	45	5	794.0%	0%
CREOSOTE LOGS	0.00	0.00	0	5	-100.0%	0%
PAPER/WAX CARDBOARD - COMPOSTABLE	0.00	0.00	0	250	-100.0%	0%
WOODWASTE FOR CHIPPING AT $25/TONNE	95.90	816.17	1224	500	144.9%	10%
COMPOSTABLE MATERIALS	130.27	1102.96	1654	1100	50.4%	13%
FINE GARDEN WASTE (NO CHARGE)	0.95	5.73	9	100	-91.4%	0%
RECYCLED MATERIALS	7.53	78.56	118	700	-83.2%	1%
ASPHALT SHINGLES	39.54	192.88	289	75	285.8%	2%
ASBESTOS TO ASBESTOS DISPOSAL AREA	0.00	4.46	7	100	-93.3%	0%
MMBC MATERIAL	0.00	0.00	0	300	-100.0%	0%
TOTAL DIVERTED	**236.77**	**2590.67**	**3886.00**	**3785.00**	2.7%	31%
TOTAL TONNAGE MANAGED AT 7 MILE LANDFILL	**1064.92**	**8285.63**	**12428.45**	**11085.00**	31.6%	
OTHER MATERIALS: ADDITIONAL TO LANDFILL - TONNES	August 1 to August 31 (2022)	2022 UP TO August 31, 2022	ANNUAL PROJECTION PRO-RATED FROM ACTUALS	BUDGET PROJECTION	VARIANCE	% WASTE STREAM
SOIL FOR REMEDIATION	0.00	0.00	0	100	-100.0%	
SOIL FOR DIRECT DEPOSIT	0.00	0.00	0	100	-100.0%	
TOTAL IMPORTED FILL	**0.00**	**0.00**	**0.00**	**200.00**	-100.0%	