

**AN ASSESSMENT OF REINSTATING PASSENGER RAIL SERVICE ON THE STAMPEDE
PASS CORRIDOR**

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INTRODUCTION

The Stampede Pass corridor is an approximately 230-mile long stretch of rail line, linking Pasco in Washington's Tri-Cities area to Auburn in the Seattle metropolitan area (Figure 1). The rail line is owned by the Burlington Northern & Santa Fe railroad (BNSF) and is used exclusively for freight rail transportation. Traffic is light: in 2010, there were 6 trains per day versus an estimated capacity of 39 trains (WSDOT, 2014). For nearly a century, however, the line was a vital artery for passenger transportation, from the time the first Northern Pacific trains traversed the Stampede Pass in 1887 until the last Amtrak train passed through on October 26, 1981.

Since that time, there has been interest among the communities along the corridor and among other stakeholders in restoring scheduled passenger train service. Much has changed in the nearly four decades since the service ended and what was once not economically viable might now be feasible. All Aboard Washington (AAWA) has led the way in pushing for careful consideration of restoring scheduled passenger rail service on the Stampede Pass corridor. As part of that effort, in 2016, AAWA asked a faculty member, John Bowen, in the Department of Geography at Central Washington University (CWU) in Ellensburg (the midpoint of the corridor) to work with students to explore the restoration of services. This report presents the results of that research.



Figure 1: The Stampede Pass Corridor. Map created by David Corder, CWU.

The remainder of this report has three main sections. The next section contains background information on the Stampede Pass corridor, including its history, physical geography demography, and economics. This section is the product of research by four CWU students in Fall Quarter 2016 and eleven students in Spring 2017¹. The third section contains the results of a public opinion survey designed to gauge support for and potential use of a restored scheduled passenger train service on the corridor. The students in Fall 2016 drafted the survey and then the students in Spring 2017 revised the survey and began to distribute it both face-to-face and online – primarily in Ellensburg. In Summer 2017, Professor Bowen worked with one of the students, Noah Westbay, to extend the scope of the survey to other communities along the line and to analyze the results. The final section of the report summarizes our findings and discusses ways to move forward.

PUTTING THE STAMPEDE PASS CORRIDOR IN CONTEXT

History

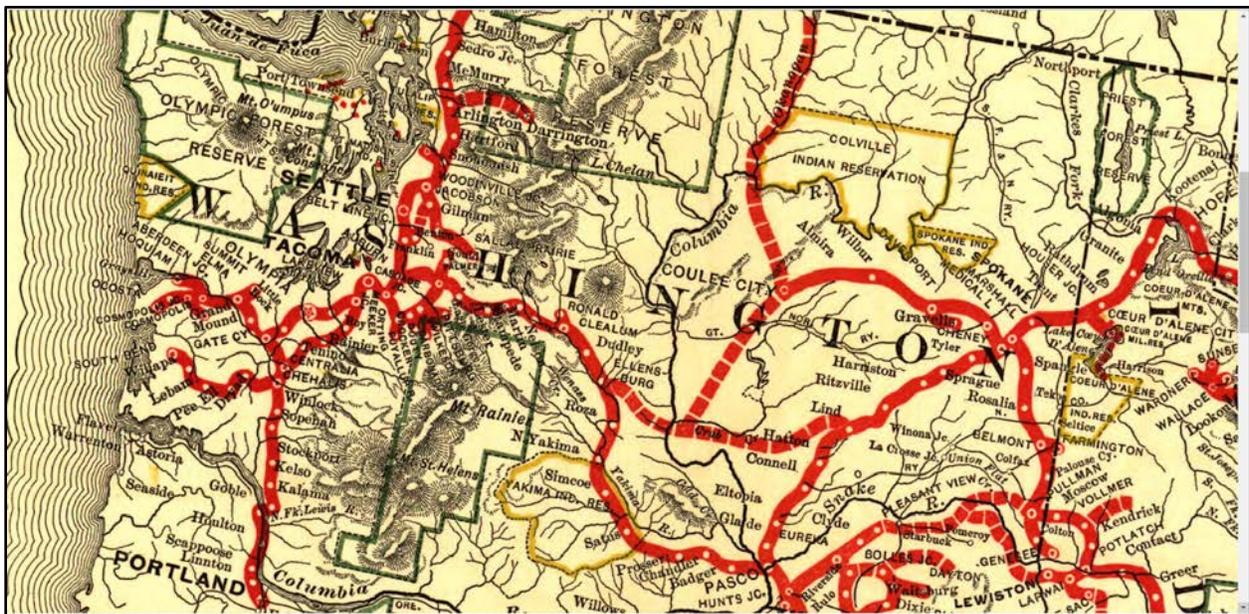


Figure 2: A portion of the Northern Pacific network, 1900. Map created by L.L. Poates Engr'g Co., New York, 1900. Image from the Library of Congress map collection, call number G4126.P3 1900 .L55 RR 502. From Fourth Annual Report of the Northern Pacific Railway company, for the Fiscal Year ending June 30, 1900. Source: Wikimedia Commons.

¹ The students who worked on this project included Jennifer Allen, Brandon Baxter, Floyd Bull, Kurtis Carpenter, Drew Houghton, Nick Moore, Tyler Murray, Cullan Paridon, Danielle Rockey, Gavin Schag, Zac Schepp, David Thompson, Noah Westbay, Ian Williams, and Mikel Zichittella.

On July 2, 1864, exactly one year after the Battle of Gettysburg – the apogee of a great struggle over the union of north and south – President Abraham Lincoln signed the charter for the Northern Pacific (NP) Railroad (Figure 2) which would become a great bond between east and west (Smalley, 2012). The charter called for a railroad between Lake Superior and some point on Puget Sound with a branch line to a point at or near Portland, Oregon.

The charter came with a land grant of 50 million acres of land, the sale of which was intended to fund construction; but starved of funds, the railway got off to a very slow start. As Cornelius Vanderbilt opined, “Building railroads from nowhere to nowhere at public expense is not a legitimate undertaking” (quoted in Lubetkin, 2006, p. 287). While the Union Pacific and Central Pacific raced to completion at Promontory, Utah in 1869, the NP attracted little enthusiasm because its route through a mainly cool and lightly populated stretch of territory seemed to offer few commercial prospects. In 1860, only 237,000 Americans lived in the states and territories along the NP’s route versus 1,169,000 along the first transcontinental railroad (Lubetkin, 2006).

The prospects for the venture seemed to improve in 1869, when Jay Cooke, a Philadelphia banker who had sold more than a billion dollars in bonds to finance the Union effort in the Civil War, agreed to market \$100 million in bonds to fund construction of the NP (Smalley, 2012). Around the same time, construction began, both in the east from Minnesota into Dakota Territory and north from Portland towards Puget Sound.

The line had not advanced far, however, when Cooke’s inability to sell enough bonds to cover his firm’s massive liabilities issued against the expected revenue from the bonds derailed the project. On September 18, 1873, the Jay Cooke & Associates – which was the most prestigious private banking house in the US at the time – collapsed, precipitating a more general crisis across a financial sector that had overinvested heavily in railroads (Lubetkin, 2006; White, 2011). The Panic of 1873 swept across the country, further delaying the completion of the NP – the railroad that had sparked the crisis in the first place.

In the meantime, however, an 1878 survey team in search of a suitable route for the railroad across the Cascade Mountains discovered what was originally called Green River Pass, not far south of Snoqualmie Pass. One day while cutting a trail ahead of surveyors in the

vicinity, a group of men became frustrated with the work and abandoned their jobs (a shortage of workers was a perennial problem in the region) leaving only a sign on a fir tree reading “Stampede camp”. Henceforth, the crossing was known as Stampede Pass, and in 1884, it was chosen for the NP route for its less aggressive grades compared to alternative crossings (Lewty, 1995).

With the buoyant American economy riding high again and with migration swelling the population of the northern tier of territories and states, construction resumed in the 1880s. In Washington Territory, the rail advanced towards Stampede Pass in 1886 from both east and west. Earlier that same year, contracts were put out and filled for the mining of a nearly two-mile long tunnel near the summit of the pass, and tunnel digging work began in spite of the winter weather (Lewty, 1995). A persistent challenge was finding laborers for construction of what was called the Cascade Division. In the summer of 1886, the contractors for the NP sourced 1,500 Chinese immigrants to work between Ellensburg and the summit of Stampede Pass (Lewty, 1995). As in other parts of the West (White, 2011), there was great hostility between white and Chinese workers to the degree that the contracting company had to bring in guards to keep the immigrant laborers from being attacked.

On June 1, 1887, an official celebration marked the completion of the Stampede Pass rail line, initially using switchbacks up and over the pass instead of through the still unfinished tunnel. Just under a year later, on May 27, 1888, the first train passed through the Stampede Pass tunnel (Figure 3) (Lewty, 1995). Shortly thereafter, another great engineering challenge, the bridge over the Columbia at Pasco was also completed.

The NP’s financial troubles persisted, however, and in 1893, the company passed into receivership. It was the same year that the Great Northern, via a route closely paralleling the NP, became the last of the great transcontinental railroads. The problem for the NP remained the same: too little traffic; but that problem gradually was overcome as population grew in the region through which it passed. For instance, the combined population of King, Kittitas, Yakima, Benton, and Franklin Counties (through which the Stampede Pass corridor travels) grew from 133,000 in 1900 to 488,000 in 1920 and 956,000 in 1950 (US Census, 1995). The railroad was instrumental in this growth, serving as a catalyst for the development of small and large

communities in the region. A feature of daily life in much of the 20th century was the daily passage of the NP's North Coast Limited passenger train (Figure 4). In 1959, for instance, the 45 hour and 40-minute long journey from Chicago to Seattle included a 5-minute stop at 3:37 AM in Yakima (Steamliner Schedules, 2009).

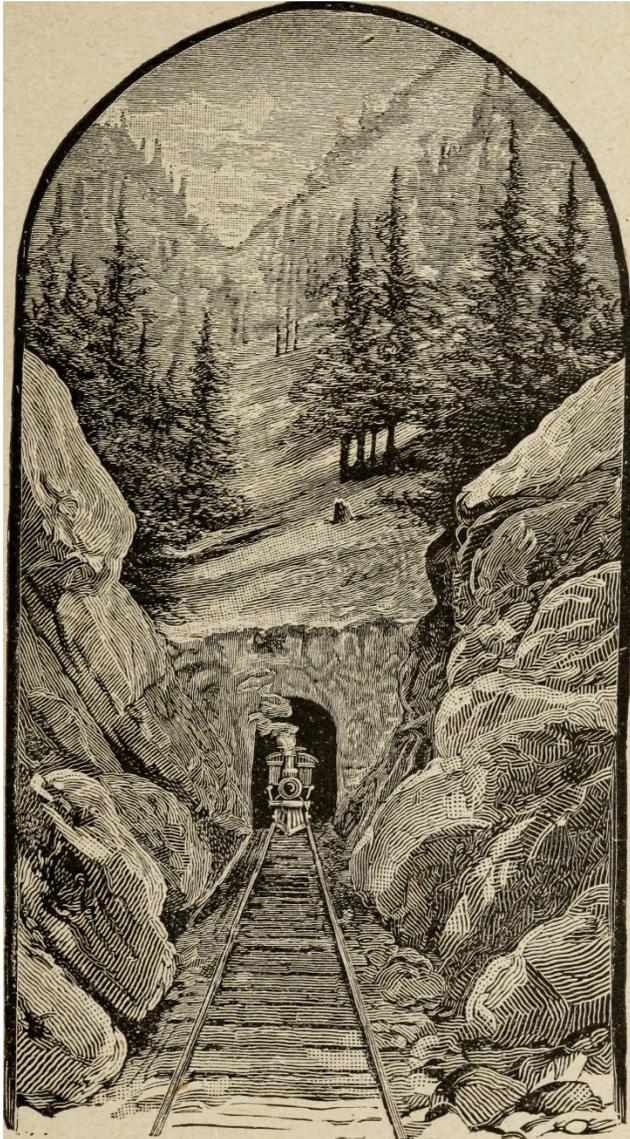
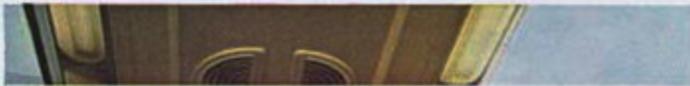


Figure 3: Artist's Impression of Western Portal of Stampede Pass, 1899 from the official Northern Pacific Railway guide.

Northern Pacific Railway Company Riley, W. C.
Source: Wikimedia Commons.



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Figure 4: Ad for Northern Pacific Railroad's North Coast Limited. The Saturday Evening Post.

Source: Wikimedia Commons.

By mid-century, however, railroads across the US were being eclipsed by aviation for long distance journeys and by cars and trucks for short ones. By 1957, airlines in the US were carrying more people than traveled in luxury Pullman and coach class rail services combined, and the railroad's share of intercity freight traffic in the US tumbled from 72 percent in 1943 to less than 40 percent in 1970 (US Census, 1975).

As the railroads' share of traffic fell, the industry consolidated. In 1970, the NP merged with three other major rail lines to create Burlington Northern. A year later, the merged railroad ended the last North Coast Limited. Passenger service resumed a few weeks later, however, as the newly created Amtrak initiated its Empire Builder service over much of the same route, but then in 1981, the alignment of the train was shifted farther north in Washington, over the old Great Northern line through Wenatchee and the Cascade Tunnel. The last regularly scheduled passenger train passed through the communities of the Stampede Pass corridor on October 26, 1981 (Historic Ellensburg, 2017).

As it further rationalized its operations, Burlington Northern closed the same section to freight traffic as well in 1983. The route might have gone the way of other railway lines and become a rails-to-trails corridor were it not for the surge in intermodal transpacific trade in the 1990s, resulting in massive rail shipments of containerized traffic from the Ports of Tacoma and Seattle to markets in the Midwest and points farther east. In 1996, the same year that Burlington Northern merged with another Atchison, Topeka & Santa Fe to create the Burlington Northern & Santa Fe (BNSF), the Stampede Pass Corridor was reopened to freight traffic (DiBenedetto and Johnson, 1996). The tunnel walls were refurbished and the height raised, new snow sheds were built, and communication facilities were updated along the route.

The resurrection of the line also brought renewed community interest in restarting passenger services. In 2001, a Washington Department of Transportation study estimated that \$350 million in investment would be necessary to provide the infrastructure (e.g., sidings) to permit regular passenger service to resume (Thomas, 2001), but that study provided no estimate of potential demand.

Physical Geography

A prominent feature of Washington State's physical geography is the rain-shadow effect. This phenomenon occurs when a large mountain range is located near a coastline with prevailing westerly winds. As the winds blow rain clouds inland, orographic lifting causes most of the precipitation to be released on the windward side of the crest. The Cascades Mountains' rain-shadow is one of the strongest on the planet, due to its mid-latitude location, the height and north-south orientation of the mountain chain, and the proximity to the Pacific Ocean and Puget Sound (Siler, et al., 2013). Figure 5 displays the stark contrast in precipitation patterns caused by the Cascades' rain-shadow effect.

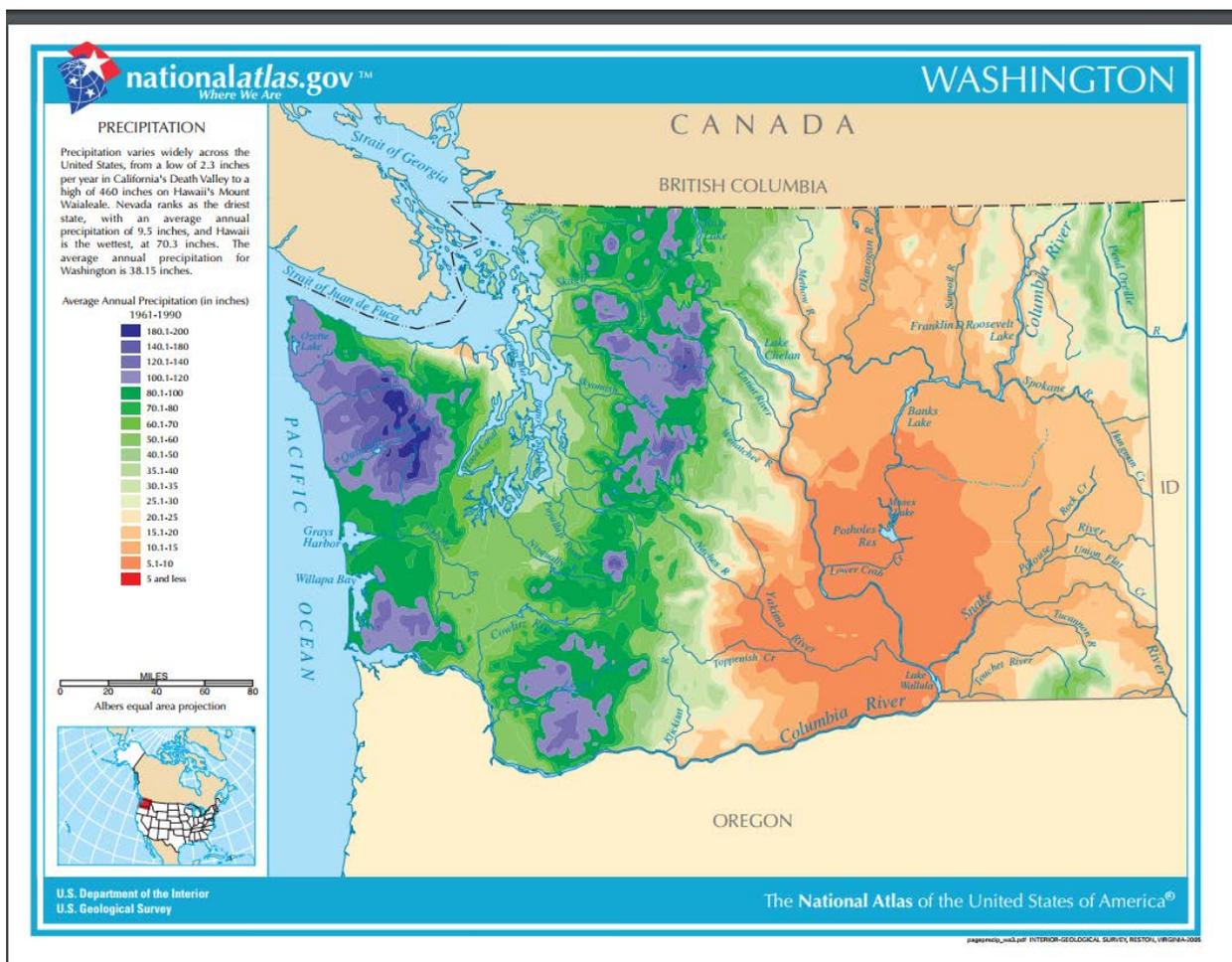


Figure 5: Precipitation Map of Washington. (2014, April 13). In ClassBrain's State Reports | State Symbols | 50 US States. <<https://statereports.com/precipitation-map-of-washington/>> Stampede Pass receives an average of 81 inches of annual precipitation (US Climate Data, 2017).

The pass itself has a cool, very wet winter and a mild, dry summer. The average high and low temperatures during January (the coldest month) are 29.0 F and 21.0 F, respectively. The average highs and lows during August are 65.1 F and 47.8 F, respectively. Stampede Pass receives an average of 81 inches of annual precipitation (US Climate Data, 2017). The pass receives nearly 80 percent of its precipitation between September and March; so most of it takes the form of snow, with average snowfall of just under 440 inches per year. Heavy snowfall at nearby Snoqualmie Pass (nine miles to the northwest) frequently interrupts winter traffic on I-90 (Figure 6), which makes the prospect of safer, more reliable rail transportation over the same corridor attractive.

I-90 Snoqualmie Pass Snowfall and Highway Closure Data

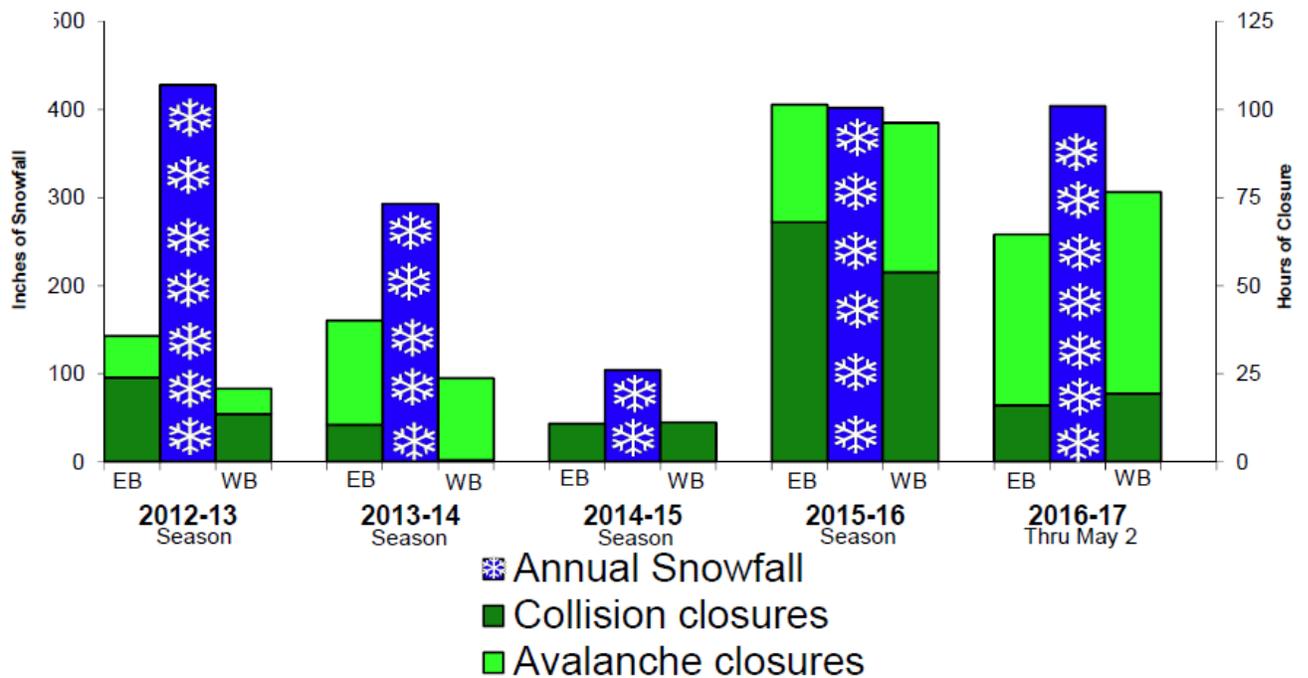


Figure 6: Precipitation and Highway Closures at Snoqualmie Pass. Washington State Department of Transportation. <<https://www.wsdot.com/winter/snoqualmie/#>> (accessed October 24, 2017).

The topography of Stampede Pass is due to plate tectonics. Convergence of plates has caused the uplifting that forms the Cascade Mountain Range, and the different passes within it

(Orr and Orr, 2002). Most of the fault lines in the area are dormant, meaning that there is minimal risk of seismically induced avalanches, compared to some other mountain passes.

Stampede Pass has an elevation of 3,671 feet. The Stampede Pass tunnel has an elevation of 2,827 feet, thus saving about 850 vertical feet. The image below is an elevation cross-section of the Stampede Pass corridor from Auburn to Pasco, highlighting the significance of the tunnel (Figure 7).

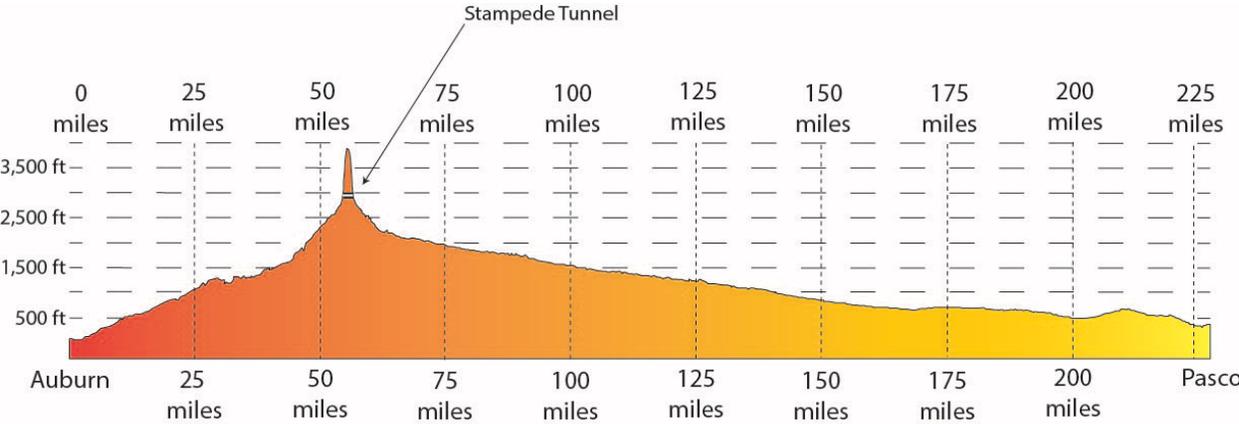


Figure 7: Cross-Section of the Stampede Pass Corridor (Derived from Google Earth).

Economics

The Stampede Pass corridor links two very different economies. Among the five counties along the line (King, Kittitas, Yakima, Benton, and Franklin), more than 91 percent of all personal income accrues in King County. That disparity is mainly driven by the uneven distribution of population, but King County also has a markedly higher per capita income (Table 1). The uneven economy across the corridor is both a potential problem and a rationale for the restoration of scheduled services. On the one hand, the smaller economies east of the Cascades may undermine demand for the service. On the other hand, scheduled rail services could be a conduit for promoting balanced economic development in the state.

Table 1: Population and Income in Stampede Pass Corridor Communities, 2015

	King	Kittitas	Yakima	Benton	Franklin
Population	2,117,125	43,269	248,830	190,309	88,807
Per Capita Income	72,530	39,157	38,527	43,507	33,955
Personal Income (Billions)	153.6	1.7	9.6	8.3	3.0

Source: Bureau of Economic Analysis (2017) Regional Data. CA1 Personal Income Summary: Personal Income, Population, Per Capita Personal Income – County. www.bea.gov (accessed November 2, 2017).

Moreover, the uneven distribution of opportunities in the state is already reflected in sizeable commuting flows along the corridor, which could be a source of regular ridership for the train. The 2009-2013 5-Year American Community Survey found, for instance, that just over 1,200 people commute at least once a week from a residence in Kittitas County to a place of work in King County (Table 2). Of course, both counties are physically large and the train would stop at only a handful of locations and would operate perhaps just once (especially initially) or a couple of times per day (i.e. it would not be a commuter train). So it would be impractical for most of those people to use the train for the journey to and from work, but if even an appreciable proportion could do so, they could provide a degree of baseline traffic. The same is true for other sectors along the corridor (e.g., Yakima County to Franklin County).

Table 2: Estimated Weekly County-to-County Commuting Flows, 2009-2013

Residence County	County of Work				
	King	Kittitas	Yakima	Benton	Franklin
King	932,634	358	148	153	25
Kittitas	1,218	15,245	887	57	N/A
Yakima	326	462	90,984	2,935	322
Benton	201	9	2,306	62,549	10,432
Franklin	68	N/A	286	11,916	17,716

Source: US Census (2017) 2009-2013 5-Year American Community Survey Commuting Flows. <https://www.census.gov/data/tables/time-series/demo/commuting/commuting-flows.html> (accessed November 2, 2017).

The train would be an especially attractive alternative for commuters dealing with frequent traffic congestion, accidents, and – especially in the winter – dangerous driving conditions on I-90 (Janovich, 2004). In summer 2017, traffic congestion on I-90 frequently reached punishing levels, with motorists (including large trucks) diverting on to narrow rural roads paralleling the highway such as Nelson Siding Road in Easton (Buhr, 2017).

From a longer-term perspective, traffic has grown about threefold on both I-90 and I-82 (Table 3) since the termination of scheduled rail services. However, capacity – especially east of Snoqualmie Pass – has barely changed during this timespan.

Table 3: Average Annual Daily Traffic at Selected Highway Locations (both ways combined)

Highway	Milepost	Location	1981	1988	1995	2002	2009	2016
I-90	37/48 (i)	North Bend	14,098	21,033	28,218	31,564	30,170	34,455
I-90	83	Cle Elum	11,230	15,169	N/A	27,230	26,961	31,038
I-82	25	Selah	6,707	9,791	13,250	15,033	15,896	18,477
I-82	49	Buena	N/A	11,386	19,313	23,254	24,049	27,130

Note: i. For 1981 to 2002, the data above come from a location six miles east of North Bend. For 2009 and 2016, the data come from a recorder located approximately 11 miles farther east (not far from Snoqualmie Pass).

Sources: Washington State Department of Transportation (2017) Annual Traffic Report.

<http://www.wsdot.wa.gov/mapsdata/travel/annualtrafficreport.htm> (accessed November 7, 2017).

While eastern Washington is a major agriculture region – including iconic landscapes such as the timothy hay fields of Ellensburg, the apple orchards around Yakima, vineyards near Zillah, and hop trellises in Moxee and Mabton – the region’s economy is dominated by service sector and manufacturing businesses which generate significant passenger traffic. The largest employers in some of the Stampede Pass corridor’s main cities include: Boeing in Auburn, Central Washington University in Ellensburg, Yakima Valley Memorial Hospital in Yakima, Yakama Legends Casino in Toppenish, Tree Top Incorporated in Prosser, and Pacific Northwest National Laboratory in Pasco.

In fact, the economies of eastern and western Washington are somewhat complementary, a relationship that fosters potential traffic for the train. In particular, tourism is a significant sector in Eastside communities with major traffic generators including Suncadia in Roslyn, the wineries in the Yakima Valley, and even Hanford. The wine industry is a particularly interesting aspect of the region’s economy. In other parts of the world, such as the Penedès region near Barcelona, special train services have been set up in conjunction with tourist agencies to promote enotourism (wine-based tourism)².

² We are grateful to Mònica Molina of Universitat Autònoma de Barcelona, who visited Central Washington University in Summer 2017, for sharing information about this connection.

Central Washington University is another important potential source of riders. In 2016, the top five counties from which CWU students hailed were: King (24 percent), Pierce (13 percent), Snohomish (10 percent), Yakima (9 percent), and Kittitas (9 percent) (CWU, 2016). The proposed rail service could facilitate trips to and from the main Ellensburg campus for many of these students.

In addition to special traffic-generating features of the Eastside, there are numerous events in the Seattle area that, depending on scheduling and connections, could be well-served by rail services. Major concerts, festivals, professional sports events in Seattle, and its suburbs draw thousands of people over Snoqualmie Pass. The table below, for instance, indicates the degree to which even communities quite distant from CenturyLink Field are home to “12th man” Seahawks fans (Table 4). The communities along the Stampede Pass corridor are highlighted in green.

Table 4: Washington Cities Ranked by Seahawks Support, 2015 (Percentage of Facebook Users in Washington State’s 40 Largest Cities Expressing Interest in Seattle Seahawks)

Rank	City	Percent	Rank	City	Percent
1	Maple Valley	40.0	21	Longview	28.8
2	Marysville	39.3	22	SeaTac	28.3
3	Lake Stevens	37.5	23	Wenatchee	27.4
4	Kent	36.7	24	Spokane Valley	26.8
5	Des Moines	36.4	25	Richland	26.7
6	Renton	36.4	26	Lakewood	26.2
7	Auburn	35.1	27	Yakima	26.1
8	Burien	34.1	28	Bellingham	26.0
9	Everett	33.3	29	Sammamish	26.0
10	Federal Way	33.3	30	Pasco	25.4
11	Lynnwood	33.3	31	Pullman	24.7
12	Lacey	33.1	32	Kennewick	24.6
13	Edmonds	32.6	33	Kirkland	23.9
14	University Place	32.3	34	Mercer Island	22.7
15	Shoreline	32.1	35	Seattle	22.2
16	Issaquah	31.4	36	Redmond	21.3
17	Bremerton	31.3	37	Spokane	20.8
18	Bothell	31.3	38	Walla Walla	18.0
19	Tacoma	30.0	39	Vancouver	17.3
20	Mt. Vernon	29.4	40	Bellevue	6.0

Source: Nickum, R. 2015. Which Washington Cities Are Home to The Most Enthusiastic Seahawks Fans? <https://www.estate.com/blog/2015/01/which-washington-cities-are-home-to-the-most-enthusiastic-seahawks-fans/> (accessed November 2, 2017).

Demographics

The populations over the Stampede Pass corridor have grown and changed a great deal between the 1980 Census (the census nearest to the termination of schedule rail services) and 2016, the most recent year for which the US Census has released population estimate. The total population of the five counties through which the corridor passes was 2.7 million in 2016,

up 69 percent over 1980 (Figure 8). By comparison, the total US population grew just 43 percent during the same interval (US Census, 2017).

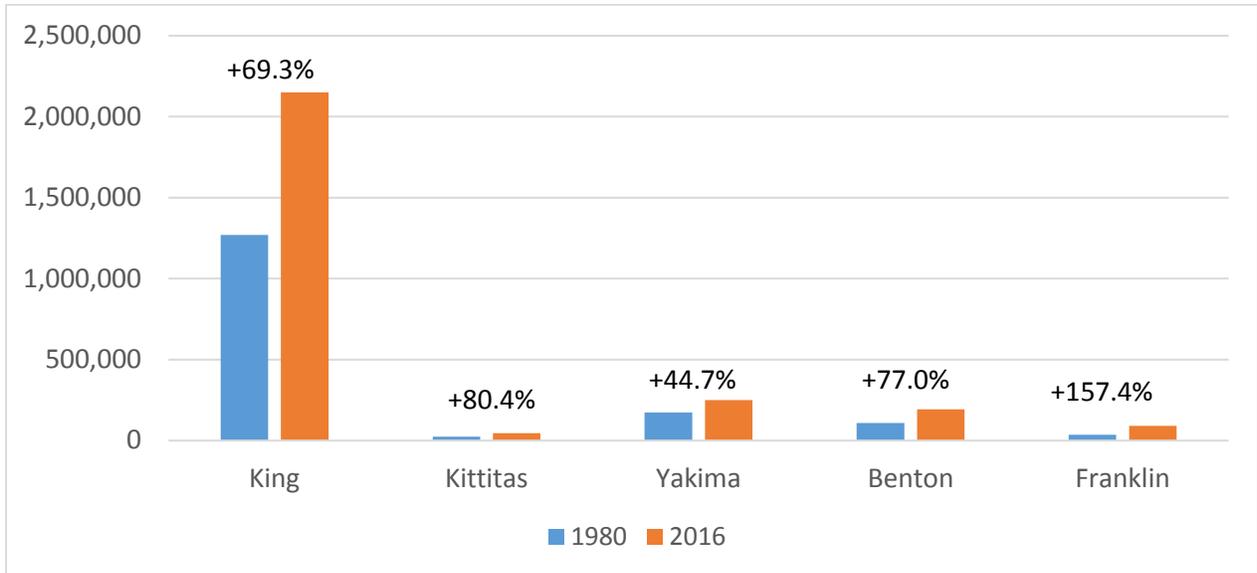


Figure 8: Population Growth in Stampede Corridor Counties, 1980-2016. Source: US Census

As defined by the US Census, the Stampede Pass corridor links three metropolitan statistical areas and one micropolitan statistical area (Figure 8). The Seattle-Tacoma-Bellevue Metro SA comprises King, Pierce, and Snohomish Counties with a total population of 3.8 million in 2016. The Ellensburg Micro SA consists of Kittitas County alone with a population of 45,000 in 2016. Further south, the Yakima Metro SA again comprises a single county, in this case Yakima whose population was 250,000 in 2016. Finally, the Kennewick-Richland Metro SA combined Benton and Franklin Counties with a total 284,000 (US Census, 2016). These data highlight again the stark imbalance in the population density in the region. Moreover, the Seattle-Tacoma-Bellevue MSA’s share of total population across these four areas actually increased since the termination of passenger rail services on the Stampede Pass Corridor: in 1980, Seattle-Tacoma-Bellevue had 85 percent of the combined population of the four areas; in 2016, its share was 87 percent.



Figure 9: Metropolitan and Micropolitan Statistical Areas in Washington

Source: US Census (2017) State-based Metropolitan and Micropolitan Statistical Areas Maps. <https://www.census.gov/geo/maps-data/maps/statecsa.html> (accessed November 7, 2017).

This imbalance affects the prospects of restoring passenger rail service because a minimum population is necessary for a train to be viable. Furthermore, the Seattle area is already connected with other cities and hubs through rail service, and funds used to support the restoration of Stampede Pass passenger rail service could instead be used to support the expansion of existing services in the more densely populated Puget Sound region.

If the overall distribution of population in the state has changed relatively little since the early 1980s, the composition of the population has shifted markedly. A key demographic change in Washington State from 1980 to 2010 was the rapid increase in the population of Hispanics (Figure 10). During that thirty-year span, Franklin County’s Hispanics increased from 15.5 percent to 51.2 percent. More generally, in every corridor county, the percent of the population that is Hispanic increased by at least a factor of three. With as much as half of the population of some corridor counties now comprising Hispanics – who tend to be younger, in larger families, and poorer than the broader population – it will be important that the restored services meet the needs of this significant and growing community.

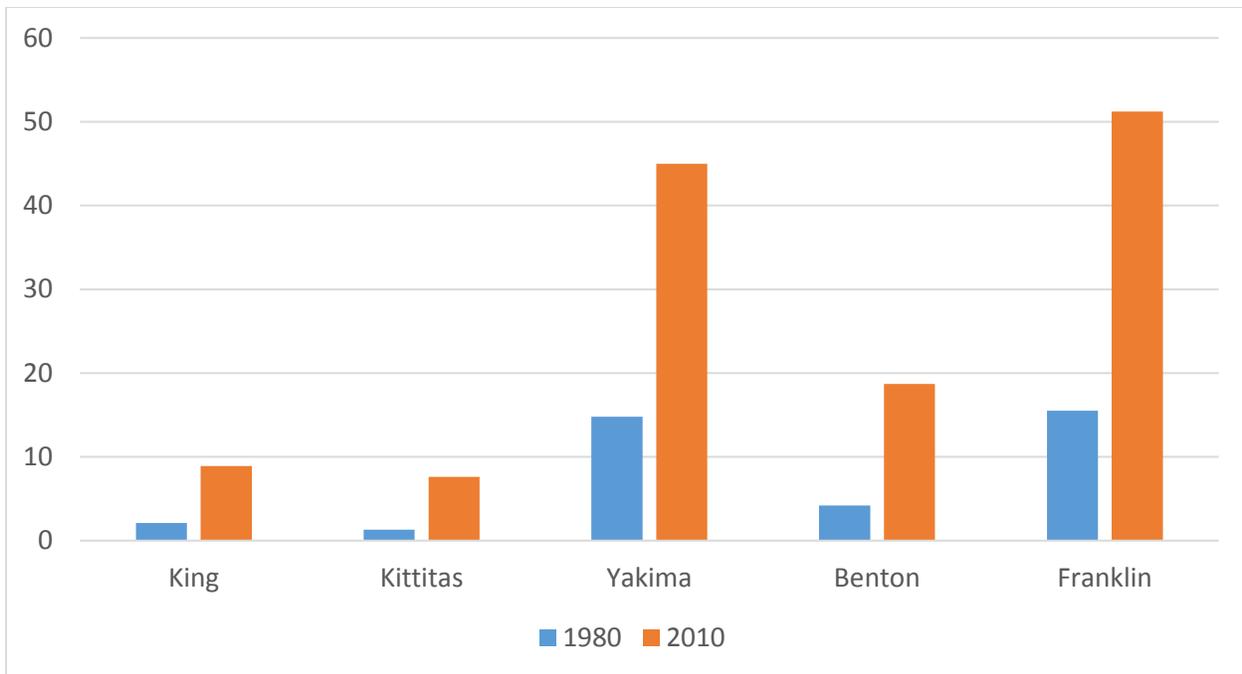


Figure 10: Percent Hispanic (LatinX) in Counties along Stampede Pass Corridor

Another significant demographic change in the region is the ageing of its population. In 1980, none of the five counties through which the Stampede Corridor passes had a median age greater than 31 years. Figure 11 shows the 2010 median age. Clearly, the corridor has gotten older, but crucially, these counties are younger than the state generally, for which the median 2010 age was 37.3 years. One can see that the counties on the east side of the mountains (Kittitas, Yakima, Benton, and Franklin) have the lowest median ages. These circumstances favor the restoration of rail services. On the one hand, the overall ageing of Washington State should foster increased demand for forms of transportation other than one's own car. On the other hand, the youth of the corridor is important; because service restoration is likely to take a long time, these are the people who are most likely to see this idea come to fruition.

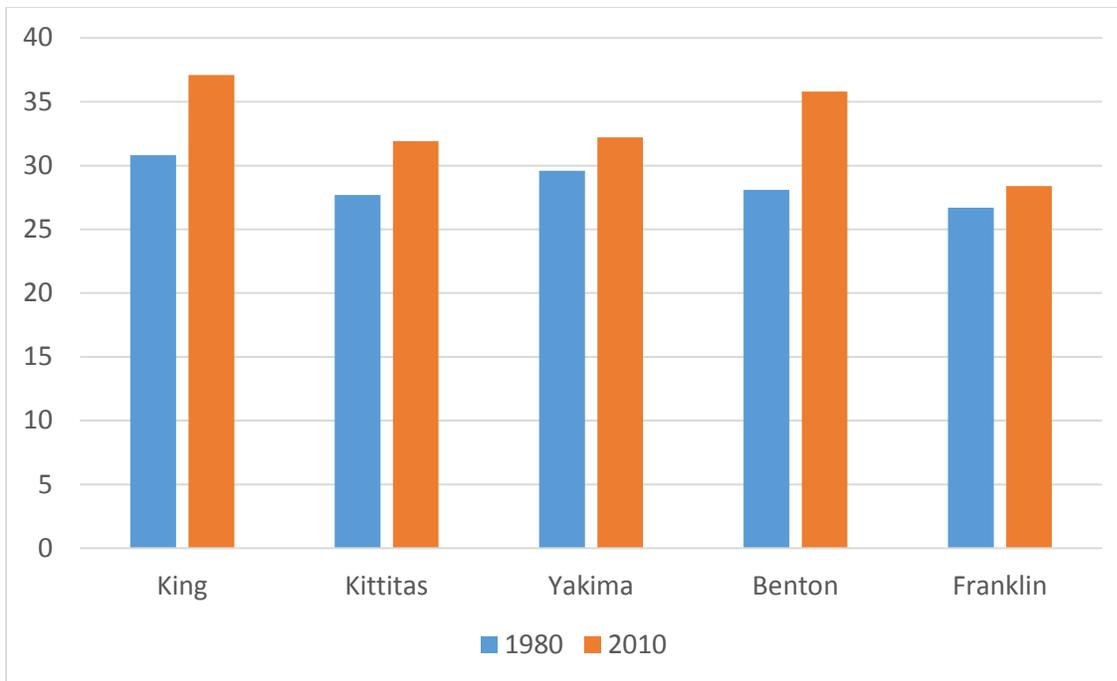


Figure 11: Median Age of Populations in Counties along Stampede Pass Corridor

A SURVEY OF THE STAMPEDE PASS CORRIDOR COMMUNITIES

Goal

The purpose of the survey was to gain community feedback on the restoration of scheduled passenger rail services along the Stampede Pass corridor as a first step in gauging the feasibility of the idea. Precise estimates of ridership over specific segments of the line and of the cost of improving the line to passenger traffic standards lie outside the scope of this study.

Methodology

In April 2017, a survey designed by CWU Geography students was administered face-to-face over several days at an Ellensburg supermarket. The 93 surveys collected in this way comprised a kind of pilot study to evaluate the efficacy of the survey instrument. The survey included questions about how often residents had ridden trains before, how often they would hypothetically ride the train if service were restored on the Stampede Pass Corridor, as well as questions about demographics (age, income, ethnicity, etc.).

Also in April 2017, an online version of the survey was distributed via CWU's subscription to Qualtrics. The survey was promoted on social media, including by the City of Ellensburg, and was primarily accessed by residents of Ellensburg (where CWU is located). Within several weeks, 635 surveys had been completed online.

During the summer, the data for both samples were analyzed and compared. The results were broadly similar and because the online survey was so much less expensive to administer, it was decided to attempt to extend the scope of the survey to other communities along the corridor via Qualtrics. The survey was modified to better accommodate responses from different communities (e.g., an early version of the survey had been premised on the respondent living in or close to Ellensburg). Questions were also added based on feedback received during the initial phases of the study. The final version of the survey (which the great majority of respondents completed) is provided in Appendix I.

To promote the survey, Bowen spoke with television, radio, and newspaper reporters. The survey was also promoted by CWU's Public Affairs department, the Yakima Chamber of Commerce, and other organizations. A website (www.stampedepassrailstudy.com) was created to make it easier to lead people to the survey.

After collecting approximately 2,495 survey responses by September 5, 2017, the data was compiled for final analysis. The results and charts were then presented at the Central Washington Rail Summit on September 16, 2017 in Pasco, Washington and are analyzed below.

Results – Demographics

One detail recorded by each survey was the respondent's zip code, as shown in Figure 10. Earlier in the data collection, Ellensburg had a large majority of the respondents. But as the website was spread through various interviews and newspaper articles, the scope of respondents branched out. These zip codes showed that at completion, the highest number of survey respondents were from Yakima, followed by Ellensburg, Kennewick, Richland, and Seattle (Figure 12). Dozens of other cities were represented, from every corner of Washington State. Overall, however, most of the respondents are from east of the Cascade Mountains; it is communities in Kittitas, Yakima, Benton, and Franklin Counties that have the most to gain from

the restoration of scheduled services, and their enthusiasm for the survey reflected that calculus.

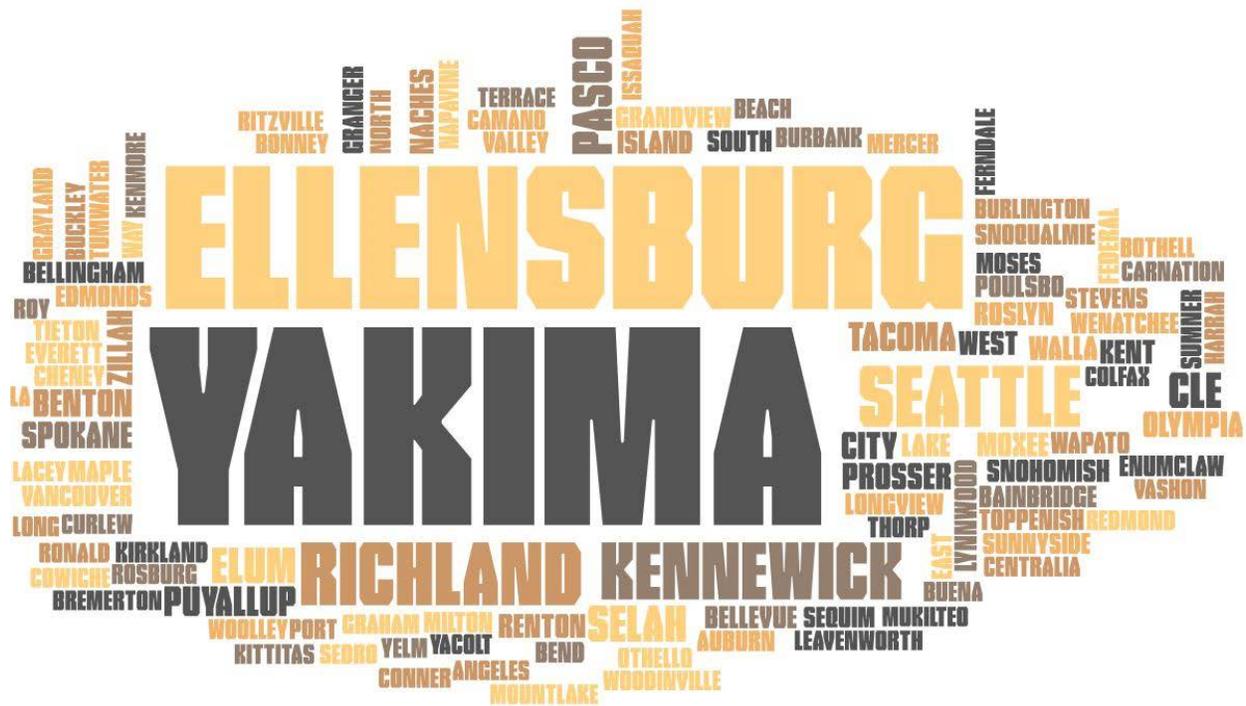


Figure 12: Distribution of Survey Respondents by Place of Residence

The age distribution of survey respondents was graphed in order to check for any demographic bias. Figure 13 shows that a fairly normal distribution of ages of people responded. There were more young adults than elderly respondents, which is positive because as a practical matter it will take some time before passenger service can be restored and so our youngest respondents are those most likely to benefit.

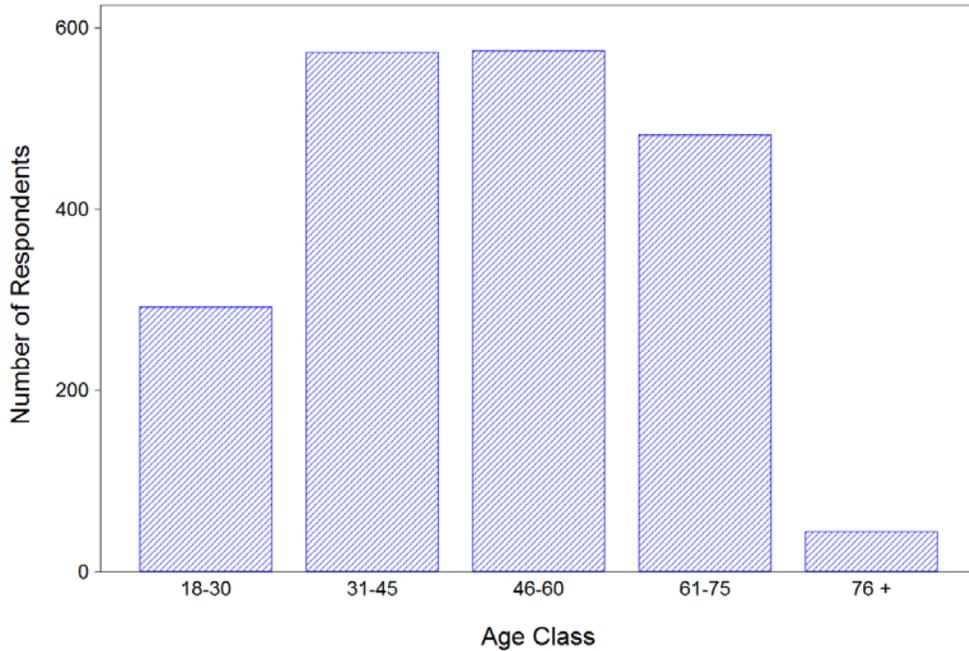


Figure 13: Ages of survey respondents

Figure 14 shows an approximately uniform normal curve distribution of incomes among respondents. This shows that people of all social classes are interested in the project. There is a spike in the number of respondents earning over \$140,000, but this is likely due to the open-ended character of the maximum data class.

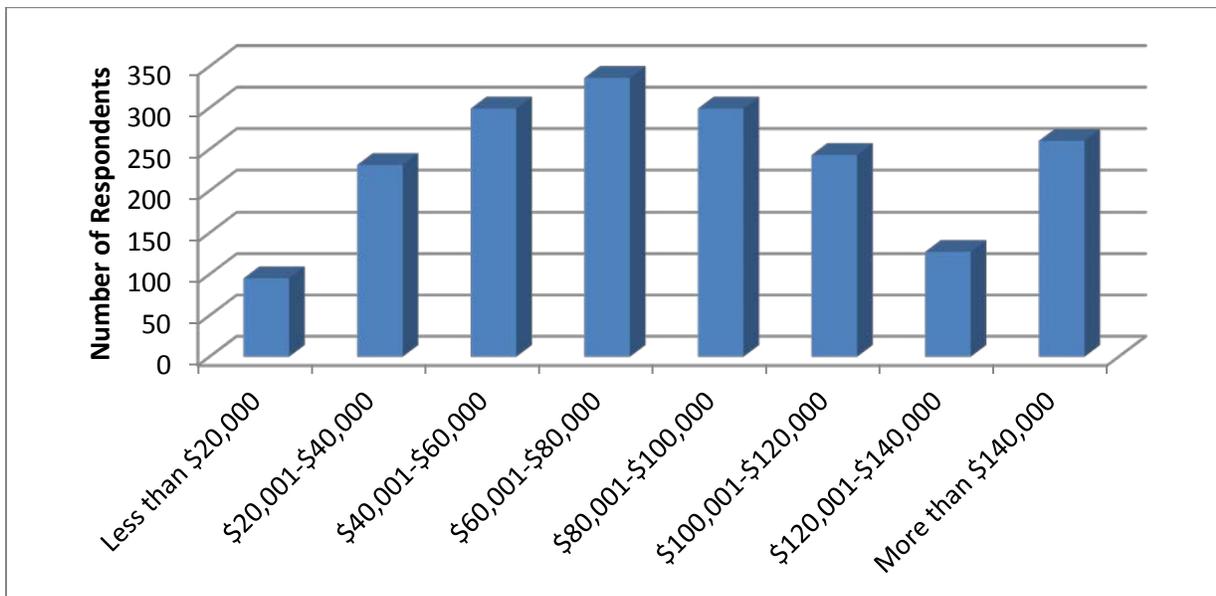


Figure 14: Household Incomes of survey respondents

In order to check for further data bias in the sample population, respondents were asked to report their ethnicity. Figure 15 shows that a disproportionate number of the respondents who self-identified as white. The ethnicity most underrepresented is Hispanic or LatinX, since this group makes up roughly 14.5 percent of the people in the five corridor counties combined and 34.5 percent of the four counties east of the Cascades (the source of most survey respondents). The low Hispanic participation is likely due to a number of factors including the fact that the survey was mainly distributed via Qualtrics, was available exclusively in English, and was promoted only in English language media. These attributes of the survey process reflect the limited funding available for this project and the fact that neither Bowen nor Westbay is fluent in Spanish.

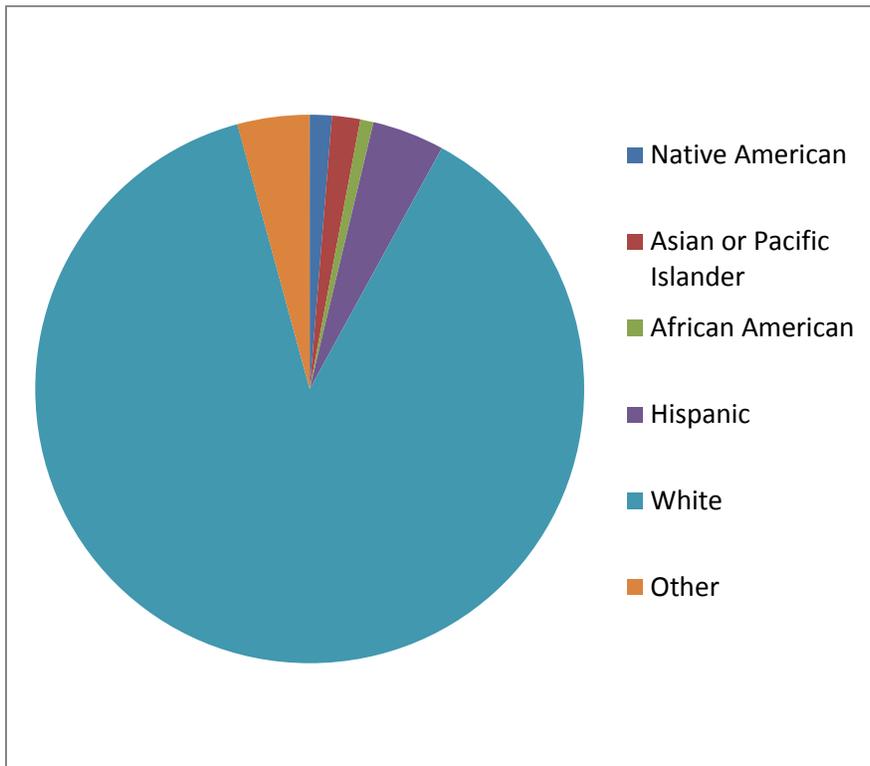


Figure 15: Pie chart of survey respondents' ethnicities

Results – Past and Predicted Use of Intercity Trains

The main part of the survey asked respondents to predict how often they would use the train service if they were restored. To help contextualize the responses to that series of questions,

we first asked about whether the respondent had traveled by intercity train in Washington in the past year. Figure 16 shows that the majority of respondents had not used a train at all. This stands to reason, because of the lack of passenger rail service in central Washington. For those that had taken a train within the last year, the most common routes taken were between Portland and Seattle followed by Pasco and Portland. Like the graphs that follow, this graph is annotated with the median and mean of the variable and the percent responding zero. The median is that value which splits the data set so that half of the observations are higher and half are lower. The mean is the average. Outlying values affect the mean more strongly than the median.

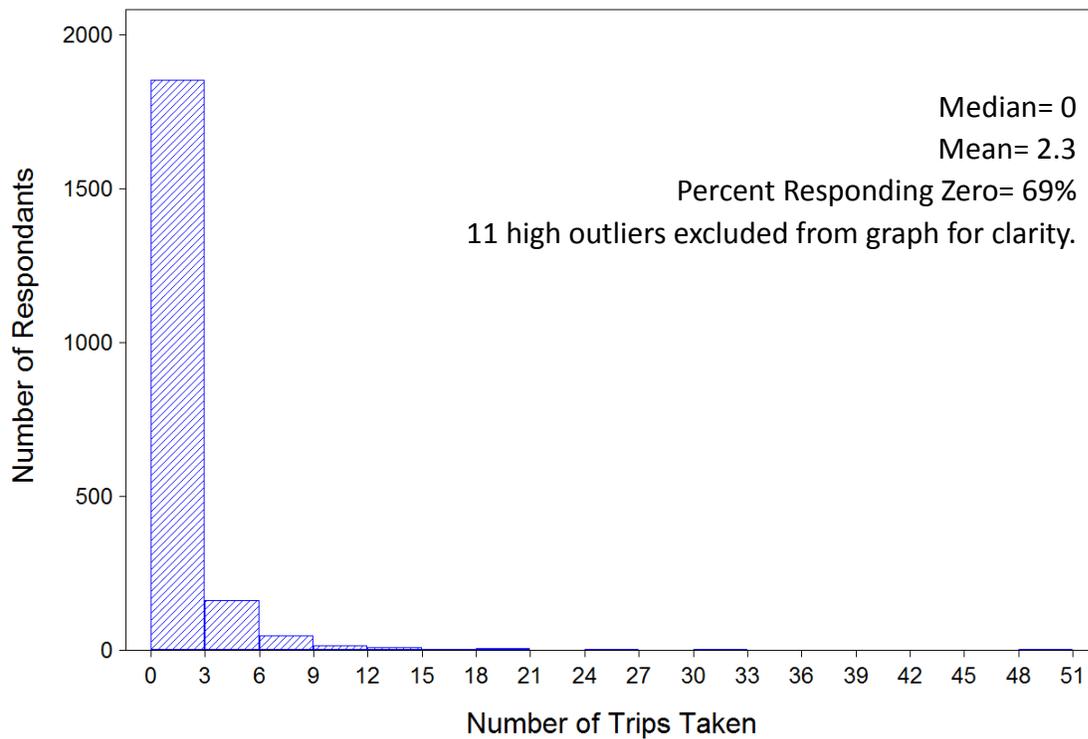


Figure 16: Reported number of intercity train trips taken in the last year. Respondents were asked to include any intercity trip (i.e. to exclude intra-city rail trips such as those on Sound Transit between various parts of the Seattle metro area) that began or ended in Washington State.

We then asked the respondents to predict how often they would take the train if services were restored. To make their responses to this hypothetical scenario somewhat more grounded, respondents were presented with information on both the estimated travel time and

one-way fare based on the current travel times and fares in Washington State for the Amtrak Empire Builder, which links Seattle and Chicago. The times and costs were geared to the nearest likely station for a respondent. So, for instance, if a respondent identified Yakima as the closest possible station (from a list comprising Auburn, Cle Elum, Ellensburg, Yakima, Toppenish, Prosser, and Pasco) they would be presented with the following questions:

6 Based on Amtrak's schedules and fares in other markets, a train from Yakima to Seattle might take about 3 hours 30 minutes and cost about \$27 one way (value fare). If the train cost this much and took this long, approximately how many trips per year to the Seattle area do you think you personally would make by train? Assume that the train schedule worked well for your needs (for instance, that the train left around the time you wanted to leave).

7 Based on Amtrak's schedules and fares in other markets, a train from Yakima to Pasco might take about 2 hours and 20 minutes and cost about \$17 one way (value fare). If the train cost this much and took this long, approximately how many trips per year to the Tri-Cities area do you think you personally would make by train? Assume that the train schedule worked well for your needs (for instance, that the train left around the time you wanted to leave).

Note that the respondents were told to assume the train schedule would be convenient (we have no idea at this stage what the scheduling for the service would be). Additionally, respondents were informed that Stampede Pass corridor's terminus in Auburn would connect to the north-south lines there, including to Seattle, and that the terminus in Pasco would connect to east-west lines, including the Amtrak service west to Portland and east to Spokane.

We now present the results, beginning with eastbound sectors. For the sake of brevity, we present data for three eastbound sectors and three westbound ones though a restored rail service could accommodate travel over many other city-pairs. First, respondents that lived closest to Auburn (which, given the set of choices presented in the survey, would include any one from Western Washington) were asked how many times in a year they would ride the train to the Tri-Cities (Figure 17). The median response was four times per year. This frequency would likely be for visiting family in the Tri-Cities. The mean of 8.8 is so much higher than the median because of a few disproportionately high responses. It seems somewhat unlikely that 79% of the citizens of Auburn would take the train to Pasco at least once per year. It could be

that respondents interpreted the question as asking how often they would take a trip on the train to any destination to the east.

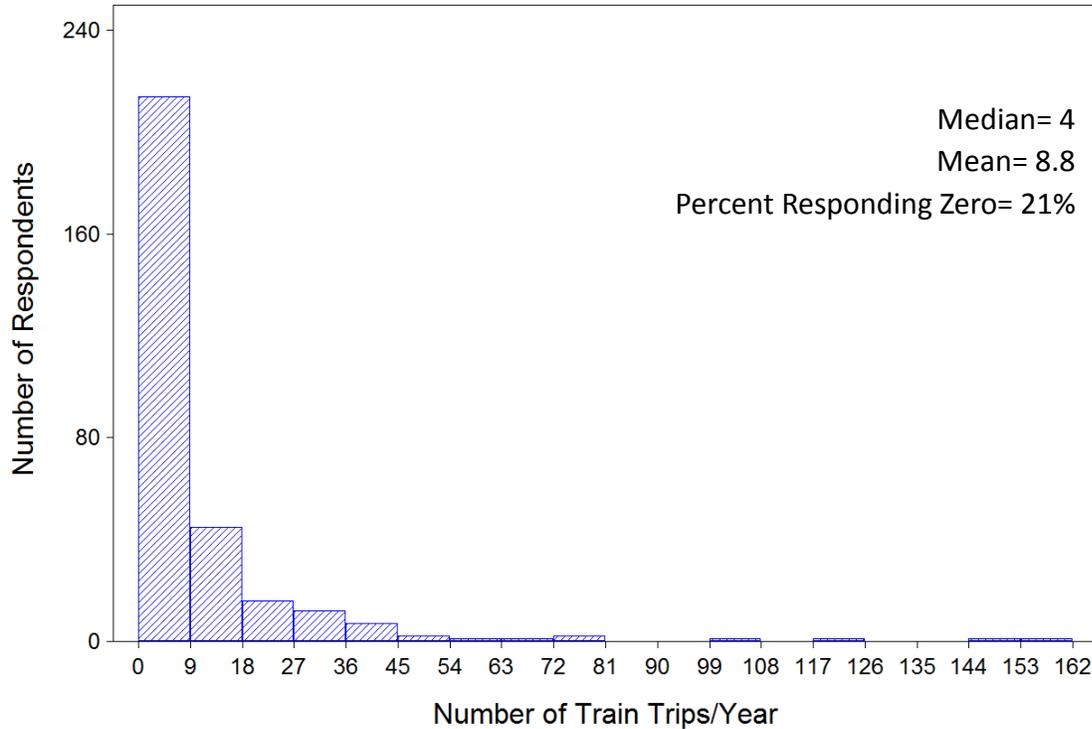


Figure 17: Respondents' projected trips from Auburn to the Tri-Cities.

Second, respondents that lived closest to Ellensburg were asked how many times in a year they would ride the train to the Tri-Cities (Figure 18). The median response was once per year. This frequency is the lowest out of any of the ridership projections. Likewise, the 37 percent that responded zero for this route is the highest among any ridership projection. There may be fewer citizens of Kittitas County that have any connection to the Tri-Cities.

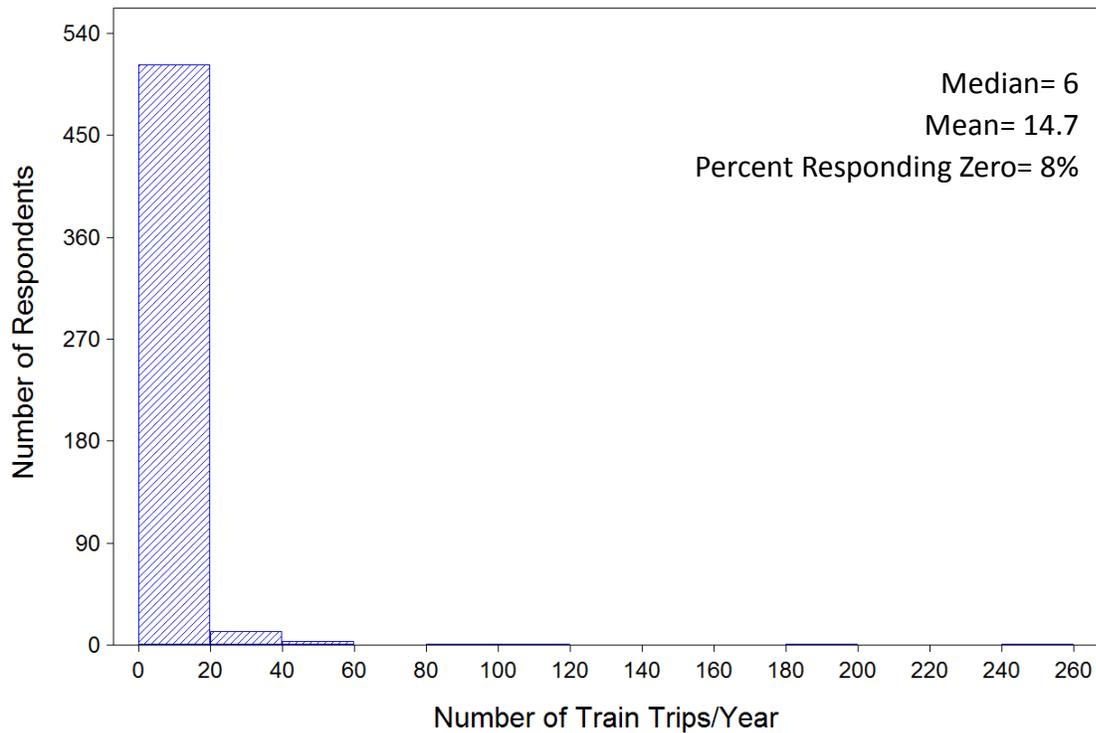


Figure 18: Respondents' projected trips from Ellensburg to the Tri-Cities

Conversely, for respondents living near Yakima, the median number of predicted trips to the Tri-Cities was four times per year (Figure 19). This frequency would likely be for visiting family in the Tri-Cities and for work. Note in Table 2 above that there is a substantial flow of commuters from Yakima County to Benton and Franklin Counties for work. Therefore, the fact that the mean of 14.4 is much higher than the median in Figure 19 is because of the numerous respondents predicting that they would use a train every weekday if services were restored. In addition to these flows of people, the apple and wine industries in the two regions attract travelers for a variety of reasons.

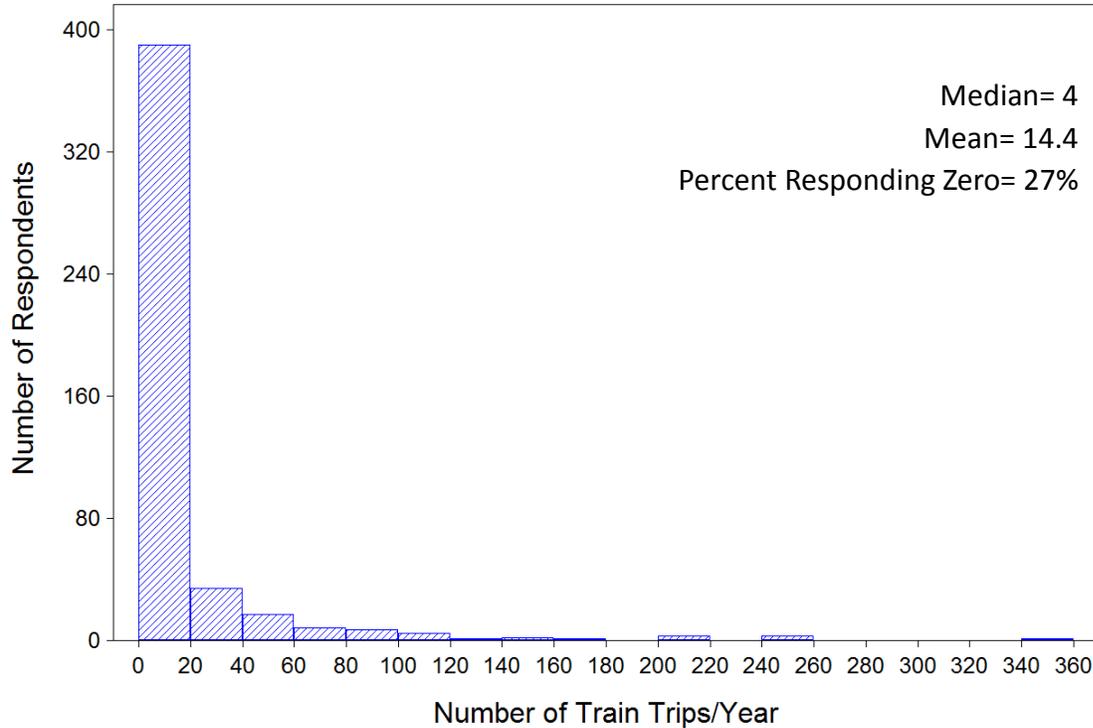


Figure 19: Respondents' projected trips from Yakima to the Tri-Cities

Turning now to several important westbound sectors, we asked respondents that lived closest to Pasco how many times in a year they would ride the train to the Seattle area (via Auburn) (Figure 20). The median response was eight times per year. The magnitude of Seattle as a trip-generating node means that these journeys could be for a very wide variety of purposes, such as tourist activities, family, and business. The mean of 13.6 is similar to the median, signifying a greater consistency in responses.

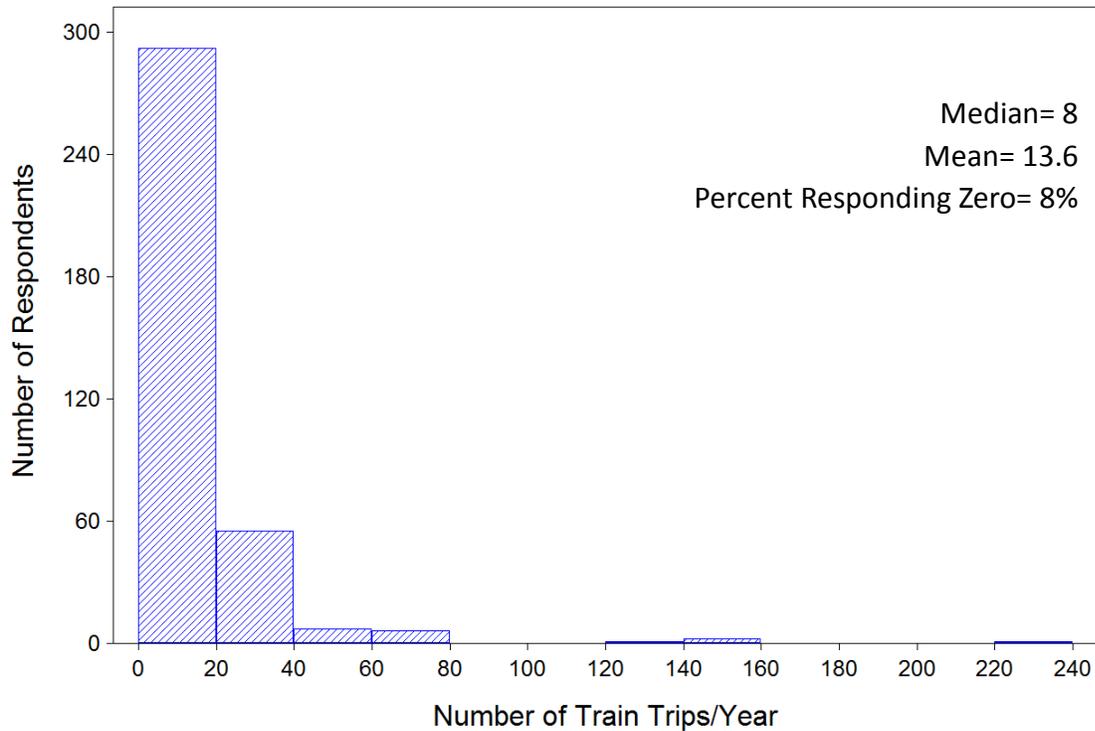


Figure 20: Respondents' projected trips from the Tri-Cities to Seattle

Next, respondents that lived in and near Yakima were asked how many times in a year they would ride the train to the Seattle area via Auburn (Figure 21). The median response was 10 times per year, and the mean was 23.6 (or roughly twice a month). The large disparity between the median and the mean is again due to the substantial number of people anticipating that they might use the train for commuting. More generally, very few of the hundreds of people in the Yakima area who took the survey indicated that they would not take the train at all.

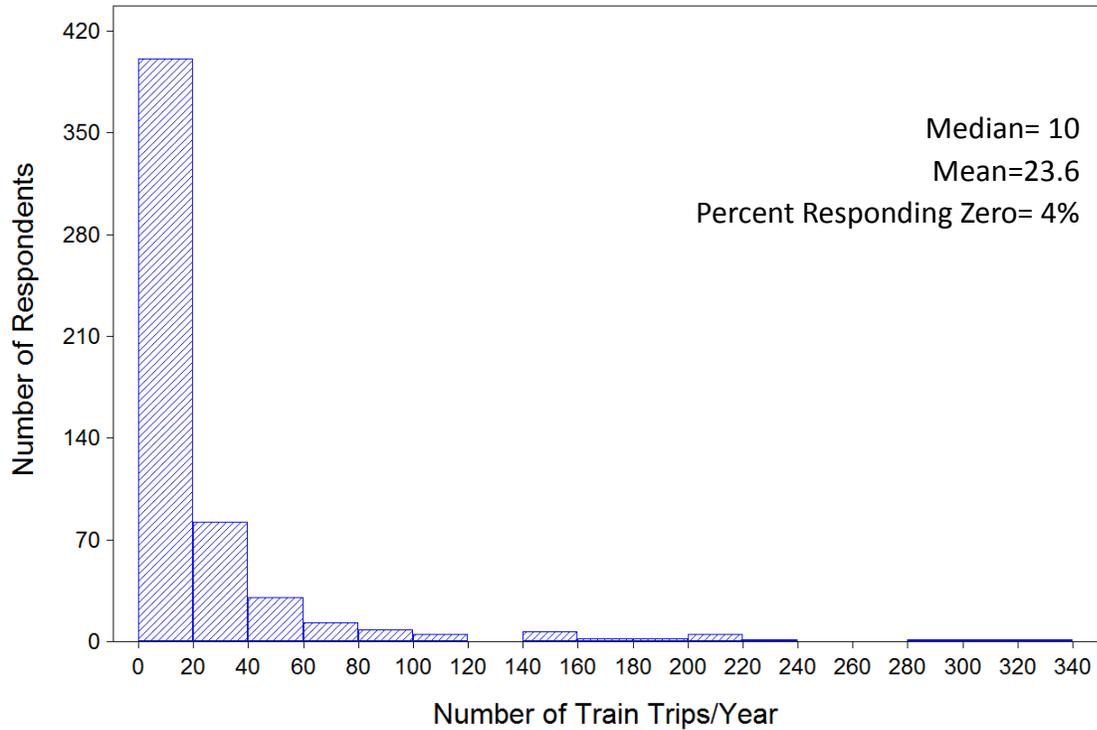


Figure 21: Respondents' projected trips from Yakima to Seattle

Finally, respondents that lived in and around Ellensburg were asked how many times in a year they would ride the train to the Seattle area (Figure 22). The median response was six times per year. Many of these trips would likely be for visiting family, especially since most of CWU’s students are from west of the Cascades. The mean of 14.7 is likely higher than the median because some students travel to see their parents every weekend. In addition, there are over a thousand residents of Kittitas County that commute to King County at least once a week (see Table 2).

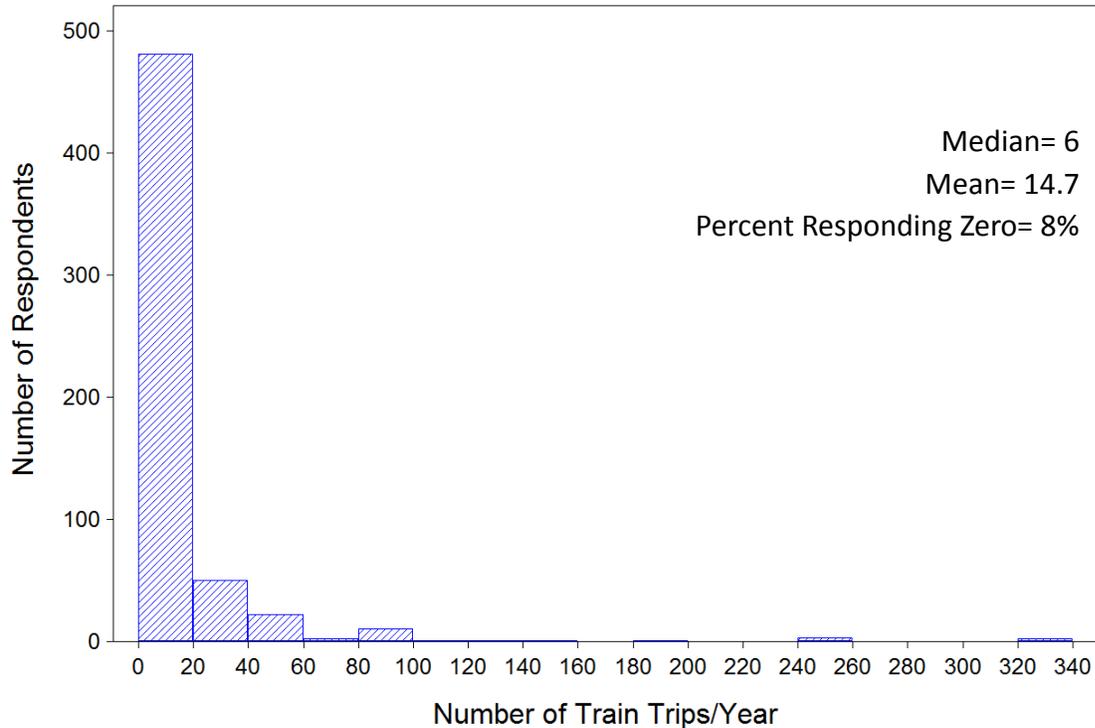


Figure 22: Respondents' projected trips from Ellensburg to Seattle

Summarizing these results, Figures 19 and 21 show that Yakima had the highest average projected trips to the Tri-Cities and Seattle at 14.4 and 23.6, respectively. This is logical, since Yakima is the largest city in the Pacific Northwest without passenger rail service. Combining the results for all cities, the projected number of train trips was compared against several of the demographic factors described above including income and age. Figure 23 shows that there was no correlation between propensity to ride the train and household income. There is a slight bimodality to the distributions both for trips to the Seattle area and to the Tri-Cities. That is, the average is slightly higher for lower income respondents and higher income respondents than those in the middle. This outcome may reflect the limited mobility options for poorer respondents and the greater leisure time of high-income respondents.

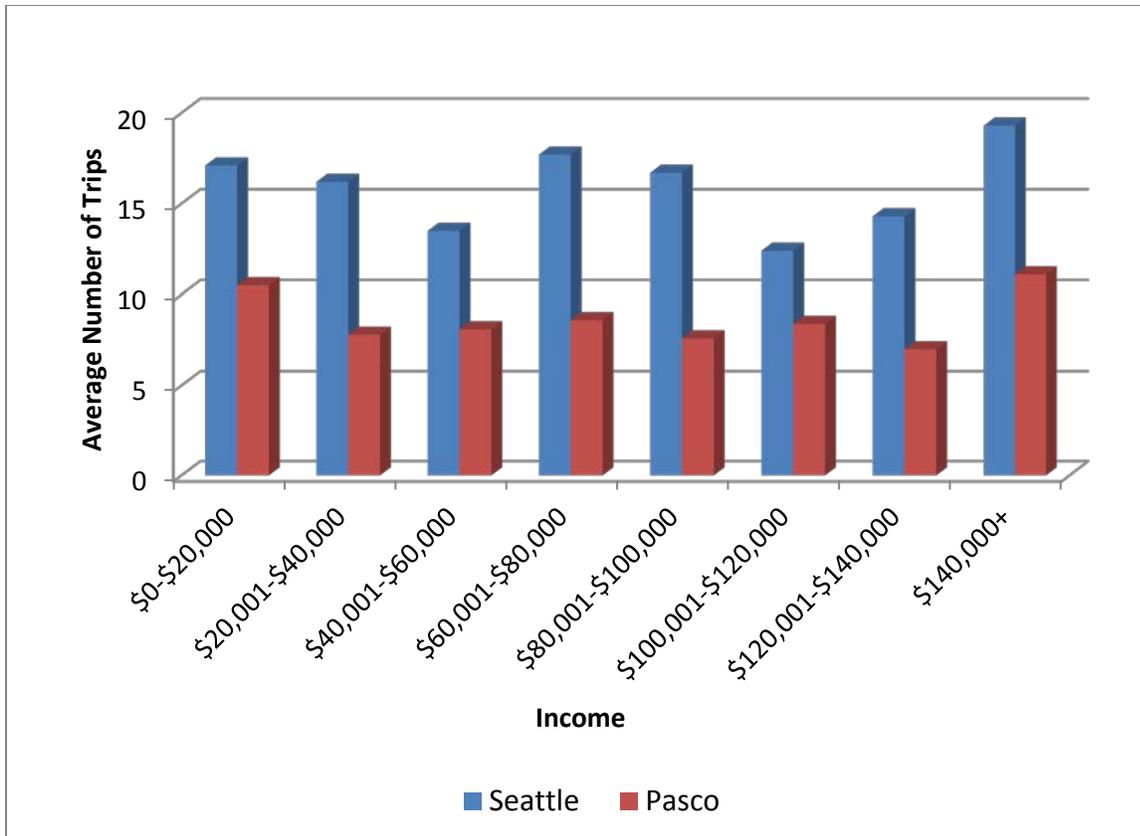


Figure 23: Predicted Number of Trips per Year by Income Class

Conversely, Figure 24 shows that there is a negative relationship between age and propensity to take the train. This pattern is much stronger for trips going towards Seattle, than for those going to Pasco. The age trend may reflect the openness of younger people to alternative modes of transport as well as more practical factors (e.g., the lack of a car). As has been widely reported in the media, fewer younger people are getting a driver’s license and those that do are waiting longer to do so (Kuhnimhof et al, 2012).

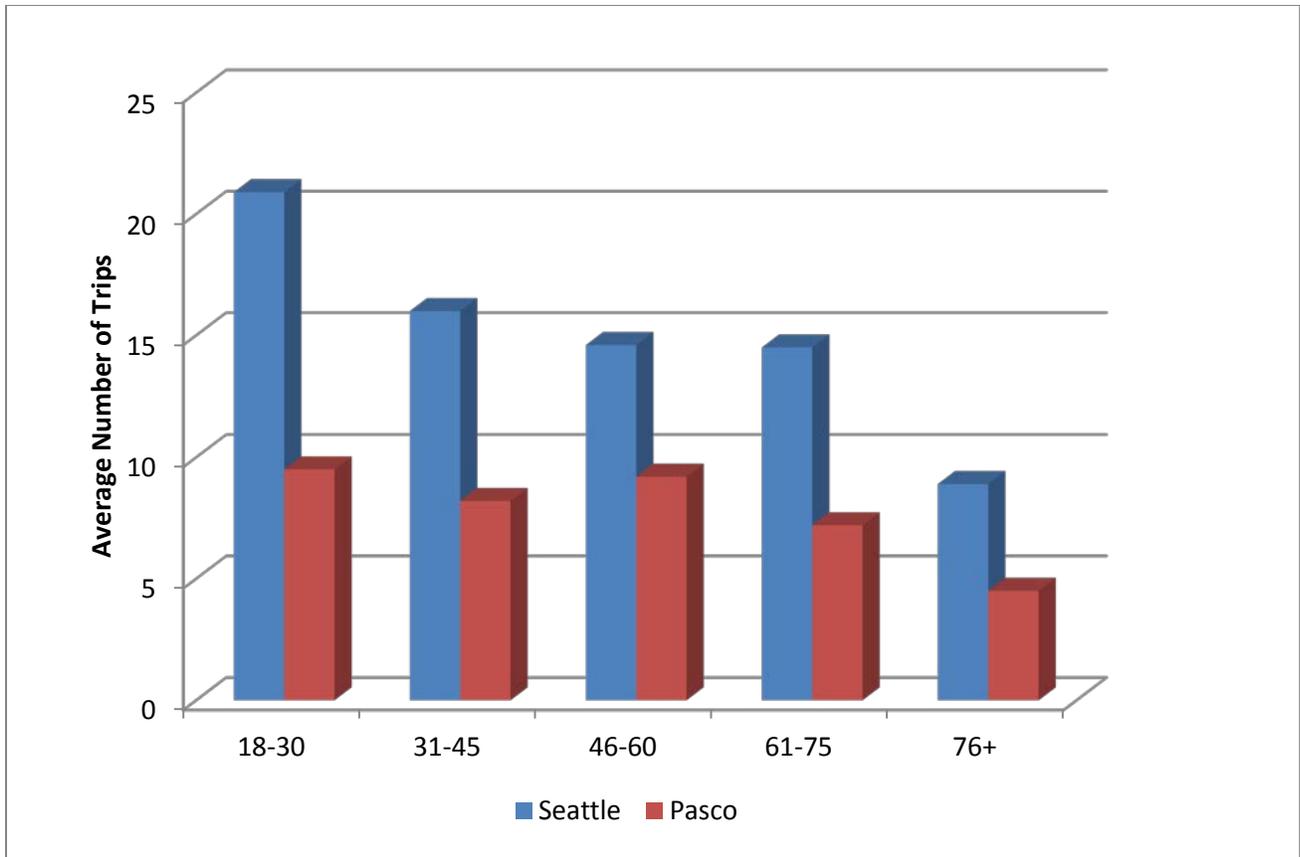


Figure 24: Predicted Number of Trips per Year by Age Class

Results – Opinions about Restoring Stampede Pass Rail Services

The last major section of the survey asked broader opinion questions about the restoration of rail services in the Stampede Pass corridor. Respondents were asked to rate how important it was to them that passenger rail service be restored, on a scale from 0 to 100 (Figure 25). Specifically, the survey asked, “On a scale of 0 to 100, how important is it to you to see scheduled passenger trains running again in the Stampede Pass corridor, where 0 indicates the idea is completely unimportant and 100 indicates the idea is absolutely important.” All of the cities had an average of over 60/100. Logically, Yakima once again felt the strongest about having service restored.

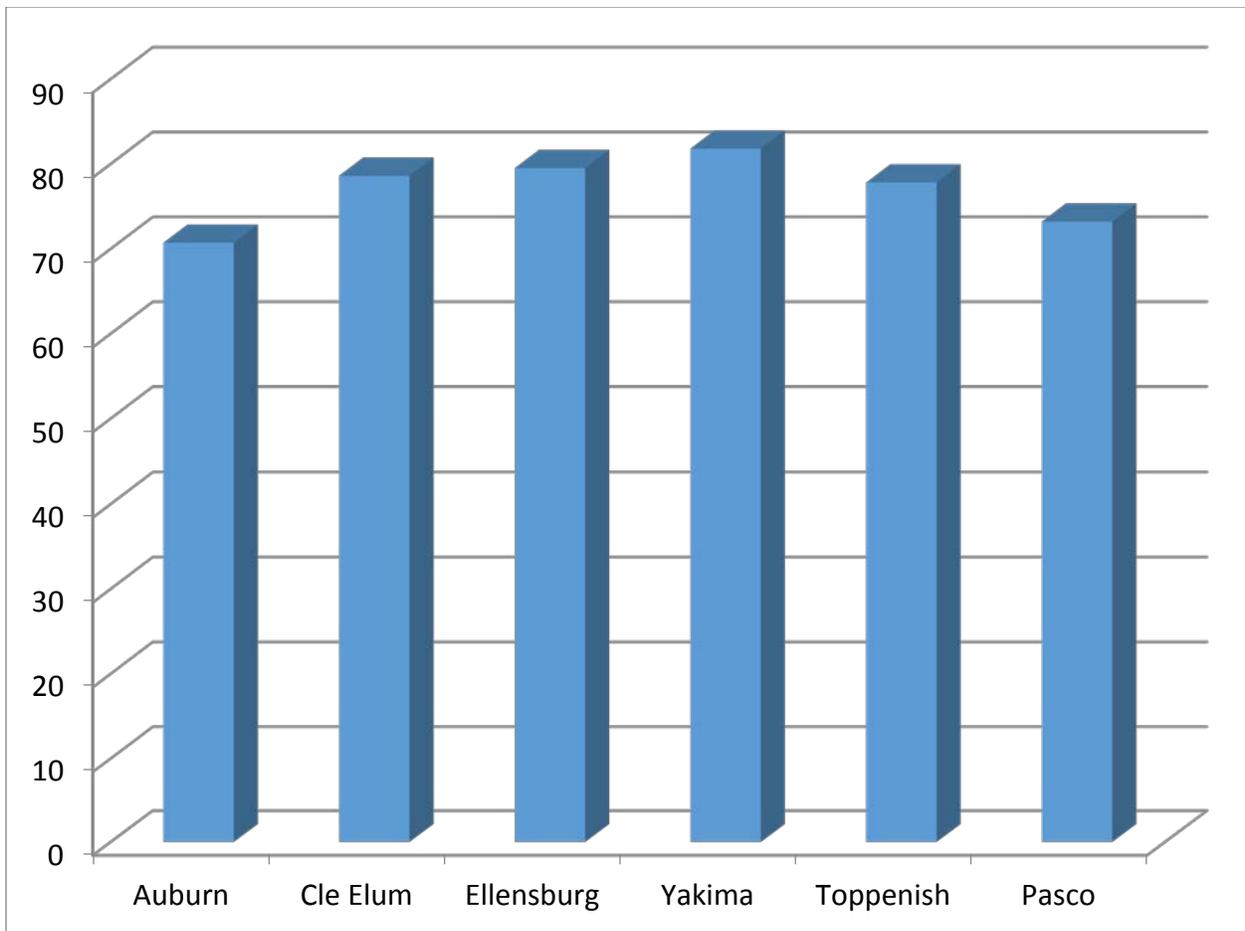


Figure 25: Measure of Perceived Importance of Restored Passenger Rail Services

The survey also inquired about how the service ought to be funded. It should be emphasized that too little is known about this hypothetical scenario to say precisely how much the capital costs and operating costs would be. The respondents' answers to this and other questions might have been different if it were possible to state that, for instance, that the restored service would cost an additional, say, \$35 in taxes per Washington State resident per year. In fact, however, such precision is not yet available and so the responses below must be considered with that proviso. In any case, respondents (who could choose more than one answer) favored a mixture of funding sources (Figure 26). Although the popularity of the various options was similar, state funding and passenger fares ranked highest.

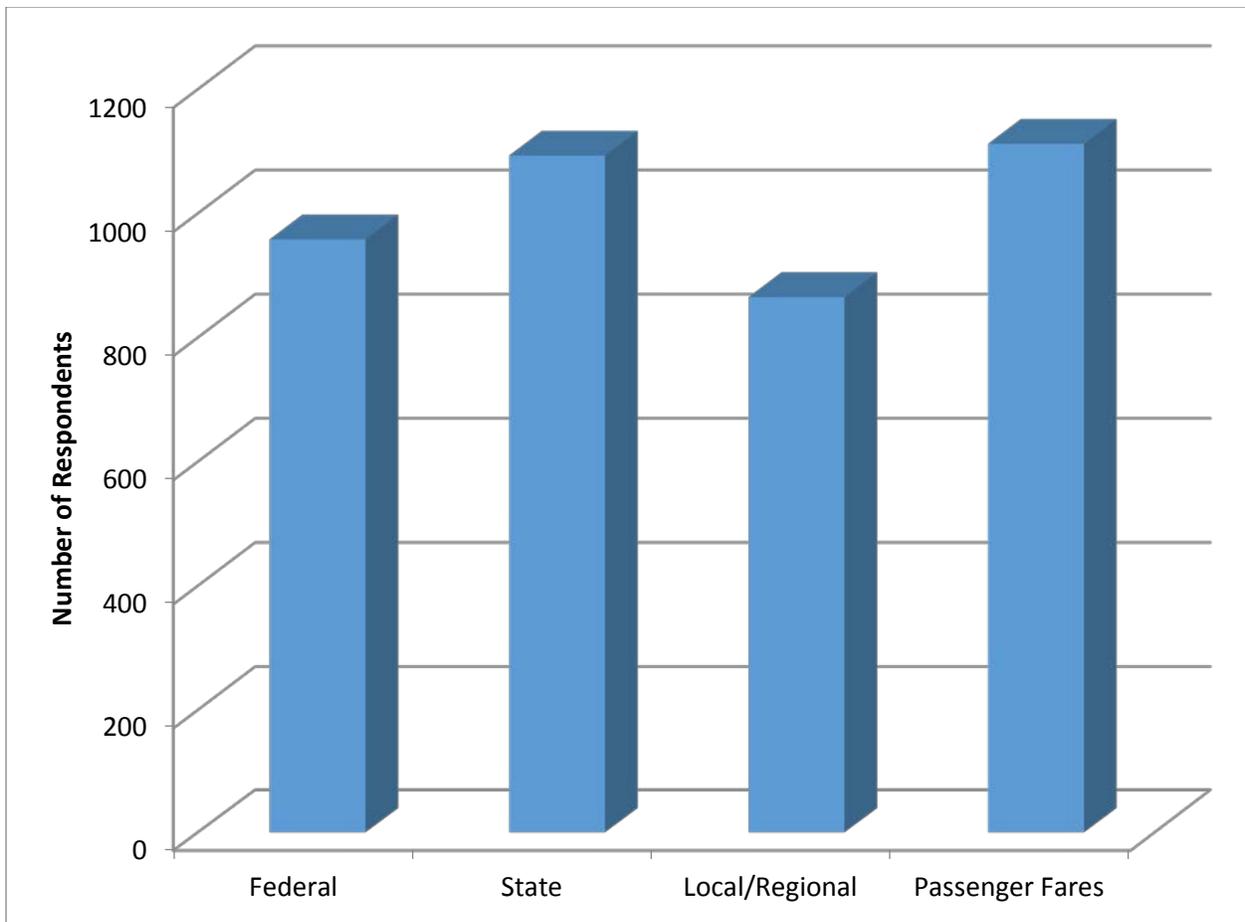


Figure 26: Preferred Funding Source for Restored Passenger Rail Services. Respondents could choose more than one option. Note that the total number of responses exceeded the size of the sample that completed the survey (2,495).

Finally, we asked survey-takers to pick the two cities along the Stampede Pass corridor at which they would most want the train to stop (Figure 27). Yakima once again had the strongest support (at over 600 votes), which makes sense since it is the largest city in Washington without any active passenger rail service. Auburn was the second highest (at just under 600). This is most likely because it would be the corridor’s gateway to the Seattle metropolitan area, which is a very attractive region for both business and leisure. Ellensburg got the third-most votes (around 450). The cities with the least votes were Wapato and Benton City, likely because both have populations below 6,000 people.

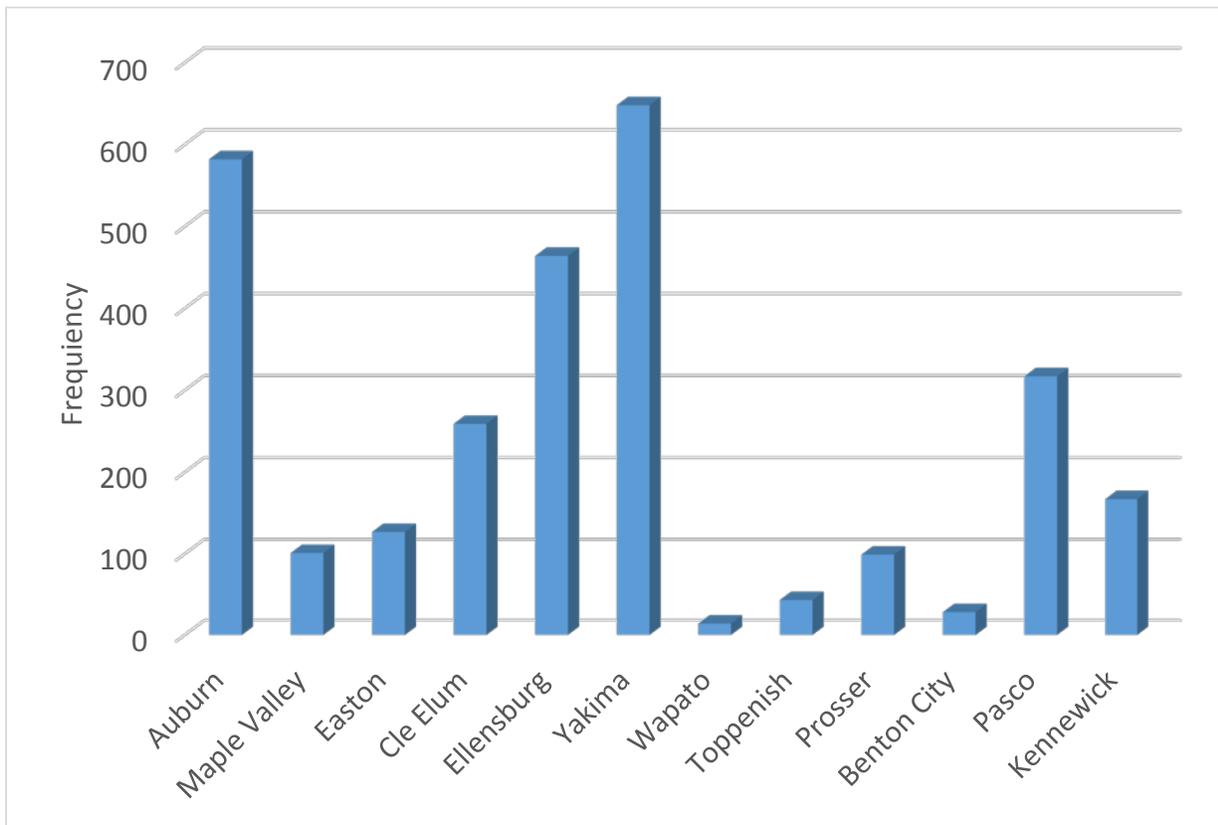


Figure 27: Cities at Which a Restored Passenger Rail Train Service Should Stop. Respondents could choose two cities.

Survey - Limitations

This report has important limitations. First, the scope of the report is limited to various features of the Stampede Pass corridor and potential demand for restored services. Whether or not to actual bring back scheduled rail services will depend greatly on the infrastructure costs of making the line suitable for shared passenger and freight services and the operating costs of the passenger services. These costs lie outside the scope of this study. Likewise, the results presented in this report address neither the potential fare box revenue for the service nor the availability of other funding sources.

Second, the survey upon which many of the results above were based was conducted in a way that likely introduced bias into the results. Because there no funds available when the survey was first implemented, the students and faculty member who conducted this study

decided to take advantage of the low-cost option of distribution via Qualtrics. This survey distribution platform allowed thousands of people from throughout the Stampede Pass corridor and beyond to freely take the survey and for the results to be easily tabulated. In distributing the survey and in promoting in mass media, the survey organizers encouraged anyone regardless of their support for restored services to complete the questionnaire. Moreover, the survey was kept deliberately brief (completion time less than five minutes) and designed so that anyone could complete it in a few minutes on a cell phone or other device. As a practical matter, however, it is probable that those who took the time to do the survey feel more strongly about the idea than the general public. An alternative survey methodology that would have produced more reliably representative results could have taken the form of either: a) surveys mailed to a randomly selected set of addresses and then repeated follow-up postcards mailed to the same addresses to maximize the return rate; or b) repeated phone calls to a randomly selected set of numbers. However, these alternatives would have been far more expensive to implement – especially over an area as large as the Stampede Pass corridor.

Third, it has been nearly forty years since scheduled passenger rail services passed through this region. So respondents' estimates of how often they would take the train over particular sectors and their preferences on where it should stop and how it should be funded are highly hypothetical. Our work was inspired in part by a somewhat similar Western Washington University study of adding a stop at Blaine, Washington to the existing Amtrak Cascades service³; but in that case, there were already well-established parameters (e.g., Amtrak's existing network and schedule) to ground the estimates of how many travelers would board and disembark at a new Blaine station. Conversely, a study of the potential use of the Stampede Pass corridor is less firmly anchored to current reality.

Fourth, the survey was distributed in English and promoted via English language media. These limitations likely explain why only 4 percent of respondents self-identified as Hispanic. The proportion of people in the corridor who are Hispanic is at least three times higher. This disparity may be due not only to the survey language but also to unequal access to devices with

³ See report here: <http://allaboardwashington.org/docs/FinalBlaineStationStopReportJune2016.pdf>.

an internet connection and differences in the amount of free time community members have to complete an opinion survey.

SUMMARY & FUTURE RESEARCH

The research presented in this report has documented a set of circumstances favorable to the restoration of scheduled passenger rail services in the Stampede Pass corridor after a hiatus approaching forty years. These factors include:

1. Historically, rail travel along the Stampede Pass corridor was vital to the economic development and everyday life of communities in central Washington and could be again.
2. Restored rail services would provide an important alternative to I-90 to overcome the formidable obstacle presented by the Cascade Mountains.
3. Seasonally heavy snowfall frequently interrupts vehicle traffic over I-90 further augmenting the appeal of another way.
4. Traffic on the segments of I-90 and I-82 paralleling the Stampede Pass corridor has grown about three fold since scheduled passenger rail service ended in 1981, and parts of the highway network are now prone to significant congestion.
5. Population in the five counties along the corridor (King, Kittitas, Yakima, Benton, and Franklin) has grown faster than the overall US population and their economies have likewise outpaced the nation.
6. In the decades since services were terminated, significant new sources of traffic generation have emerged east of the Cascades including Suncadia, a much enlarged Central Washington University, and winery-based tourism in the Yakima Valley.
7. A significant number of people commute long-distance along the corridor. The rapid growth of already very high housing prices in Seattle and its suburbs is likely to foster further trans-Cascades commuting, a portion of which might be accommodated by a rail service.

8. A survey conducted in communities along the line found strong support for restored services. Support was strongest in Yakima, which not coincidentally is the largest metropolitan area in the Pacific Northwest without scheduled passenger rail services.
9. For respondents from east of the Cascades, the predicted number of train trips per year to the Seattle area and beyond (e.g., connecting to the Amtrak Cascades between Eugene and Vancouver, BC) averaged 18. For respondents from west of the Tri-Cities, the predicted number of train trips per year to the Tri-Cities and beyond (e.g., the Amtrak Empire Builder between Portland and Chicago) averaged 10.
10. The survey found that projected use of rail services was consistent across income groups but substantially higher among younger respondents than older ones. The latter finding augurs well for the future inasmuch as it is likely to take quite few years until the trains roll again.

Yet while the results of this research hold some promise for the restoration of services, there are a number of cautionary points that should be emphasized. First, population density east of the Cascade Mountains is generally light and funds that would need to be expended to restore and operate a passenger train on the Stampede Pass corridor would have opportunity costs inasmuch as those same funds could be invested in other areas of the state with greater transportation demand. Second and related to the last point, the area served by this corridor is physically large so that the ease with which a train could be used may have been overestimated by our survey respondents; a given individual is unlikely to live and/or work close to a station on the line. Third, if and when service over the corridor resumes, its frequency will likely be low, undermining its utility for some roles (e.g., commuting). Fourth, the present study does not include any assessment of the cost of restoring services; and the survey results, while interesting, lack the rigor of a representative sample that would make them a more meaningful basis for predicting demand.

The survey featured in this report gave approximately 2,500 people in the Stampede Pass corridor and beyond an opportunity to share their views about bringing back passenger trains to this region. With few exceptions, they support the idea; but the survey was just the beginning. To move this idea farther down the tracks towards reality, more research is

required. In Fall 2017, Brett Lucas, the senior planner of the city of Cheney and an adjunct faculty member at Eastern Washington University, began work on gravity modeling and geographic information system (GIS)-based analysis of the corridor. The result of these analyses will be more precise estimates of how many people would travel on a restored rail service and over what sectors. Beyond the work of academics and students, it is vital the Washington State Department of Transportation undertake an in-depth analysis of the Stampede Pass corridor including estimation of potential demand, identification of station locations, projection of infrastructure and operating costs, evaluation of possible operators, and consideration of various funding scenarios.

It has been approximately 130 years since passenger rail services began along the Stampede Pass corridor and nearly 40 years since they ended. This report has sketched some of the important parameters of the corridor and has given some sense of public support for the restoration of services. Yet whether and how scheduled rail passenger services should be restarted remain important, open questions. The present report is a step towards providing an answer, but it is important to keep going. As Will Rogers once said, “Even if you’re on the right track, you’ll get run over if you just sit there.”

ACKNOWLEDGMENTS

Most of the work presented in this report was done at no cost by Central Washington University students and a faculty member. In Summer 2017, the work of Noah Westbay (who was among those students and who graduated from CWU in June 2017) on the further distribution of the survey and analysis of the results was funded by a contract between All Aboard Washington and CWU. CWU also contributed funds to support this research effort. We are grateful for their support.

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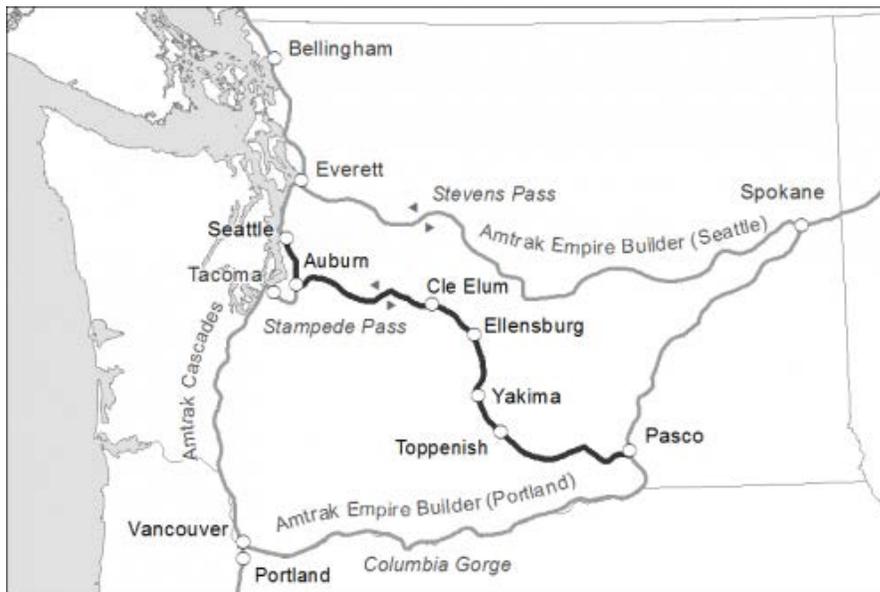
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APPENDIX 1: THE SURVEY (YAKIMA VERSION)

Central Washington Passenger Rail Restoration

Recently, a group of community leaders, rail travel supporters, and other stakeholders have begun working on a project to restore passenger rail service in the Stampede Pass corridor linking the Tri-Cities to the Seattle metropolitan area. The last passenger train in this corridor passed through in 1981. If service is restored, it will probably be on Amtrak, with stops in Pasco, Prosser, Toppenish, Yakima, Ellensburg, Cle Elum, Roslyn, Auburn, and Seattle and potentially other communities too. The route would link to the existing Amtrak Cascades service between Eugene, Oregon and Vancouver, British Columbia through Seattle and the Amtrak Empire Builder service between Portland and Chicago through Pasco. Amtrak is interested in exploring the technical feasibility of this service. The survey below is intended to gauge potential demand. If there is support, it will make it more likely that this idea moves forward, though it still may be years before the train returns.



You must be 18 years or older to participate in this survey. This survey will take approximately 10 minutes to complete. By choosing to participate you will help expand the knowledge about public interest in and support for restored rail passenger service in Central Washington.

Your decision to participate is strictly voluntary. There are no anticipated risks, physical discomforts, or psychological stresses associated with these research procedures. You are free to answer all, some or none of the questions on the survey. You may withdraw from participating at any time and to do so you simply close your internet browser. Declining to participate will involve no penalty to you. If you submit a survey, your responses are recorded without any personal identifiers, so your responses are completely anonymous. We hope to gather approximately 500 responses. Data will be stored on a secure server and can only be accessed by the research team. Reasonable and appropriate safeguards have been used in the creation of the web-based survey to maximize the confidentiality and security of your responses; however, when using information technology, it is never possible to guarantee complete privacy.

You can ask questions about the research by contacting John Bowen, Department of Geography, Central Washington University, Ellensburg, WA 98926; (509)-963-1130. You may also contact the CWU Human Protections Administrator if you have questions about your rights as a participant or if you think you have not been treated fairly. The HSRC office number is (509) 963-3115.

1 Before asking about your potential use of a new train service in the Stampede Pass corridor, we first want to ask about your experiences traveling train and other modes. In the past twelve months, how many times did you travel by train on routes that began in Washington or ended in Washington (for instance, Seattle-Bellingham, Chicago-Spokane, Pasco-Portland)?

2a If you used the train at least once in the past twelve months, what city was the most common place for you to start your train trip?

2b What city was the most common place for you to end your train trip?

3 For the route you identified above, what was the most important reason you took the train? Circle one.

- The train was more convenient than other ways of getting to where I was going. (1)
- The train was faster than other ways of getting to where I was going. (2)
- The train was less expensive than other ways of getting to where I was going. (3)
- Traveling by train is fun. (4)
- I was traveling in a place where I did not have a car. (5)
- Other (6)

4 How many trips you have taken to each of the indicated places in the past twelve months by any mode (car, bus, train, air, etc.)? If you are not sure, then please estimate.

Tacoma, Auburn, and Tacoma suburbs

Seattle, Bellevue, and other Seattle suburbs

Kennewick-Richland-Pasco

5 For each place where you made at least one trip in the past twelve months, please indicate the main reason you traveled there.

	Business/Work (1)	Shopping (2)	Recreation/Tourism (3)	Visit family and friends (4)	Other (5)
Tacoma, Auburn and Tacoma suburbs (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seattle, Bellevue and other Seattle suburbs (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kennewick-Richland-Pasco (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6 Based on Amtrak's schedules and fares in other markets, a train from Yakima to Seattle might take about 3 hours 30 minutes and cost about \$27 one way (value fare). If the train cost this much and took this long, approximately how many trips per year to the Seattle area do you think you personally would make by train? Assume that the train schedule worked well for your needs (for instance, that the train left around the time you wanted to leave).

7 Based on Amtrak's schedules and fares in other markets, a train from Yakima to Pasco might take about 2 hours and 20 minutes and cost about \$17 one way (value fare). If the train cost this much and took this long, approximately how many trips per year to the Tri-Cities area do you think you personally would make by train? Assume that the train schedule worked well for your needs (for instance, that the train left around the time you wanted to leave).

8 If the train could stop in any community along the Stampede Pass corridor, which TWO of the following possible stations would you be most likely to use? For example, where would you be most likely to get on and off the train. Choose two cities.

- Auburn (including connecting to north-south lines such as Sounder and the Amtrak Cascades with service to Seattle)
- Maple Valley
- Easton (including potential shuttle service to Snoqualmie)
- Cle Elum
- Ellensburg
- Yakima
- Wapato
- Toppenish
- Prosser
- Benton City
- Kennewick
- Pasco (including connecting to the Amtrak Empire Builder between Portland and Chicago)

9 If scheduled train services are restored in the Stampede Pass corridor, how should they be funded? Circle all that apply.

- Federal funding (1)
- State funding (2)
- Local and regional funding (3)
- Passenger fares (4)
- Other (5)

10 On a scale of 0 to 100, how important is it to you to see scheduled passenger trains running again in the Stampede Pass corridor, where 0 indicates the idea is completely unimportant and 100 indicates the idea is absolutely important.

11 How many people live in your household (all of the people who live at your address)?

12 What is your age?

13 In 2016, what was the approximate total household income for the people living at your address? Circle one.

- less than \$20,000 (1)
- \$20,001-\$40,000 (2)
- \$40,000-\$60,000 (3)
- \$60,001-\$80,000 (4)
- \$80,001-\$100,000 (5)
- \$100,001-\$120,000 (6)
- \$120,001-\$140,000 (7)
- more than \$140,000 (8)

14 Would you please tell us what ethnic/racial group, if any, you and the members of your household belong to? If your household members belong to more than one ethnic group, please tell us the one that is most common in your household. Circle one.

- American Indian or Alaska native (1)
- Asian or Pacific Islander (2)
- Black or African-American (3)
- Hispanic (of any race) (4)
- White, non-Hispanic (5)
- Other (6)

15 How many vehicles (including pickup trucks, SUVs) do the people in your household, including you, have?

16 Do you have any other comments about the idea of restoring scheduled passenger train service through Central Washington?