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An Analysis of Air Traffic Patterns in the Intermountain West

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Findings

An analysis of commercial air travel patterns for the major metropolitan areas of the Intermountain West between 1999 and 2009 reveals the following:

- **Air passenger travel has increased more rapidly in the Intermountain West than in the rest of the United States since 1999, consistent with the region's population growth, but all regions' passenger growth has fallen sharply during the current recession.** Rapid population growth in the region has led to increased demand for air travel. The average annual growth rate of passengers for the 21 largest corridors in the Intermountain West was 3.1 percent from 1999 to 2009, while it was just 1.7 percent nationally. The recession, however, induced an average travel decrease of 5.4 percent in the region versus 6.3 percent nationally.

- **Measured by the number of connections, the Intermountain West has two of the country's 10 most connected metropolitan areas and another five that rank in the top 100.** Airports in metropolitan Denver and Las Vegas have 127 and 97 connections to other metropolitan and micropolitan areas respectively, which rank them in the top 10 nationally. Salt Lake City and Phoenix round out the top 15. Some of the smaller metro areas in the Intermountain West are not particularly well-connected, such as Albuquerque, Tucson, Boise, and Colorado Springs. Others such as Reno, Boulder, and Santa Fe don't make it into the top 100.

- **Two of the top 10 most travelled air corridors in the nation and 21 of the top 100 lie in the Intermountain West.** The corridors linking Los Angeles to Las Vegas and Phoenix attracted over 3.7 and 3.4 million passengers respectively during the last year to rank ninth and 10th in the country by volume. The Los Angeles-Denver corridor accommodates another 2.7 million passengers and ranks 17th. Overall, Denver boasts eleven corridors in the nation's top 100, Las Vegas seven, and Phoenix six. Among short-distance routes of less than 400 miles, only the hyper-trafficked LA-San Francisco corridor boasts more traffic than the Vegas-LA and Phoenix-LA corridors. These extremely busy corridors are critical links in the nation's air system. The busiest of them may be good candidates for high speed rail (HSR) development.

- **On-time performance continues to improve in the Intermountain West metros, which now outperform the rest of the nation, even as flight delays over the long term proliferate around the country.** During the last year, 82.3 percent of arriving flights in the major Intermountain West metros were on time, compared to 78.9 around the country, and each delay was an average of almost six minutes shorter in the Intermountain West. Salt Lake City has the most efficient airports in the country in terms of on-time arrivals.

The current economic recession has provided a temporary respite from the challenges associated with fast air traffic growth in the Intermountain West. Soon, though, growth will return, and with it the need to address capacity and system-management problems in the region's metros and short-haul corridors. Policymakers need to focus aviation investments on the metropolitan hubs and consider the development of rail options along the heaviest trafficked short-haul corridors.

I. Introduction

Airports, air hubs, and air linkages are critical influences on metropolitan and megapolitan prosperity, and nowhere more so than in the Intermountain West.[1]

Given the region's vast distances and relatively under-developed inter-urban rail and highway systems, air hubs and corridors have played an important role in linking the region's metros and megas to each other—and to the global economy.[2]

How rich those links are, how busy, and how timely they are amounts to an important influence on economic performance. After all, the robustness of a locale's air links has been shown to enhance interconnectedness, confer productivity gains, and increase efficiency for firms.

This brief, therefore, gets beyond broad assertions about the importance of air connectivity and assesses exactly where people are flying in and around the Intermountain West and just how often their flights take-off and land on-time.

Fortunately, these patterns and dynamics do not exist in a locational vacuum. Simply put, commercial air travel is primarily a metropolitan system based in airports located within metropolitan and megapolitan areas in the region. Therefore, studying national air travel patterns is really another component of studying inter-metropolitan travel patterns more broadly. It also means that maximizing air travel performance is inseparable from maximizing the performance of the overall intermetropolitan transportation system in the West.

Along these lines, this brief—which discusses key Intermountain West implications of the national Brookings Metropolitan Policy Program report "Expect Delays: An Analysis of Air Travel Trends in the United States"—provides several types of new information.[3]

First, it assesses national and Intermountain West travel trends over time, including into the current recession. Then the brief disaggregates those national passenger statistics to reveal travel patterns as they implicate the specific metropolitan area hubs and corridors out of and through which the majority of that travel occurs. Next, the report analyzes the on-time performance seen in U.S. metros. Finally, the brief derives from these findings a series of critical implications and implementable recommendations for policymakers.

[1] See, for example, Robert Lang, Andrea Sarzynski, and Mark Muro, "Mountain Megas: America's Newest Metropolitan Places and a Federal Partnership to Help Them Prosper" (Washington: Brookings Institution, 2008).
[2] Ibid.
[3] Adie Tomer and Robert Puentes, "Expect Delays: An Analysis of Air Travel Trends in the United States" (Washington: Brookings Institution, 2009).

II. Findings

A. Air passenger travel has increased more rapidly in the Intermountain West than the rest of the United States since 1999, consistent with the region's population growth, but all regions' passenger growth has fallen sharply during the current recession.

Air traffic tracks with the economy. As the economy grows, people fly more. And so the number of air passengers nationally grew by an annual rate of 3.5 percent from 1990 to 2008, increasing from just under 500 million to 807 million. This is the same rate as real GDP growth over the same period and exceeds the rate of population growth by a multiple of about three. Likewise, the close link between flying and the economy means that the recession has also depressed passenger numbers. Between 2007 and 2008, the drop was 3.5 percent and, based on data through March of 2009, the predicted annual drop from 2008 to 2009 would be another 6.3 percent. Even worse, the data from domestic carriers are available through June of 2009 and show a drop of 7.8 percent compared to the annualized measure from June of 2008.[4] Such traffic declines are typical during recessions and suggest that the market will bounce back as the economy recovers.[5]

In the Intermountain West all of these trends are very much in display. As discussed at length in the Brookings report "Mountain Megas," the Intermountain West has been characterized by extreme growth in jobs and population.[6] It should come as no surprise, then, that air travel patterns have followed suit. For example, the average annual growth rate of passengers for the 21 largest corridors in the Intermountain West was 3.1 percent from March 1999 to March 2009 (annualized), while it was just 1.7 percent nationally.

This faster growth, however, has not spared the region from a sharp downturn in traffic. In fact, in some of the largest Intermountain West corridors, the year-over-year fall based on the most recent 12 month period (April 2008 to March 2009) was more pronounced than the national decline: Air travel between metropolitan Las Vegas and metropolitan Los Angeles fell 13.4 percent; travel between LA and Phoenix fell 13.0 percent; Chicago-Vegas traffic was down 13.6 percent; and the Vegas-Phoenix line was down 18.5 percent. Taking the average of the largest Intermountain West corridors, passenger growth was down 5.4 percent versus the 6.3 percent drop in national passenger levels. The region's links with San Francisco proved more durable, and airports in metropolitan Denver came out relatively unscathed.

[4] Annualized travel refers to the use of any consecutive twelve month period to construct travel measures. These moving, twelve month measures control for seasonal variation and permit comparisons from any time of year to previous annual measures.

[5] Based on U.S. Air Carriers only, the other years with air travel decreases since 1956 were 1970, 1975, 1980, and 1981.

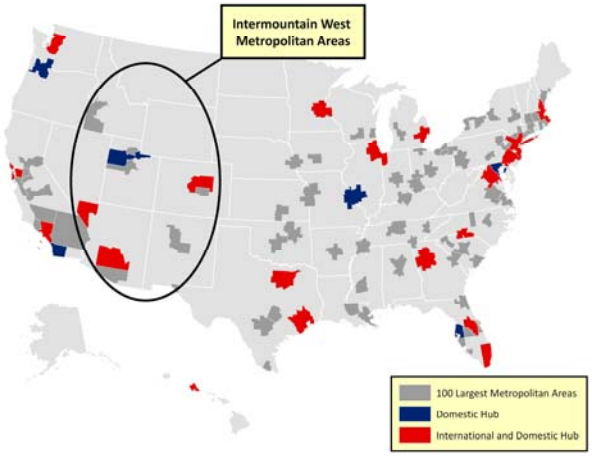
[6] Robert Lang and others, "Mountain Megas."

B. Measured by the number of connections, the Intermountain West has two of the country's 10 most connected metropolitan areas and another five that rank in the top 100.

The U.S. airport network operates on a hub-and-spoke system, with smaller airports feeding into larger hubs.[7] As a result, a relatively small number of metropolitan hubs absorb the vast majority of traffic.[8]

This is very much true in the Intermountain West. Based on the one-percent rule established in "Expect Delays" for both domestic and international passengers, the Intermountain West contains three metropolitan areas that serve as both international and domestic hubs: Phoenix, Las Vegas, and Denver. It also contains a fourth metropolitan area that serves as a domestic hub only: Salt Lake City. To put these figures in perspective the country has only 26 domestic hubs and 20 international ones.

Figure 1. The Mountain West boasts three international and domestic hubs and one domestic one



Source: T-100 Market Data

Another method for showing the sizable air service available in the Intermountain West is by examining metros' connectivity to other metros. One way to show this density of connectivity is by summing up the number of metropolitan and micropolitan areas directly served by each metropolitan area. Using this data, two Intermountain West hubs—Denver and Las Vegas—rank among the top 10 best-connected metros nationally, with 127 and 97 connections respectively. Salt Lake City and Phoenix round out the top 15. Such extensive connectivity facilitates travel both within and outside of the region, enabling these metropolitan areas to operate as focal points for the Intermountain West as well as the domestic aviation system. Of course, several of the smaller top-100 metro areas in the region—places such as Albuquerque, Tucson, Boise, and Colorado Springs—remain only modestly well-connected. And other smaller metros—such as Reno, Boulder, Yuma, and Santa Fe—don't make it into the top 100.

[7] For more hub-and-spoke information, see: Reconnecting America "Missed Connections: Finding Solutions to the Crisis in Air Travel," 2002. Two follow-up reports also discuss the hub-and-spoke system.
[8] Tomer and Puentes, "Expect Delays."

Table 1. Denver and Las Vegas are two of the best-connected metro areas in the nation as measured by metro- and micropolitan area connections

Metropolitan Area	Connections	National Rank
Atlanta-Sandy Springs-Marietta, GA	145	1
Chicago-Naperville-Joliet, IL-IN-WI	133	2
Denver-Aurora, CO	127	3
Dallas-Fort Worth-Arlington, TX	124	4
Minneapolis-St. Paul-Bloomington, MN-WI	122	5
Detroit-Warren-Livonia, MI	114	6
Houston-Sugar Land-Baytown, TX	109	7
Charlotte-Gastonia-Concord, NC-SC	98	8
Las Vegas-Paradise, NV	97	9
New York-Northern New Jersey-Long Island, NY-NJ-PA	96	10
Salt Lake City, UT	84	14
Phoenix-Mesa-Scottsdale, AZ	83	15
Albuquerque, NM	35	35
Tucson, AZ	22	49
Boise City-Nampa, ID	18	57
Colorado Springs, CO	15	64

Source: T-100 Segment Data, Annualized, March 2009

C. *Two of the top 10 most travelled air corridors in the nation and 21 of the top 100 lie in the Intermountain West*

Some of the nation's busiest air corridors lie in the Intermountain West. Ranked 9th in the nation, the corridor connecting Las Vegas to Los Angeles attracted 3.7 million international and domestic passengers from April of 2008 to March of 2009. Before the recession, in the 12-month period ending in March of 2008, the figure was 4.3 million.[9] In all, Las Vegas serves as a node for seven of the top 100 corridors. In addition to LA, its other top-100 connections, in order of size, are with San Francisco, Chicago, New York, Denver, Phoenix, and Atlanta.

Ranked 10th in the nation, the LA-Phoenix corridor also sees a large flow of air traffic, with 3.4 million passengers recorded over the last year of available data and almost 4 million from previous twelve month period. Aside from Vegas and Denver, Phoenix is the only other metropolitan area node in the Intermountain West to make the top 100, but it has six such routes.

Meanwhile, Denver's status as a major center of transportation is illustrated by the fact that it serves as a node for 11 of the nation's top 100 air corridors. Denver's densest corridor is also

[9] This figure for the LA metropolitan area excludes Riverside. Including it would add another 778,000 in 2008 passenger traffic between LA and Vegas, brining the total 5.1 million. To put this figure in an international perspective, 1.5 million passengers flew between London's Heathrow and Paris's Charles De Gaulle in 2008, according to data from the European Commission, available at http://epp.eurostat.ec.europa.eu/portal/page/portal/transport/data/database (September 2009).

with LA, and that route channeled 2.7 million passengers over the last year, making it the 17th most populous route overall.

As to the region's other metropolitan areas, none participate in any of the nation's 100 busiest air corridors.

It should be said that traffic trends in all of these areas have corresponded to their local economic fortunes.[10] Phoenix, which has seen a 9.3 percent loss in jobs since its peak, saw an average drop of 9.4 percent in passenger traffic across its six top routes over the last year of available data. Likewise, after rapid gains in passenger flows over the last 10 years, Vegas saw an average drop in passengers of 9.0 percent across its top routes, accompanying a 7.1 percent loss in employment from its peak. Only Denver, which has fared fairly well during the recession—with employment down by just 4.2 percent from its peak—has remained relatively stable. Air travel across Denver's top routes saw an average decrease of just 2.4 percent over the last year. Some of Denver's modest reduction in traffic over the last year could also be explained by the fact that it hosted the Democratic National Committee Convention in August of 2008.

Table 2: Two of the top 10 busiest national air corridors and four of the busiest 20 in the nation lie in the Intermountain West

Rank	Metro Area 1	Metro Area 2	Distance (miles)	Total Passengers	Change	
					1-Year Change	10-Year Change
1	Miami-Fort Lauderdale-Miami Beach, FL	New York-Northern New Jersey-Long Island, NY-NJ-PA	1,067	8,748,534	-6.20%	30.50%
2	Los Angeles-Long Beach-Santa Ana, CA	San Francisco-Oakland-Fremont, CA	347	6,306,638	-8.30%	-17.70%
3	Atlanta-Sandy Springs-Marietta, GA	Miami-Fort Lauderdale-Miami Beach, FL	574	5,045,415	1.70%	10.50%
4	Chicago-Naperville-Joliet, IL-IN-WI	New York-Northern New Jersey-Long Island, NY-NJ-PA	733	4,705,007	-17.10%	-3.70%
5	Atlanta-Sandy Springs-Marietta, GA	New York-Northern New Jersey-Long Island, NY-NJ-PA	768	4,544,176	-4.70%	14.50%
6	Los Angeles-Long Beach-Santa Ana, CA	New York-Northern New Jersey-Long Island, NY-NJ-PA	2,458	4,355,755	-0.70%	14.00%
7	New York-Northern New Jersey-Long Island, NY-NJ-PA	Orlando-Kissimmee, FL	955	4,032,427	-8.00%	39.00%
8	New York-Northern New Jersey-Long Island, NY-NJ-PA	London, United Kingdom	3,468	3,881,558	13.10%	0.70%
9	Las Vegas-Paradise, NV	Los Angeles-Long Beach-Santa Ana, CA	229	3,733,037	-13.40%	-16.50%
10	Los Angeles-Long Beach-Santa Ana, CA	Phoenix-Mesa-Scottsdale, AZ	358	3,434,874	-13.00%	-10.40%
17	Denver-Aurora, CO	Los Angeles-Long Beach-Santa Ana, CA	853	2,723,775	1.60%	15.00%
20	Las Vegas-Paradise, NV	San Francisco-Oakland-Fremont, CA	411	2,553,818	-2.40%	48.60%
21	Chicago-Naperville-Joliet, IL-IN-WI	Denver-Aurora, CO	892	2,535,863	-2.60%	-3.80%
35	Chicago-Naperville-Joliet, IL-IN-WI	Las Vegas-Paradise, NV	1,518	2,099,833	-13.60%	48.60%
38	Las Vegas-Paradise, NV	New York-Northern New Jersey-Long Island, NY-NJ-PA	2,253	2,035,113	-1.60%	131.40%
45	Denver-Aurora, CO	San Francisco-Oakland-Fremont, CA	962	1,928,848	-4.00%	-10.50%
52	Chicago-Naperville-Joliet, IL-IN-WI	Phoenix-Mesa-Scottsdale, AZ	1,442	1,866,299	-10.10%	18.70%
55	Denver-Aurora, CO	Phoenix-Mesa-Scottsdale, AZ	602	1,818,332	-7.40%	49.60%
56	Denver-Aurora, CO	Las Vegas-Paradise, NV	629	1,799,122	-5.70%	85.20%
61	Las Vegas-Paradise, NV	Phoenix-Mesa-Scottsdale, AZ	256	1,735,790	-18.50%	-26.20%
69	Phoenix-Mesa-Scottsdale, AZ	San Francisco-Oakland-Fremont, CA	649	1,637,836	5.80%	4.60%
74	Atlanta-Sandy Springs-Marietta, GA	Las Vegas-Paradise, NV	1,747	1,566,943	-8.00%	159.80%
81	Atlanta-Sandy Springs-Marietta, GA	Denver-Aurora, CO	1,199	1,494,732	-0.80%	48.90%
82	Denver-Aurora, CO	New York-Northern New Jersey-Long Island, NY-NJ-PA	1,617	1,487,396	-7.70%	-0.10%
83	Denver-Aurora, CO	Seattle-Tacoma-Bellevue, WA	1,024	1,484,024	5.20%	12.40%
86	Phoenix-Mesa-Scottsdale, AZ	San Diego-Carlsbad-San Marcos, CA	304	1,438,177	-13.30%	-13.10%
92	Denver-Aurora, CO	Salt Lake City, UT	391	1,399,848	-2.10%	33.20%
100	Denver-Aurora, CO	Houston-Sugar Land-Baytown, TX	872	1,336,214	-0.90%	50.50%

Source: T-100 Segment Data, Annualized, March 2009

D. *On-time performance continues to improve in the Intermountain West metros, which now outperform the rest of the nation, even as flight delays proliferate around the country.*

Air traffic delays have been and will soon again be a long-term problem for U.S. flights. Over the last 10 years the percentage of domestic flights that managed to land on time has declined. Since 1999, the share of flights arriving on time peaked at 82.9 percent in mid-2003 before falling sharply to 72.8 percent in 2007 prior to the recession. The downturn has caused a drop in

[10] See Alan Berube, Howard Wial, and Alec Friedhoff, "MetroMonitor: Tracking Economic Recession and Recovery in America's 100 Largest Metropolitan Areas" (Washington: Brookings Institution, 2009)

traffic, and, as a result, improved on-time performance, bringing it back up to 78.9 percent in mid-2009. But as the economy recovers, one can expect fewer on-time flights unless there are major changes in capacity. The story is similar for on-time departures, which were down to 78.5 percent in late 2007 but back up to 83.1 percent in mid-2009.

The data on the length of delays is even worse. The trend is clearly towards longer delays. Over the last 10 years delay times of later arriving flights have gone up 11.8 percent nationally, from 50.7 minutes to 56.5 minutes, and the recession has barely improved this.

In comparison to the national average and the average of the top 100 metropolitan areas, the major Intermountain West metros performed rather well. For example, over the last year, 82.3 percent of Intermountain West arrivals were on time compared to an average of just 78.8 percent in the largest metros and 78.9 nationally. Likewise, at 85.4 percent, the Intermountain West metros have higher on-time departure rates than the national average, and are further ahead of the 100 largest metros (which average 82.8). Furthermore, the delays, when they come, are typically six minutes shorter (50.7 compared to 56.5 minutes) in the Intermountain West than for the nation and its largest metros.

Salt Lake City looks especially efficient in on-time performance, with an 86.0 percent on-time arrival rate. This puts Salt Lake City first among the U.S. metros analyzed. Three other metros—Phoenix, Albuquerque, and Boise—also rank in the top 10, with arrival rates of 83.1 percent, 83.0 percent, and 82.6 percent respectively. The other Intermountain West metros were not far behind: Tucson had 82.1 percent of its flights arrive on-time, Vegas had 81.4, Denver 80.4, and Colorado Springs also still beat the national average with 79.9 percent. The worst U.S. performers were the metro areas encompassing Palm Bay FL and New York metropolitan areas, which had on-time rates of just 69.2 percent and 66.3 percent respectively.[11]

These Intermountain West arrival rates are world-class. Phoenix SkyHarbor was recently ranked in the top 10 as one of the world's most on-time airports, bringing in 83.2 percent of its flights on-time, according to data from flightstats.com.[12] If our data were used, Phoenix would look the same relative to foreign airports, but Salt Lake City would come in at third and Albuquerque would also make the international top 10 with the current cut-off.[13]

Table 3: Intermountain West airports deliver some of the best on-time performance in the nation

[11] Intermountain West metros are less likely to cite the National Aviation System as a cause of arrival delays than other metros, which implies that their airports have sufficient infrastructure to accommodate their traffic patterns. Denver, Phoenix, and Las Vegas had the highest percentage of flights delayed by these factors (ranging 37.3 to 34.4 percent), but none were above the national average of 37.3.

[12] Jeff Koyen, "World's Most On-Time Airports." *Forbes Traveler*, September 3, 2009, Available at http://www.forbestraveler.com/jets-planes/most-on-time-airports-story.html. Similarly, the BLS data from our sources for the last twelve months reports the Phoenix metro area brought in 83.1 percent of its flights on-time. Asian countries, led by Haneda in Tokyo, faired best, with its 91 percent on-time rate. Honolulu, Detroit, San Jose, Riverside, Bakersfield, and Memphis also score at or above 83 percent.

[13] Our analysis includes the Mesa Gateway Airport as part of the Phoenix metropolitan area.

	Percent Arriving On-time	Percent Departing On-time	Avg Length of Arrival Delay (in Minutes)
Salt Lake City, UT	86.0%	88.6%	50.3
Phoenix-Mesa-Scottsdale, AZ	83.1%	83.7%	48.6
Albuquerque, NM	83.0%	86.1%	49.1
Boise City-Nampa, ID	82.6%	87.3%	51.0
Tucson, AZ	82.1%	88.6%	49.1
Las Vegas-Paradise, NV	81.4%	81.4%	51.1
Denver-Aurora, CO	80.4%	80.9%	52.7
Colorado Springs, CO	79.9%	86.6%	53.9
IMW	82.3%	85.4%	50.7
Top 100 Metros	78.8%	84.5%	56.7
National	76.1%	81.1%	56.8

Source: On-time Performance Database, Annualized, June 2009

For the most part, on-time departures from Intermountain West airports are also more likely to be on-time than the national average, but not every metro does well on both arrivals and departures. Las Vegas ranks 23rd in on-time arrivals over the last year of available data but 77th in on-time departures. Denver ranked 33rd in arrivals but 80th in departures. Still, every Intermountain West metro—including those two—score above the national average for on-time departures, and Salt Lake City and Tucson are tied for 5th place overall with 88.6 percent of their flights leaving on-time.

III. Policy Implications

These pages suggest the heavy interrelation of the Intermountain West's air system and its economic health. They also suggest the importance of the region's major air traffic hubs and corridors to its internal cohesion, and its connections to the rest of the nation.

In light of that, the importance of the region's air linkages suggests that public officials need to think broadly and with foresight about the present and future shape, capacity, and efficiency of the Intermountain West's overall inter-metro transportation system.

With substantial long-term growth predicted in the region and near-term economic recovery likely within a few years, public officials at all levels must prepare for new growth in air passenger levels and commit themselves to maximizing the long-term balance and effectiveness of the region's aviation and general transport systems.[14]

If historical travel trends continue, economic recovery will bring increased numbers of passengers and flights and more passengers and flights traveling 500 miles or less. Those trends will put increased pressures on airport capacity, increase travel delays for customers, and further intensify air travel's relative contribution to atmospheric pollutants. This situation is squarely at

[14] New projections prepared and provided to the authors by Arthur C. Nelson call for a doubling of the population in the five major Intermountain states by 2040.

odds with national and regional priorities on economic efficiency, environmental sustainability, and the provision of transportation choice.

In view of that, the broad-based aviation trends presented here raise a number of important aviation and transportation issues for planners, leaders, and public officials in the Intermountain West.

Current policies don't address the primary sources of our nation's passengers and delays—the largest metropolitan areas

If the nation's air travel network is a metropolitan network, then it is the nation's and region's largest air centers that anchor—and slow—the entire system. But contrary to the metropolitan primacy implicit in these numbers, federal aviation policy does little to recognize that these particular metropolitan areas and their airports are critical to the national interest.

The most recent federal investment, $1.3 billion in the American Recovery and Reinvestment Act (ARRA), provided only 19.9 percent of total funding to the 26 largest metropolitan areas and their commercial domestic and international service hub airports, which include Denver, Phoenix, Las Vegas, and Salt Lake City.[15] The result: Of the $2.6 billion in total investment through the Airport Improvement Program (AIP) in Fiscal Year (FY) 2009, only 21.8 percent went to these 26 metropolitan areas.[16] Even if these FY 2009 grants were extended to all of the 100 largest metropolitan areas, the total share only increases to 37.1 percent. That means that while these 26 or 100 metros handle 72.8 percent or 83.9 percent of the nation's passenger traffic, respectively, they are receiving much lower shares of the federal airport funding.

Sending a majority of this federal funding to airports that constitute a small minority of all passenger trips only serves to intensify the congestion-related pressures the country's aviation system already experiences.[17] To be sure, ARRA and AIP funds, alongside the annual subsidies from the Essential Air Service (EAS) program, ensure that more locations are reachable via air travel, irrespective of their local financing and market demand. But the gross imbalance may not well serve the region's and nation's long-term interests.

Continued growth in short-haul air travel (500 miles or less) presents special logistical, economic, and environmental challenges

Air travel will soon rebound, and that will present many benefits. For one thing, airline health is likely to improve through increased revenues. However, the coming renewed growth of overall passenger travel is likely to bring problems in the Intermountain West's short-haul market—that involving flights of less than 500 miles.

These sub-500 mile routes pose problems for several reasons. First, they place logistical stresses on limited airport infrastructure. While traveling between Atlantic and Pacific coasts may only

[15] The data is from a project list dated July 1, 2009. At that time, 90.2 percent of the $1.3 billion package has been assigned to specific airport projects. Source: Authors' analysis of ARRA reporting data.
[16] Source: Authors' analysis of Federal Aviation Administration's Airport Improvement Program data
[17] Thomas Frank, "Feds Keep Little-Used Airports in Business," *USA Today*, September 18, 2009.

be reasonably done via airplane, that is not the case when traveling over land at distances of 500 miles or less. Unfortunately, the relative lack of investment in alternative modes leaves consumers with minimal choices along such corridors. This places added stresses on airport infrastructure as airports supply capacity and personnel for all flights, irrespective of distance. In this connection, this research found that the 10 metropolitan areas generating the largest shares of flights traveling less than 500 miles were also the source of 42.2 percent of all domestic departure delays.

In addition, the environmental pollutants produced per mile are far greater on short-haul routes versus all others. This causes the average short-haul flight of 250 miles to have an emissions factor of 0.64 pounds per mile per person, while medium flights of 800 miles emit 0.45 pounds per mile per person and long-distance flights of 2,500 miles emit 0.39 pounds per mile per person.[18]

Short-haul flights are, by far, the most common routes within our domestic system. The negative effects of over-reliance on them are not minor and affect every regional, domestic, and international hub in the country.

The air traffic control system seems ill-equipped to meet the "return to normal" of increased passenger travel, further delays, and overall weaker on-time performance of the aviation system once the economy rebounds

Finally, the air traffic system seems ill-equipped to deal with the longer-term likelihood of continued expansions of air traffic. Policymakers in the Intermounatin West and nationally must therefore prepare themselves for the return to growth that will ensue as the economy recovers.

The present economic downturn has clearly had the short-term benefit of freeing up airport and air-system capacity and improving on-time arrival rates. But these boons will soon disappear as, according to the FAA's most recent forecasting report, passenger growth resumes in 2010.[19] Moreover, if history is any indication, passenger levels will increase at a higher rate than population growth and so resume airport's downward slope on on-time performance.

One reason policymakers can feel confident that such performance will continue to suffer is the reality that the same antiquated air traffic control system will be in place to manage our ever-busier skies. The federal government most recently recognized the inadequacies of its air traffic control system in 2001 and, in response, proposed a major new system known as NextGen. Unfortunately, this system has been wrought with implementation problems and, according to the most recent estimates, is still at least three to nine years from midterm implementation.[20] There is little question that the economic recovery will arrive before NextGen, meaning the country will continue to rely on its current air traffic control system and any near-term infrastructure upgrades.

[18] Emissions factors provided by the United Kingdom's Department for Environment, Food, and Rural Affairs, "Passenger Transport Emissions Factors," 2007.
[19] Federal Aviation Administration, "*Aerospace Forecast, Fiscal Years 2009 – 2025*," 2009.
[20] GAO, 2009b.

In short, the regional and U.S. air network—while enjoying a temporary breather from its rapid past growth—will soon again be stressed by serious system challenges.

IV. Recommendations

These trends and their implications pose broad policy problems for the Intermountain West and the nation. Policymakers and officials at all levels must contend with installing new capacity based on future demands, making better use of current capacity through enhanced flight distances, and ensuring the entire inter-metropolitan travel system does not cramp up due to inadequate attention on the major aviation hubs and insufficient work to provide for transportation options and redundancy.

As often is the case in transportation policy, there is no silver bullet. There are, however, a number of coordinated ideas that can help the nation and the Intermountain West improve its passenger aviation system, both now and in the future. The following three federal policy recommendations aim to cut across those three major problems and solve multiple problems at once. These federal strategies do not obviate the need for strong state and regional engagement; they simply insist upon Washington's special responsibility for tending to the efficient operation of crucial interstate, national, and globally-connected networks. Collectively these recommendations have the power to positively affect the functioning of a network critical to the competitiveness of a highly mobile, interconnected regional and national economy.

1. Empower the most congested metropolitan areas to enact congestion mitigation policies in the present and offer a national capacity plan for the future

The federal government should unleash metropolitan innovation in the Intermountain West by permitting experimentation with a range of congestion mitigation policies that reflect its spatial realities. There are many alternatives available to policymakers. One potential option is congestion pricing. By enabling airports to levy a variable charge for flights to land, some flights could be shifted to slower periods while maintaining near-peak capacity during busy periods.[21] Unfortunately, for a variety of political and equity concerns there has been little implementation of these methods in the U.S.[22]

Another alternative is complete airport privatization, which empowers private-sector ownership to maximize efficiencies and provide more immediate operational adjustments. Other countries have already implemented such plans, including Australia's Sydney Airport. However, private ownership would make airport performance more susceptible to market fluctuations and require adequate consumer protections against poorly-constructed agreements.

Due to the complexities of these two policies and many others, the federal government should authorize an independent commission to continue the legacy of the FAA's Future Airport Capacity Task (FACT). FACT's two national reports in 2003 and 2007 targeted specific

[21] Eric A. J. H. Pels, "The Economics of Airport Congestion Pricing," Tinbergen Institute Discussion Paper No. 03-083/3.

[22] Joshua L. Schank, "Solving Airside Airport Congestion: Why Peak Runway Pricing is Not Working," *Journal of Air Transport Management* 11: 417–425.

locations to install capacity expansions in both the short and long terms.[23] The most recent report also provided brief recommendations of alternative policies to decrease congestion.

The new commission could update and expand on FACT's work in a few distinct ways. First, it could broaden the range of stakeholders to include airport and other transportation officials, airline managers, researchers, and consumer groups alongside federal government officials.

Second, the commission could generate an official implementation rubric for congestion mitigation, including the specific criteria used to select particular policies for a metropolitan area. The goal would be to take a national perspective, and help metropolitan areas understand which policies are available to them based on their particular congestion levels and relationship with other metros. At the same, this rubric would not reduce local authority over airports.

Third, the commission could generate concrete eligibility requirements for federal congestion mitigation assistance. Due to increased congestion in the highest trafficked metropolitan areas, the eligibility requirements could include a hybrid of passenger levels and delay quantities. Moreover, the requirements should include provisions for reducing or enhancing funding based on performance metrics over time.

Just as Congress established two national commissions to examine the U.S. road and rail network in 2005, a national aviation commission could target the largest threats to future system operations and outline the optimal policy alternatives to address those threats. The panel's work would then inform the National Plan of Integrated Airport Systems, which outlines approved projects for the country's AIP grants over a five year period, to ensure capital investments go to the most needed metropolitan areas.[24]

Reduced congestion levels since the current recession's onset provide a window to generate such a plan and an update to FACT's 2007 report. And since Congress is currently debating FAA authorization, it's an optimal time to establish such a commission.

2. Utilize aviation corridor statistics to prioritize specific high-speed rail investments

High-speed rail holds out excellent prospects for reducing air-system stresses and providing greater choice and redundancy along high-traffic corridors, especially at distances between 200 and 500 miles. However, the proliferation of proposals to construct high-speed rail corridors around the country raises thorny issues of corridor selection and of developing criteria to prioritize investments.

How should the nation choose where to invest? It's not easy to decide.

[23] The MITRE Corporation, "Capacity Needs in the National Airspace System, An Analysis of Airport and Metropolitan Area Demand and Operational Capacity in the Future, 2007 – 2025 (FACT 2)," Federal Aviation Administration, 2007.

[24] Federal Aviation Administration "National Plan of Integrated Airport Systems, Report to Congress, 2009 – 2013," 2008.

Fortunately, though, air travel data provides an excellent tool to prioritize corridor investments—around the nation, and across the West. Studying aviation corridors especially helps probe two primary dimensions of corridor selection: distance and demand.

Research suggests that successful high-speed rail corridors require competitive travel times versus air travel.[25] Rail is fortunate to have certain built-in time advantages due to air travel's additional time expenditures: decentralized airport location (in most cases), security lines, and early gate arrival requirements. Thus, at distances of less than 400 miles high-speed rail can meet or beat air travel times, while that capability wanes up to and past 500 miles.[26] Specifically, research based on European results finds that the optimal corridor length for maximizing mode shifts from air travel to high speed rail are 200 to 300 miles.[27] The effective distances are fluid, though, depending on the rail line's speed in each corridor.[28]

Demand is another critical element of any successful transportation investment. Simply put, if you build it you'd like them to come. And here the detailed statistics for air travel among certain corridors present a detailed picture of the current marketplace for travel between points. The nearby table shows the 10 busiest corridors in the country of less than 400 miles. (The table is limited to the 400-mile threshold because research suggests that, under optimal conditions, this is the maximum distance for rail to assume a significant portion of air travel's market share.)[29]

Table 4: Largest Metropolitan Corridors less than 400 Miles, 100 Largest Metropolitan Corridors Only, Annualized March 2009

Metro 1	Metro 2	Distance (miles)	Passengers	Rank of Corridors Under 400 Miles	National Rank of All Corridors
Los Angeles-Long Beach-Santa Ana, CA	San Francisco-Oakland-Fremont, CA	347	6,306,638	1	2
Las Vegas-Paradise, NV	Los Angeles-Long Beach-Santa Ana, CA	229	3,733,037	2	9
Los Angeles-Long Beach-Santa Ana, CA	Phoenix-Mesa-Scottsdale, AZ	358	3,434,874	3	10
Dallas-Fort Worth-Arlington, TX	Houston-Sugar Land-Baytown, TX	232	2,910,797	4	13
Boston-Cambridge-Quincy, MA-NH	New York-Northern New Jersey-Long Island, NY-NJ-PA	185	2,745,311	5	16
New York-Northern New Jersey-Long Island, NY-NJ-PA	Washington-Arlington-Alexandria, DC-VA-MD-WV	222	2,396,311	6	24
Los Angeles-Long Beach-Santa Ana, CA	San Jose-Sunnyvale-Santa Clara, CA	318	2,220,207	7	30
Dallas-Fort Worth-Arlington, TX	San Antonio, TX	248	2,116,049	8	32
Chicago-Naperville-Joliet, IL-IN-WI	Minneapolis-St. Paul-Bloomington, MN-WI	342	2,030,439	9	37
Austin-Round Rock, TX	Dallas-Fort Worth-Arlington, TX	190	2,028,399	10	38
Las Vegas-Paradise, NV	Phoenix-Mesa-Scottsdale, AZ	256	1,735,790	13	59
Phoenix-Mesa-Scottsdale, AZ	San Diego-Carlsbad-San Marcos, CA	304	1,438,177	17	84
Denver-Aurora, CO	Salt Lake City, UT	391	1,399,848	19	90

Source: T-100 Segment Data

What does this data show? One thing that jumps out is that corridors running between Las Angeles and the two southernmost Intermountain megalopolises—Las Vegas and Phoenix—amount to two of the most heavily traveled short-haul air links in the nation and so may represent prime candidates for high speed rail investment, to the extent that air traffic data provides a

[25] Mar González-Savignat, "Competition in Air Transport: The Case of the High Speed Train," *Journal of Transport Economics and Policy*, Vol. 38(1): 77-108.

[26] Ibid. See Also: Nicole Adler, Chris Nash, and Eric Pels, "High Speed Rail and Air Transport Competition," Tinbergen Institute Discussion Paper, TI 2008-103/3.

[27] M Janic, "High-speed rail and air passenger transport: a comparison of the operational environmental performance," *Proceedings of the Institution of Mechanical Engineers, Part F: Journal of Rail and Rapid Transit*, Vol. 217(4): 259-269.

[28] Since many of the lines currently under consideration would only offer speeds of up to 110 mph, these limitations may significantly reduce the competitive distances.

[29] For one example, see: Ginés De Rus, "The Economic Effects of High Speed Rail Investment," Discussion Paper No. 2008-16, OECD and International Transportation Forum Joint Transport Research Centre, October 2008.

useful guide. No fewer than around 3.4 million air passengers a year have been traveling these corridors of late.

To put these numbers in perspective, the total amount of travelers on Amtrak' Acela Express and Northeast Regional lines were 11.7 million in fiscal year 2008. Yet that total corridor services 14 major metropolitan areas.[30] Based on these Amtrak statistics, aviation corridors like the L.A.-Vegas and L.A.-Phoenix links may offer an excellent customer base off of which to quickly create significant ridership and begin making returns on investment as soon as possible.[31] Respectable, too, is the traffic flowing between Phoenix and Las Vegas and Denver and Salt Lake.

To be sure, not every short distance, high-volume air corridor is a strong candidate for high-speed rail. As such, the United States must utilize the lesson from the recently opened Madrid-Barcelona corridor in Spain that an investment can achieve immediately high ridership levels if a large market exists between points.[32] It should concentrate a large share of resources in one corridor with broad political support that also consistently tests as a high-ridership corridor. Representing initial success with a single trunk line will serve as an example to the rest of the country that, when chosen carefully and empirically, high-speed rail can work.

At any rate, aviation considerations should be part of the nation's rail investment selection criteria. Regulations should require that locations with congested airports receive certain considerations in the selection process. Similarly, short-haul air travel statistics should be reviewed at regular intervals to ensure potential high-value rail markets are considered for investment. There also should be a formal process for federal railroad and federal aviation leaders to come together in their common goal to provide efficient and equitable inter-metropolitan travel.

3. Accelerate deployment of new technologies and investments to expand operational capacities in the medium term

Finally, the inevitable return of congestion raises the matter of capacity.

Accordingly, the federal government must plan ahead and begin to accelerate deployment of new technologies and investments to expand operational capacities. The primary goal of these investments must be explicit: to ease congestion and expand capacity in our nation's busiest metropolitan areas.

Since midterm implementation of NextGen is years away due to poor organization and questionable structure, the federal government must focus on near-term upgrades to the country's

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[30] Amtrak, *Northeast Corridor Trains Report*, Fiscal Year 2008, available at http://www.amtrak.com/pdf/NortheastCorridor.pdf.

[31] Among other sources, GAO found that the Japanese experience discovered higher ridership along corridors with multiple large urban areas. See: U.S. Government Accountability Office, "High Speed Passenger Rail: Future Development Will Depend on Addressing Financial and Other Challenges and Establishing a Clear Federal Role", Report GAO-09-317, 2009c.

[32] "Ave Madrid," *The Economist*, February 5, 2009. See Also: Ginés De Rus, "The Economic Effects of High Speed Rail Investment."

critical hubs, as recommended by the Government Accountability Office (GAO).[33] Based on interviews with industry stakeholders, GAO recommends that the "FAA shift its focus from planning for NextGen to maximizing what can be done with existing, proven capabilities and existing infrastructure."[34] These upgrades will directly tackle the NAS delays hurting the country's most vital airports—and are implementable now.[35]

The FAA recently formed a task force through RTCA, a non-profit organization, to also help identify the technologies available now that can increase capacity in the next few years. Their initial were delivered in September 2009.[36] The federal government should consider these recommendations and we underscore their focus on the key metropolitan areas in the system. This includes not just current bottlenecks, which the task force identified, but also metropolitan areas with looming bottlenecks. The FAA has already reported that even after current planned improvements are made across the country, some of the nation's 35 busiest airports will still need new capacity.[37]

The country can not afford to aim short—and it can not afford to send limited financial resources to under-used airports. Enhanced FAA investments in targeted metropolitan airports have the potential to significantly improve air travel delays.[38]

[33] GAO,2009b.
[34] Ibid
[35] Specifically, GAO mentions that performance-based navigation and approach capabilities, which are mature and already active in certain areas, "allow for more efficient arrival and departure procedures, … more routes, and enable the use of runways that cannot currently be used under certain conditions." There are also data communication capabilities that upgrade plane-to-control communications and, in turn, "improve air traffic controller productivity, and enhance efficiency, capacity and safety." See: *Responses to Questions for the Record: March 18, 2009, Hearing on ATC Modernization: Near-Term Achievable Goals*, GAO-09-718R, 2009e
[36] "RTCA Task Force 5 NextGen Mid-Term Implementation Task Force Report,"RTCA, 2009.
[37] GAO, 2009b.
[38] Steven A. Morrison and Clifford Winston, "The Effect of FAA Expenditures on Air Travel Delays," *Journal of Urban Economics* 63: 669-678.

IV. Conclusion

Commercial air travel in many ways built the Intermountain West. Flights between its metropolitan centers and outward into the world beyond at once have shrunk the region's wide open spaces and provided regional, national, and global connectivity.

More recently, commercial air travel and its growth since deregulation have benefited customers and Mountain region metros alike. Real ticket prices have been cut almost in half since 1978. Aviation advances have served to improve connections among American metropolitan areas and with other world cities, providing a critical tool in the growth of the country's high-end service industries. In response, national passenger levels have grown in lock-step with national economic growth since 1990. And while passenger levels began dropping in late 2008, they are expected to resume their growth in short order.

But these positive trends belie some of the serious inadequacies within commercial aviation and the transportation system as a whole. Air travel continues to produce more and more environmental pollutants, especially due to the high volume of short-haul flights. On-time performance has suffered, though not so dramatically in the Intermountain West as elsewhere. Finally, the federal government and states in the region have primarily limited their non-automobile, inter-metropolitan investments to aviation in the region, leaving consumers with little modal choice and a travel system ill-prepared to manage ever-rising gas prices.

These dueling trends have created a set of serious implications for federal and megapolitan-West policymakers. The intrinsic connection between economic growth and commercial aviation will force infrastructure investments to match upcoming economic growth. In turn, those investments must target two critical systemic elements: the large volume of environmentally and spatially inefficient flights under 500 miles and the country's critical 26 metropolitan hubs.

In response, the federal government must address these implications and implement targeted reforms. Metropolitan areas should be empowered to enact congestion-management policies. Air travel statistics must be utilized when selecting high-speed rail investments and perhaps supporting them in the Intermountain West. And the federal government simply must accelerate the deployment of available technologies to create more capacity within the current system.

The country stands at a unique moment. The return of economic expansion will require high-growth industries to be supplied with an educated workforce and goods from around the world. But none of this will be possible without an efficient and equitable inter-metropolitan transportation network.

Targeted transportation investments can create such a network and manage future growth. It is critical for the continued vitality of the Intermountain West that the country gets these investments right even as the region itself moves with foresight to design a robust, balanced, and multi-model inter-metropolitan transportation network.

Methodology

Note that this brief is a regional snapshot developed out of "Expect Delays."[39]

The data is drawn from the United States Department of Transportation's Bureau of Transportation Statistics (BTS) and two distinct commercial aviation databases, covering the years between 1999 and 2009. The national report includes data from 1990 to 2009.

The first dataset comes from the monthly Air Carrier Statistics, known as the T-100 data bank, which covers domestic and international carriers.[40] The T-100 has both a Market and Segment subset, with the former providing passenger information by flight number (giving the final destination) and the latter providing departure information by plane. The second primary source of information is the Airline On-Time Performance database, which reports time-related statistics for all domestic carriers with at least one percent of the market.

The data for each airport is compiled into a metropolitan aggregation, allowing for a more comprehensive analysis of the aviation patterns in the 100 largest population centers (based on 2007 Census data). For a full discussion of the data sources, definitions, and methods, see the full report.[41]

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[39] Adie Tomer and Robert Puentes, "Expect Delays."

[40] The Air Carrier Statistics database is also available in other combinations limited to domestic carriers and domestic flights.

[41] Adie Tomer and Robert Puentes, "Expect Delays."

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