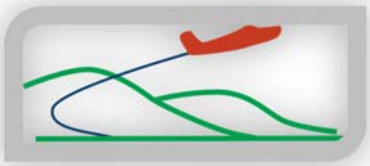

The Economic Impacts of the Pullman-Moscow Airport and Realignment Project

And Contribution to the Regional Economy

Sponsored by

Pullman-Moscow Regional Airport

DATE

March 3, 2016

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The Economic Impacts of the Pullman-Moscow Airport and Realignment Project

And Contribution to the Regional Economy

Executive Summary

- This report is an economic impact study of the Pullman-Moscow Regional Airport (PUW) and airport realignment. It was sponsored by the PUW and completed in March, 2016. The author of the study was Steven Peterson, Research Economist and Clinical Assistance Professor, Economics, College of Business and Economics, University of Idaho.[1]

Why is the Realignment Project Necessary?

- The PUW airport will lose commercial air service from noncompliance with FAA standards from inadequate airport infrastructure and face the possible long run decline of the PUW airport to a general aviation airport due to infrastructure decay and the loss of federal funding.
- The runway and taxiway are too close together for the primary Horizon/Alaska Air commercial airplane: The 76 seat (ARC) C-III Bombardier Q-400. In addition the runway together is too short (6,731 feet long) and too narrow (100 feet wide) for larger aircraft.
- The region will lose approximately $2.5 million per year in federal grants and contracts that are tied to commercial air service.
- The current airport alignment causes an average of 124 average annual commercial flight (in and out) and 160 charter flight cancellations/diversions per year due to poor weather conditions.
- PUW reliability in the winter is an important impediment to airport use and future growth.
- The total realignment cost is $119 million (including a 25% contingency fund) and the project is expected to take five years to complete (2015 to 2019).
- Most of the construction is being funded by the federal government and represents an infusion of funds into the local economy (approximately $109 million) with a local match of about $9.66 million (including a contingency fund).
- Most of the local match has been achieved including a $2 million (+) commitment from Schweitzer Engineering Laboratories (SEL) and Ed and Beatriz Schweitzer.

Why does the Regional Economy need PUW Air Service?

- In the 21st Century, airports have emerged as a regional economy's most prominent, if not the most important, transportation network. Airports, even more than modern computer networks, tie the modern world together. In the Palouse region (Moscow, Idaho - Pullman, Washington), air travel is especially important.
- The Palouse is transportation constrained, located in a rural, geographically isolated and hard to reach region of Idaho and Washington states, respectively, situated about nearly 90 miles south from the

[1] This analysis as well as its conclusions is solely those of the author and do not necessarily represent the views of the University of Idaho or any other individuals or organizations.

nearest urban center (Spokane, WA). The highways are underdeveloped, especially in Idaho, passenger rail service is unavailable, and public transportation is limited.

- Airports today are much like the railroads of the old "Wild West." Communities connected to the railroads usually thrived and prospered while those that did not have a rail connection often died. They are a necessity for modern economic development, especially in rural regions of the U.S.
- The global market place for large employers (such as Schweitzer Engineering Laboratories) and professional employees is fiercely competitive. The PUW airport increases regional competitiveness for the attraction and retention of both employers and professional employees.
- Air travel improves the quality of life of the region, promotes tourism, increases market access to start-up firms, provides access to emergency healthcare services, and promotes arts, recreation, and entertainment.

Higher Education: A Key Regional Industry Supported by PUW Air Service

- Higher education is the largest regional industry and especially dependent on air transportation which is essential for university research support, attracting and retaining world class faculty and staff, student recruitment, and support for sports teams.
- Approximately 26,199 university related flights occurred in 2015. (WSU: 15,499, UI: 10,700) costing approximately $9.0 million. About, 11,000 of these flights originated from the PUW airport (42%).
- The Palouse (Whitman County and Latah County) has two major land grant universities (Washington State University and University of Idaho) with 32,000 students (36,294 students including Lewis-Clark State College-LCSC).
- The regional economy is highly dependent on the three universities (WSU, UI, and LCSC) which directly employ 13,946 people locally and attracts $441 million direct research dollars annually.
- Factoring in the multiplier effects, the universities create 25,935 local jobs with a $1.6 billion in gross regional product contribution annually.
- The presidents of the Palouse universities (WSU and UI) fly frequently to their respective state capitals (Olympia, Boise) and rely on air travel nationally for their official activities.
- The PUW airport provides support for over 40 charter flights per year for sports teams.

High Technology Manufacturing and Services (M&S): An emerging Key Industry Supported by PUW Air Service

- Schweitzer Engineering Laboratories (SEL) forms the epicenter of a new emerging high technology manufacturing and service sector producing living wage jobs. This rapidly growing industry was in its infancy 25 years ago (effectively) and it is highly dependent on air transportation. SEL, for example, has five jets, four of them stationed at the PUW airport with its corporate headquarters in Pullman. Many of the other smaller technology firms are also dependent on PUW air transportation as their gateway to national and international markets and suppliers.
- The high technology industry (M&S) consists of over two dozen firms and directly creates 3,650 jobs in the Palouse Region (or 4,285 jobs in the Quad County).

- Factoring in the multiplier effects, M&S industries creates 6,107 local jobs with a $374 million in gross regional product contribution to the Palouse economy.
- PUW air service is essential for the future high technology manufacturing (and services) cluster growth.

Economic Impacts of the Realignment Construction Project

- PUW construction realignment project will add nearly 50% ($23.8 million per year for five years) to the average annual private Palouse construction expenditures (which averages $49 million per year).
- PUW construction realignment project will create 93 *direct* jobs annually for five years.
- Factoring in the multiplier effects, the project will create 226 total jobs, contribute $20.1 million to gross regional product to the Washington State economy (mostly in Whitman County), and add $3.0 million in local and state taxes coffers annually.

Economic Impacts of the PUW Annual Operations

- The PUW airport annually creates 212 direct jobs in the regional Quad County economy.
- Factoring in the multiplier effects, the PUW airport creates 300 local jobs, contributes $17.4 million in gross regional product, and adds $2.72 million in local and state taxes annually.

PUW Growth

- PUW enplanement increased 20% from 2014 to 2015 (41,525 to 49,830) exceeding recent forecasts and expectations. There were over 100,000 passengers (both ways) at the PUW in 2015 including charters.
- PUW airport has increased its approximate catchment (i.e. regional market share) from 26% to 37% based on the previous Mead and Hunt (M&H) forecast assumption of 135,164 catchment enplanements in 2015.
- If the PUW airport captured all the airline travelers in this market region, the economic impacts of the PUW airport would increase from 300 jobs to 814 jobs (including the multiplier effects) and contribute $47.2 million in gross regional product.
- Future Growth: The M&H baseline forecast (after adjustments for current enplanement growth) is projected to reach nearly 100,000 enplanements or double the 2015 level by year 2038. The M&H unconstrained forecast exceeds 150,000 PUW enplanements by 2038.
- Future Growth: If the adjusted baseline projection occurs, the PUW economic impacts will increase from 300 jobs impacts in 2014 to 744 jobs (including the multiplier effects) in 2038 and gross regional product will increase from $17.4 million to $43.1 million (in constant 2014 dollars).

Taxpayer Rate of Return on Assessment

- Annual taxpayer rate of return is estimated to be 6.41 as measured by year 2014. The local annual taxpayer and institutional support for the PUW airport is $130,711 (from Pullman, Moscow, WSU, UI, and Whitman County). The annual local tax revenues (mostly property taxes) generated (including the multiplier effects) is $838,394 from PUW operations. For every one dollar of tax payer support, a total of 6.41 dollars are created by the PUW operations.

Palouse Region Economic Integration

- Total full and part-time 2015 Quad County employment was 80,383 jobs of which 25,975 jobs were in the Nez Perce County, Whitman County (25,677), Latah County (20,194), and Asotin County (8,537).

- Whitman County employment grew 20% cumulatively from 2001 to 2015, Asotin County (9.6%), Latah County (6.4%), and Nez Perce County (3.1%)
- Whitman County is projected to exceed Nez Perce County in total employment in 2016/2017.
- Whitman County has become a job leader with manufacturing and high technology employment increasing 228% cumulatively from 2001 to 2015. WSU also increased student enrollments by nearly 3,000 students over the same time period.
- Moscow and Latah County benefit nearly equally from Whitman County economic growth due to east-west economic integration. Moscow is the retail trade hub of the Palouse and the "home" of the Palouse. There is substantial spillover growth from Pullman to Moscow. As Pullman grows, so does Moscow.
- Latah County is a job importer. In 2013 there were 2,152 (net) residents who lived in Latah County but worked outside the county (mostly in Pullman).
- Whitman County is a net job exporter. Approximately 2,171 (net) Whitman County workers lived outside the county (mostly in Moscow and Latah County).
- These income inflows from commuting patterns bring in approximately $152 million per year to Latah County which creates an approximate 800 jobs and $41 million in gross regional product. (There is also a Whitman County net economic outflow of $138 million).

Loss of the PUW Airport: Impacts of the Status-Quo --no Realignment

- The immediate loss of 226 jobs due to the construction, $20.1 million in gross regional product and $3.0 million in state and local taxes (including the multiplier effects).
- Short-term: The loss of commercial air service that will reduce 3/4ths of the PUW's current operation as it transforms to a general aviation airport, costing 225 jobs, $13 million in gross regional product, and $2 million in local and state taxes.
- Intermediate-term: An *additional* loss of general aviation services and a reduction of high technology industry employment related to air transportation and general company transportation services. It will cause an estimated reduction in Palouse employment of 200 total jobs and $12 million in gross regional product including the multiplier effects.
- Long-term (*possible impacts*): The potential loss of one or more major high technology employers creating an additional 3,347 jobs and $204 million in gross regional product, including the multiplier effects.
- Long-term (*Possible impacts*): Loss of regional competitiveness, greater difficulty in attracting new firms, and to the regional economy, reduction in regional attractiveness for professional employees and researchers, slowing of university growth, and reduced tourism and visitor spending.

In the 21st Century, airports have emerged as a regional economy's most prominent, if not the most important, transportation network. Airports, even more than modern computer networks, tie the modern world together. In the Palouse region (Moscow, Idaho - Pullman, Washington), air travel is especially important.

The PUW airport is an essential infrastructure component to the Palouse economy:

Construction Realignment Impacts: The PUW airport construction activities will directly employ 93 workers for five years, increasing to 226 workers when the multiplier effects are included, adding $20.1 million to gross regional product, and $2.5 million in state and local taxes each year.

Current Operational Impacts: The PUW airport operations and activities directly employs 212 workers, increasing to 300 workers when the multiplier effects are included, adding $17.4 million to gross regional product, and $2.7 million in state and local taxes annually.

Expected Future Growth of Operations: The PUW airport has two major sources of potential growth: 1) Future growth and expansion of the Palouse regional economy, and 2) Greater capture of market share from its catchment region:

- Palouse Regional Growth: The operational impacts increase to 744 workers including the multiplier effects (for the baseline forecast in 2038), and will add $43.1 million to gross regional product, and $6.7 million in state and local taxes.
- Capturing Market Share: At *current* full market share, the operational impacts would increase to 814 workers including the multiplier effects (for 100% market capture), and will add $47.2 million to gross regional product, and $7.4 million in state and local taxes at that time.
- Capturing Both: Proportionally, future impacts will include both future Palouse economic growth and capturing greater market share, so these impacts could increase further.

Loss of the PUW Airport: Impacts of the Status-Quo --no Realignment:

- The immediate loss of 226 jobs due to the construction, $20.1 million in gross regional product and $3.0 million in state and local taxes (including the multiplier effects). Longer term: The loss of commercial air service that will reduce 3/4ths of the PUW's current operation as it transforms to a general aviation airport, costing 225 jobs, $13 million in gross regional product, and $2 million in local and state taxes.
- Long-term (*possible impacts*): Loss of regional competitiveness, greater difficulty in attracting new firms, and to the regional economy, reduction in regional attractiveness for professional employees and researchers, slowing of university growth, and reduced tourism and visitor spending.

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THE ECONOMIC IMPACTS OF THE PULLMAN-MOSCOW AIRPORT AND REALIGNMENT PROJECT

Study Author and Sponsor

This report is an economic impact study of the Pullman-Moscow Regional Airport (PUW) and airport realignment (Figure 1). It was sponsored by the PUW and completed in March, 2016. The author of the study is Steven Peterson, Research Economist and Clinical Assistance Professor, Economics, College of Business and Economics, University of Idaho.[2]

Introduction

In the 21st century, airports have emerged as a regional economy's most prominent, if not the most important transportation network. Airports, even more than modern computer networks, tie the modern world together. Travelers within hours or days can be transported to anywhere on the planet. Goods and services increasingly are transported by air, often overnight. Air travel binds together the often geographically disparate units of business firms and corporation operations into cohesive and efficient operations. Air transportation quickly moves the critically sick and injured to hospitals, facilitates organ transplants, and unites friends and families together.

Airports are key components in attracting and retaining top performing employees in a regional economy. Airports and air service operations create living wage jobs in communities. Technology and industrial parks are often tied directly into airport locations.

In the Palouse region (Moscow, Idaho - Pullman, Washington), air travel is especially important. The Palouse is transportation constrained, situated in a rural, geographically isolated, and hard to reach region of Idaho and Washington states, respectively. The region's highways are underdeveloped, especially in Idaho, passenger rail service is unavailable, and public transportation is limited.

The Palouse has two major land grant universities (Washington State University and University of Idaho) with strong research missions. Air travel is essential for their growth of operations and the attraction and retention of faculty and staff. Both universities have numerous sports teams that rely on air travel throughout the year. In addition to the universities, the region has an emerging high technology manufacturing and services industry led by Schweitzer Engineering that employs over 2,200 workers alone. Schweitzer Engineering has four corporate jets that rely on the Pullman-Moscow Regional Airport. Airports are also important for crop spraying for local agriculture, fighting forest fires, and for governmental and military use.

[2] This analysis as well as its conclusions is solely those of the author and do not necessarily represent the views of the University of Idaho or any other individuals or organizations. Research assistance was provided by Stephen Pool, regional economist, Moscow, Idaho.

The Palouse is developing a high technology cluster that will depend on air service to reach its potential. (This cluster is supported by the Palouse Knowledge Corridor, an organization providing entrepreneurship assistance.)

The Pullman-Moscow Regional Airport is at a crossroads with the realignment project. Currently the PUW is not in Federal Aviation Administration (FAA) compliance for current or future commercial aircraft operations. Modern commercial aircraft (i.e. the 76 seat Horizon Q400 Bombardier) has "outgrown" the current airport configuration. The PUW has been given a temporary waiver that allows it to operate. Without the realignment project PUW commercial air travel will be forced to close and the remaining airport infrastructure would decay over time from the loss of commercial revenues and federal grants and contracts.

The total cost of the realignment may reach $119 million (including a contingency fund) when fully completed. Approximately $109 million (about 92%) will be provided by federal government but the project requires sizeable local matching funds ($9.66 million). This process is complicated by the unique jurisdiction of the airport covering two states, two counties, two universities, and two cities. The costs of this project to the communities is substantial, but prior analyses suggest the benefits are much higher and will likely increase sharply in the future.

This study is an economic impact assessment of the Pullman-Moscow Regional Airport (PUW) and the realignment project. It will analyze the role of the airport in the regional economy with a forecast towards the future.

Rational for PUW Airport Realignment project

Inadequate Airport Infrastructure: Today, the runway and taxiway is too close together for the primary commercial airplane - the 76 seat (ARC) C-III Bombardier Q-400. The runway is also too short (6,731 feet long) and too narrow (100 feet wide) for larger aircraft. The current airport alignment makes the runway difficult to see and navigate in poor weather conditions. The visibility minimums are higher than other comparable airports, which causes 124 average annual commercial flight cancellations and diversions per year (80% of which occur during the winter) and 160 charter flight cancellations/diversions. PUW reliability in the winter is an important impediment to airport use and future growth.

Terminal and Parking: The PUW airport has an approximate 10,000 square-foot terminal building, a 13,000 square-yard aircraft parking area, and a rental car facility. The terminal building constructed in 1989 and is currently inadequate, especially for future passenger growth. PUW passenger parking spaces are currently at or exceeding full capacity (210 parking spaces) and 46 seats in the terminal building. It is projected that by 2038 over 867 parking spaces will be needed and 137 seats in the terminal building.

Air Service for Washington State University (WSU) and University of Idaho (UI): Two large universities - University of Idaho and Washington State University rely on the airport for faculty and student recruitment and retention, research and development, extension services, and sports teams travel. Team charter jets are an important component of air travel regional demand. There are nearly 200 large turbojet aircraft chartered each year from WSU and UI sport teams with approximately 40 enplaning at the PUW and the rest (160 charters) flying out of Lewiston or Spokane airports due to the currently inadequate PUW runway or bad weather conditions.

Air Support for High Technology Manufacturing and Service Cluster: There is a high technology manufacturing and service cluster led by Schweitzer Engineering Laboratories that relies heavily on the regional air transportation system for their businesses. For example, the SEL corporate headquarters is situated in Pullman, Washington. SEL is the region's largest private employer and is the epicenter of the Palouse high technology manufacturing and service cluster. The company employs 5 corporate jets with 4 stationed at the PUW where it recently constructed a new hangar facility. SEL contributed over $2 million to the PUW Realignment Project. The company has over 2,200 employees in the Quad County Region and 3,900 worldwide.

PUW Federal Grants and Contracts: The PUW airport has averaged approximately $1.6 million per year (in constant 2014 dollars) in federal grants and contracts over the last 16 years and nearly $2.5 million per year over the last six years. Most of these funds (all but $150,000) would be eliminated with the loss of commercial air service. The passenger facility fee revenues ($166,348 in 2014) would also be lost.

Overview of the PUW Airport

Type of Airport: Technically, the PUW airport is designated as a *Primary Non-hub Airport* (enplanements of more than 10,000 annually -41,525 in 2014) with a Class E airspace designation. The PUW airport (defined as an Airport Reference Code – ARC B-III) was designed for an older generation of commercial aircraft such as the B-II Fairchild Metroliner and the 37 seat B-III Bombardier Q-200. PUW has a temporary FAA waiver that permits it to continue operations with substandard facilities. Without the realignment project, the airport will lose commercial air services (Mead and Hunt, 2014).

Location and Flights: The PUW airport is situated on approximately 468 acres 40 miles north of the Lewiston-Nez Perce Regional Airport (LLS) and 82 miles south of the Spokane International Airport (GEG). It offers commercial Horizon/Alaskan Air passenger service (direct) to the Seattle-Tacoma International Airport (SEA) with four flights per day and has about 80 operations/day with 71 based aircraft.

General Aviation Services: PUW has a variety of general aviation businesses. For example, PUW's Fixed Based Operation-FBO (mostly Inter-state Aviation) offers a variety of services, including aircraft maintenance, fueling, catering, flight training, and charter operations. The airport has 51 tie-down leased spaces, 4 individual large airplane hangars, 24 small airplane hangars, and 16,000 square yards of airplane parking.

PUW Governmental Structure: The PUW airport has a relatively unique and challenging administrative and governance structure. The airport jurisdictions include two states (Washington and Idaho), two counties (Whitman and Latah), two cities (Pullman and Moscow), and two universities (Washington State University-WSU and the University of Idaho-UI). The airport is included in the airport inventories of both Washington and Idaho.

Jurisdictional Financial Support: The Airport Board is governed by an inter-local agreement and its officers include the Mayors of the cities of Pullman and Moscow, a Pullman city council member, appointed representatives from Moscow, WSU, Latah County, an at large member. Each jurisdiction contributes annual support (2015) totaling $130,711: Pullman - $32,013, Moscow - $32,013, Whitman County/Port of Whitman County - $20,750, WSU - $18,935, and UI - $10,000.

PUW Budget and Employment: The PUW airport has 8 full-time employees and part-time employees. Total FY 2015 revenues equaled $817,283. Sources of revenues include jurisdiction support (see above), landing fees,

passenger facility charges (i.e. a per enplanement/passenger fee), rents, parking fees, and miscellaneous fees. The FY 2015 expenditures ($584,378) include salaries and benefits, supplies, equipment, and capital expenditures.

Opportunities for PUW Airport Growth and Expansion

Regional Passenger/Enplanement Leakages: Mead and Hunt estimated the PUW market region for air travel in Figure 2. It runs east-west through the Pullman and Moscow geographic corridor consisting of 30 zip codes with a 2009 population of 78,000 and an estimated 2015 population of 82,455. The total estimated 2015 enplanement passengers for the entire region was 135,164. The PUW airport captured only 49,830 of those enplanements (37%) in 2015, representing an adjusted leakage of 63% of regional airline enplanement passengers to other airports. Approximately 45% of the region's customers flew out of the Spokane International Airport (GEG), 10% out of the Lewiston-Nez Perce County Regional Airport (LWS), 6% out of the Seattle-Tacoma International Airport, and 2% from other airports.[i]

Future Growth - Regional Passenger/Enplanement Forecasts: From 1990 to 2007 PUW passenger enplanements were stagnate if not declining in numbers. Since 2007 PUW enplanement numbers have been growing robustly from 24,856 (2007) to 49,830 (2015), a 100% cumulative increase.

Enplanement Forecasts: There have been several PUW enplanement forecasts going forward conducted by various entities. Two of those are illustrated in Figure 3. The Mead and Hunt baseline forecast projects the 2038 PUW enplanement passengers at 94,147, a 69% cumulative increase. (The baseline forecast was used in this study after adjustments that were made to account for recent PUW growth). The Mead and Hunt unconstrained environmental forecast is also presented and estimates PUW enplanements at 155,400 in 2038, a 212% increase over 2015.[ii]

The PUW Realignment Project: The realigned runway will increase to 7,100 feet long and to 150 feet wide and will be able to handle aircraft with weight greater than 150,000 pounds. The preferred runway alignment rotates the existing runway and taxiway system approximately 10 degrees counter- clockwise and shifts the new runway south to allow for future landside development on Airport property.

There were a variety of realignment-related alternatives outlined in the Mead and Hunt Environmental Impact Assessment (EIS). They included: a) No Action, b) Improvements to the Existing Runway, c) Relocation of the Runway to the South Ridgeline, d) Shifting the Runway, e) Runway re-alignment, and e) Preferred Alternative: Combination of runway relocation, shifting and/or alignment. Ultimately the preferred alternative of the runway shift and a counterclockwise realignment proved to be the most cost effective while meeting the needs of the future of the PUW airport.

Under the no action scenario, alternatives included using smaller commercial aircraft, diverting passengers to other airports such as Spokane (GEG) and Lewiston (LWS), the use of automobile, and telecommuting. The use of smaller aircraft would likely result in the loss of commercial air service since the industry is moving to larger airplanes. The use of automobiles and telecommunications would likely not provide adequate services to offset the loss of PUW air transportation.

The total cost of the project including a 25% contingency fund is $119 million and the project is expected to take five years to complete (2015 to 2019). The proposed budget is illustrated in Figure 4. The federal government is paying for about 92% ($109.3 million) and the local match is about 8.2% or $9.66 million.

FIGURE 1 PUW (SOURCE: MEAD AND HUNT)

FIGURE 2: PUW MARKET REGION (SOURCE: MEAD AND HUNT)

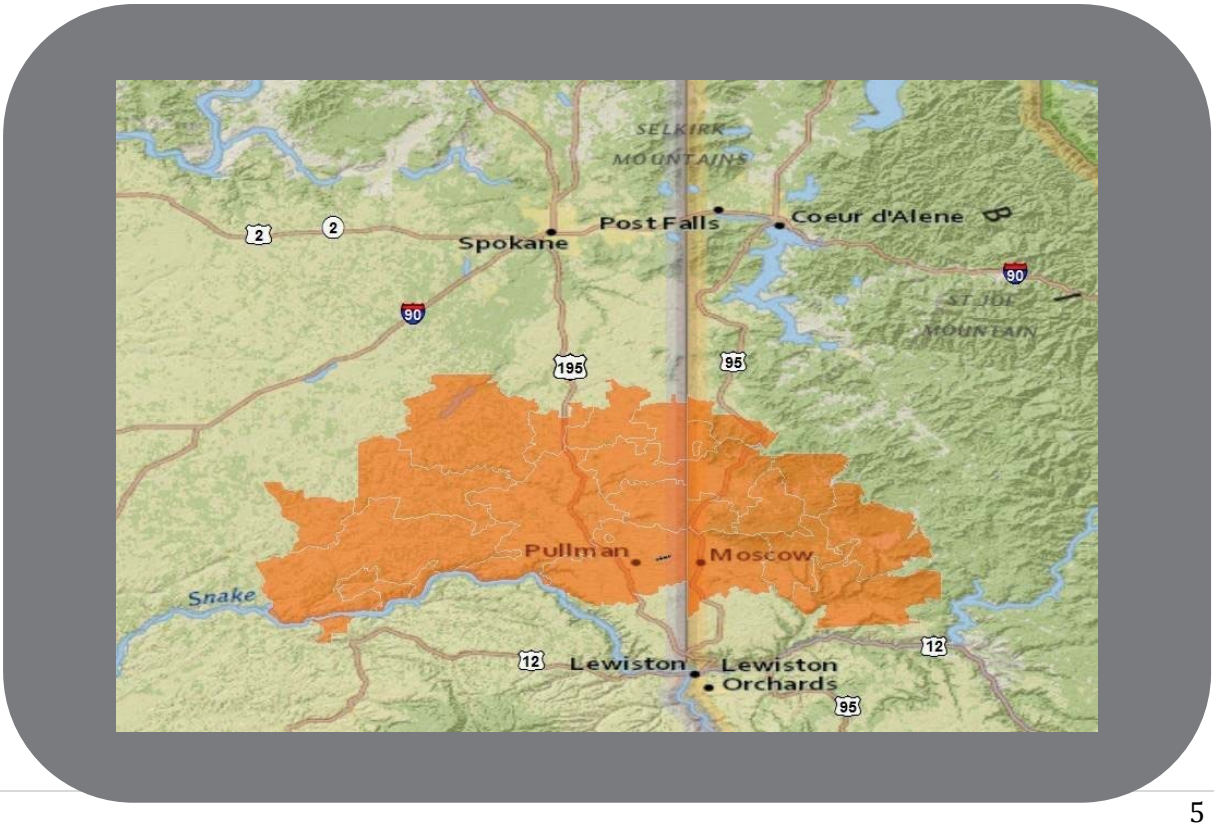


FIGURE 3: BASELINE VERSUS UNCONSTRAINED ENPLANEMENT FORECASTS

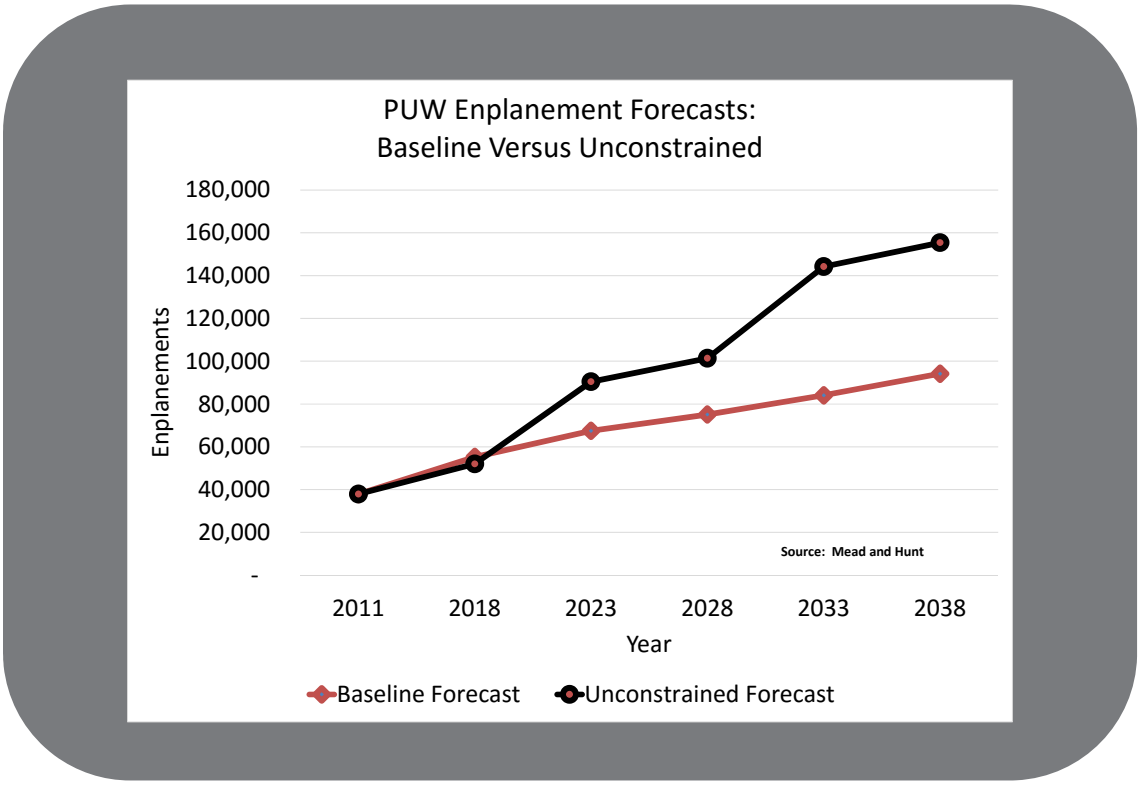


FIGURE 4: ESTIMATED CONSTRUCTION COSTS OF PUW REALIGNMENT

Source: Mead and Hunt, Final Environmental Assessment, Pullman-Moscow Regional Airport, Appendix M., November 2014.

Description	Cost
Land Acquisition	**$12.0 million**
Wetlands/Stream Relocation	**$1.2 million**
Floodplain Relocation	**$9.6 million**
Power Line Relocation	**$8.9 million**
Mobilization, Etc.	**$6.7 million**
Site Prep/Earthwork	**$29.2 million**
Drainage Earthwork	**$2.5 million**
Pavement	**$28.4 million**
Drainage	**$10.2 million**
Airfield Lighting	**$4.4 million**
NAVAIDs/ASOS	**$3.4 million**
Fencing	**$1.3 million**
System Improvements	**$1.2 million**
TOTAL	**$119.0 million**

Overview: This study estimates and reports:

a. The annualized economic impacts of the five year realignment construction project on the regional economy.
b. The economic impacts of the PUW airport annual operations.
c. Forecast of the economic impacts of the future PUW annual operations.
d. Forecast of the economic impacts of PUW after the elimination of traveler leakages to other regional airports.
e. The linkages of air transportation to the rapidly emerging high technology manufacturing and services industries.
f. The linkages of air transportation to the region's university systems (i.e. WSU and UI).
g. An analysis of the regional economy.

Economic Models: Several IMPLAN input-output models were created to fit the needs of the analysis. 1) A Palouse (Whitman County and Latah County) model, 2) A Quad County model (Whitman County, Latah County, Nez Perce County, and Asotin County) model, 3) A Washington State Model, and 4) Individual county models. IMPLAN (*Impact Analysis for Planning*) is the most widely used and cited economic impact software and data: (IMPLAN Group LLC).

The Quad County model was utilized to estimate the economic impacts of the PUW's annual operations and forecasts. The Quad County represents a relatively integrated regional economy consisting of both east-west and north-south trade flows. The Washington State model was utilized to estimate the realignment construction impacts as many of the construction firms will originate from Spokane, Washington and some from the Seattle area. The Palouse model was used to estimate the impacts of the growth of high technology manufacturing whose epicenter is the Whitman County-Latah County region.

Economic Base Assessment: This analysis is founded on economic base theory. A local or regional economy has two types of industries: base industries and non-base industries. Any economic activity that brings money into the local economy from the outside is considered a base industry. A base industry is sometimes identified as an export industry, which is defined as any economic activity that brings new monies into the community from outside. For example, base industries can include high-technology companies, medical services, retail trade services, federal government operations, as well as other manufacturing and service firms.

Firms providing services to individuals living outside the region's trade center, such as medical and legal services, are included in the region's base. Payments from state and federal governments (including Social Security, Medicare, university funding, and welfare payments) are sources of outside income to businesses and residents. These are counted as part of the economic base.

Non-base industries are defined as economic activity within a region that support local consumers and businesses within the base sector. They re-circulate incomes generated within the region from the base industries. Such activities include shopping malls that serve the local population, business and personal services consumed locally, medical services consumed locally, and local construction contracts. Non-base industries support the base industries.

Base industries are sometimes confused with non-base industries. For example, some county economies have a large retail trade sectors that produce a paradox: they employ a substantial percentage of the workforce but actually contribute little economic impacts because most of the retail sales are local. They bring little new money into the community. Thus it appears from the size effect that the retail trade sector contributes a large amount of employment and earnings to the economy. In reality, most of this employment and earning activity is allocated or attributed to other local "export" industries that bring revenues into the community from outside sales. From a "size" perspective, the retail trade sector appears large. However, from an economic base perspective which determines the economic "drivers" of the economy, the retail trade sector is actually much smaller. Only the retail trade activities serving visitors from outside the area can be counted as economic base activity and employment.

Economic base analysis is important for identifying the vital export industries of a region. Non-base industries, on the other hand, are important for keeping money within a region and stimulating local economic activity for residents. In this respect, non-base industries can function in the same manner as an export industry. For example, suppose an Idaho patient elects surgery at a local hospital instead of traveling to a medical center in Salt Lake City, Utah. The substitution of local services for an imported service represents an increase in the demand for local business services. Keeping income in the community enhances the multiplier effects of the export industries. The overall effect of import substitution can be viewed as an analogous increase in demand for an export industry. Our economic models are founded on economic base theory. An example is medical patients. Patients from outside the core economic area are counted as base as well as local patients who would have traveled outside the regional economy for health care services in the absence of the local hospital.

Defining and Explaining Economic Impacts: Economic impacts measure the magnitude or importance of the expenditures of base (export) industries. Our economic model estimates multipliers for each industrial and service sector. Suppose you have a (hypothetical) sales multiplier of 1.45. Every dollar of direct expenditures creates $1.45 dollars of total new spending in the community economy.

Impacts are apportioned into two levels. The first level is the direct impact of airport expenditures on each respective county economy – the jobs, payroll and earnings, value-added, and sales that are directly created by the PUW airport and related services as export businesses. The second is comprised of two parts: a) the impacts on other regional businesses that provide goods or services to the airports – the indirect impacts - and b) the effect of employee and related consumer spending on the economy -- the induced impacts. The indirect and induced impacts are the so-called "ripple" or multiplier effects of the airports in each respective economy. The multiplier or ripple effects are driven by the exports of an economy.

Exports, the new money coming into an economy, set off a web of transactions as each business seeks to fulfill the demands of their customers. An airport's impact upon the economy is thus comprised of the magnitude of the multiplier(s) and the magnitude of the exports. The sum of the direct, indirect, and induced effects measures the total impact of an industry to an economy.

The PUW airport and related services are considered base or export activity bringing new monies into the regional economy or reducing leakages out of the regional economy. In the absence of the PUW airport, most of those revenues would leak to Spokane, outside the regional economy. The related air services would eventually leave the regional economy or close as well.

1) The primary direct information source was Tony Bean, Executive Director of the PUW airport. Tony provided financial data on the PUW operations and enplanements, employment estimates for the airport-related service firms and operations, and other relevant data.
2) Mead and Hunt conducted an exhaustive Environmental Impact Report (EIS). Mead and Hunt (2014). "Pullman-Moscow Regional Airport - Final Environmental Assessment." http://www.meadhunt.com/client/puw-ea/documents.html. The documentation includes two full report volumes (Volume 1 and Volume II) and Appendices A-O. This study primarily (but not exclusively) utilized data from the main report, Volume I, Appendices C and M.
3) U.S. Department of Commerce, Bureau of Economic Analysis, www.bea.gov
4) U.S. Department of Labor, Bureau of Labor Statistics, Quarterly Census of Employment and Earnings. http://www.bls.gov/cew/
5) U.S. Department of Commerce, U.S. Census Bureau, http://www.census.gov/
6) Economic Modeling Specialists, International (EMSI), http://www.economicmodeling.com/ The EMSI headquarters is Moscow, Idaho and is an emerging high technology service company employing about 130+ employees worldwide. Most of the regional growth projections in this study were from the EMSI database.
7) U.S. Department of Commerce, U.S. Census Bureau, On the Map, http://onthemap.ces.census.gov/
8) U.S. Department of Transportation, Bureau of Transportation Statistics, Airlines and Airports, http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/subject_areas/airline_information/index.html
9) Idaho Department of Transportation (2010). "Idaho State Airport System Plan" http://itd.idaho.gov/aero/Publications/08SystemPlan/IDAirportSystemPlan.htm
10) Washington Department of Transportation (2012). "2012 Aviation Economic Impact Study." http://www.wsdot.wa.gov/aviation/WAEconomicStudy.htm
11) U.S. Travel Association (2014). "Flight Cancellations from Latest Storm Cost Economy $95 Million." https://www.ustravel.org/press/flight-cancellations-latest-storm-cost-economy-95-million
12) Mead and Hunt (2014). "Economic Considerations (Draft)." Unpublished.
13) Oxford Economics (2011). "Economic Benefits from Air Transport in the US." https://www.iata.org/policy/Documents/Benefits-of-Aviation-US-2011.pdf

Figure 5 presents the (annual) economic impacts of the PUW annual operations for year 2014 in the Quad County Region. These impacts include the direct impacts of airport and air-related service expenditures and the backward linkages of that spending as it circulates throughout the economy, i.e. the multiplier effects. It also includes the impacts of consumer spending relating to this economic activity. The Quad County IMPLAN economic model was used to estimate these economic impacts. The following economic model outputs were reported:

1) Direct (actual) annual employment (not including the multiplier effects)
2) Sales transactions– reflects the total transactions from all sources in dollars by direct, indirect, and induced economic activity (i.e. including the multiplier effects).
3) Gross Regional Product – the overall net contribution to the economy (a subset of sales transactions) from the airport and air-related serves. Gross regional product includes employee compensation, proprietor income, other property income, and indirect taxes.
4) Total Compensations (payroll) – (a subset of gross regional product) includes wage, salary, proprietor income payments, and fringe benefits (i.e. supplements) to workers (including the multiplier effects).
5) Total Employment – represents the total employment resulting from economic activity (including the multiplier effects).
6) Local and State Taxes – includes local property taxes, sales taxes and excise taxes, and all other state taxes (including the multiplier effects).

The primary indicators of economic activity most relevant are gross regional product, total compensation (payroll), jobs, and taxes.

PUW Operating/Capital: Row one in Figure 5 presents the economic impacts of the PUW operating expenditures (excluding institutional support from the cities and other entities) and capital outlays. The total PUW operating budget is just under $450,000 per year and the airport has averaged approximately $2.5 million per year over the last 6 years in capital outlays arising from federal government grants and contracts. The direct job creation is 39 jobs including airport employees. Factoring in the multiplier effects, PUW creates $4.1 million in sales transactions, $2.1 million in gross regional product, $1.5 million in total compensation, and 51 total jobs.

PUW Support Services: Row two in Figure 5 presents the economic impacts of the PUW support services. Support services include car rental companies, ground transportation, and local auxiliary services that support the airport infrastructure. The direct job creation is 17 jobs. Factoring in the multiplier effects, PUW creates $2.8 million in sales transactions, $1.6 million in gross regional product, $0.91 million in total compensation, and 24 total jobs.

General Aviation: Row three in Figure 5 presents the economic impacts of the PUW general aviation services. General Aviation includes FBO Inter-State Aviation, Schweitzer Engineering Laboratories (SEL) SEL hangars and related activities, a portion of the SEL travel division. It also includes all other general aviation activities associated with the PUW airport. The direct job creation is 48 jobs. Factoring in the multiplier effects, PUW creates $13.6

million in sales transactions, $6.0 million in gross regional product, $3.5 million in total compensation, and 80 total jobs.

Commercial Aviation: Row four in Figure 5 presents the economic impacts of the PUW commercial aviation services. It includes Air/Alaska operation and pilots and the Transportation Security Administration (TSA) employees. It also includes all other commercial aviation activities associated with the PUW airport. The direct job creation is 40 jobs. Factoring in the multiplier effects, PUW creates $9.0 million in sales transactions, $4.4 million in gross regional product, $2.8 million in total compensation, and 61 total jobs.

Commercial Visitor Spending: Row five in Figure 5 presents the economic impacts of the PUW commercial visitor spending. The methodology was adapted from the *2010 Idaho State Airport System Plan*, economic impacts section, in which PUW enplanement passengers were surveyed as part of an earlier ITD study.[iii] After adjustments, the direct job creation is 37 jobs. Factoring in the multiplier effects, PUW creates $3.6 million in sales transactions, $1.8 million in gross regional product, $0.99 million in total compensation, and 47 total jobs.

General Aviation Visitor Spending: Row six in Figure 5 presents the economic impacts of the PUW general aviation visitor spending. As with the commercial aviation visitors, the methodology was adapted from the *2010 Idaho State Airport System Plan*, economic impacts section, in which PUW general aviation passengers were surveyed as part of an earlier ITD study.[iv] After adjustments, the direct job creation is 30 jobs. Factoring in the multiplier effects, PUW creates $2.9 million in sales transactions, $1.5 million in gross regional product, $0.80 million in total compensation, and 38 total jobs.

PUW Total Economic Impacts: Row seven in Figure 5 presents the total economic impacts of the PUW airport. The direct job creation is 212 jobs. Factoring in the multiplier effects, PUW creates $36.0 million in sales transactions, $17.4 million in gross regional product, $10.5 million in total compensation, and 300 total jobs.

PUW Tax Revenues Generated: Row eight in Figure 5 presents the taxes generated from economic impacts of the PUW annual operations. Total annual taxes including the multiplier effects generated by the PUW are $0.84 million in property taxes; $1.34 million in sales taxes, $0.54 million in other state taxes, for a total of $2.72 million in local and state taxes annually.

Taxpayer Rate of Return on Assessment: Annual taxpayer rate of return is estimated to be 6.41 as measured by year 2014. The local annual taxpayer and institutional support for the PUW airport is $130,711 (from Pullman, Moscow, WSU, UI, and Whitman County). The annual local tax revenues (mostly property taxes) generated (including the multiplier effects) is $838,394 from PUW operations. For every one dollar of tax payer support, a total of 6.41 dollars are created by the PUW operations.

Comparison to Other Studies

There have been several other studies of the PUW airport conducted and they range from the Washington State Department of Transportation study that found the PUW contributed $16.3 million to sales transactions (in 2014 dollars) and 158 jobs *including the multiplier effects*; to an *implicit analysis* adapted from Mead and Hunt (and an Oxford Economics study) that placed the direct contribution of U.S. air travel at 1.5% of GRP, which translates regionally at $79.2 million in sales transactions and 684 jobs (Figure 6).

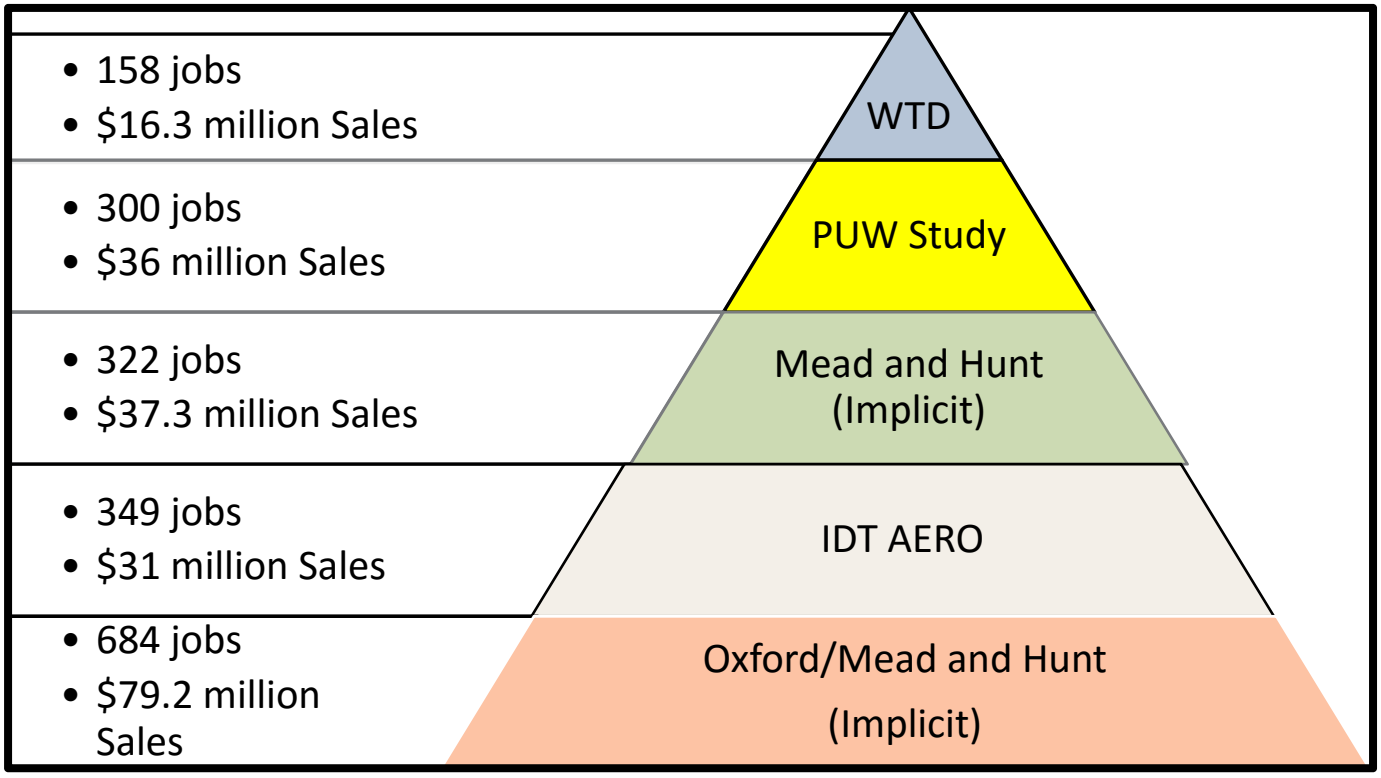
FIGURE 5: ECONOMIC IMPACTS OF PUW ANNUAL OPERATIONS

Annual 2014 Economic Impacts of the Pullman-Moscow Regional Airport

Operation Category	Direct Jobs	Sales Transactions	Gross Regional Product	Total Compensation	Total Jobs
		Includes the Direct, Indirect, and Induced Impacts (i.e. Multiplier Effects)			
PUW Operating/Capital	39	$ 4,118,088	$ 2,129,675	$ 1,497,192	51
PUW Support Services	17	$ 2,780,594	$ 1,593,271	$ 910,898	24
General Aviation	48	$ 13,636,458	$ 5,994,593	$ 3,539,887	80
Commercial Aviation	40	$ 8,993,401	$ 4,407,961	$ 2,785,581	61
Commercial Visitor Spending	37	$ 3,594,972	$ 1,818,058	$ 990,227	47
General Aviation Visitor Spending	30	$ 2,889,984	$ 1,461,531	$ 796,040	38
Total	212	$ 36,013,498	$ 17,405,088	$ 10,519,825	300

Tax Impacts	Property	Sales	Other Taxes	Total
Local and State Taxes	$838,394	$1,337,359	$542,873	$2,718,626

FIGURE 6: PUW ECONOMIC IMPACT COMPARISON STUDIES



The economic impacts reported in this study are in the middle range in magnitude of these former studies. According to our findings, the PUW contributes $36 million in sales transactions and 300 jobs (including the multiplier effects) to the regional economy:

a) The 2012 Aviation (Washington State) Economic Impact Study, Washington Department of Transportation estimated the direct PUW jobs at 117 jobs. The economic impacts *including the multiplier effects* included 158 total jobs, sales transactions of $16.3 million effects (*adjusted to 2014 dollars*), labor income of $5.5 million; local taxes of $0.26 million; and state taxes of $1.57 million; for a total tax impact of $1.84 million annually (Washington Department of Transportation, 2012).
b) PUW Study (*the results of this report*) estimates the economic impacts at 300 jobs and $36 million in sales transactions, $14.4 million in gross regional product, $10.5 million in total compensation, and $2.7 million in state and local taxes including the multiplier effects.
c) Implicit Measure adapted from Mead and Hunt (Economic Considerations): Value (or cost) of a diverted or missed flight: $31,600[v]. There were 119 missed or diverted PUW flights in 2013 that cost the regional economy $3.76 million. Conversely, PUW had 1,179 successful commercial flights/landings in 2015. Assigning $31,600 implicit value to the 2015 1,179 successful flight totals $37.3 million value (sales transactions) to the regional economy and 322 regional jobs.[vi]
d) The 2009-2010 Idaho Department of Transportation AERO study (based on 2007 data) estimated the economic impacts of the PUW airport at 210 direct jobs annually. *Including the multiplier effects*, the PUW airport created sales transactions of $31.0 million (*adjusted to 2014 dollars*); total compensation of $12.2 million, 349 jobs, and $1.2 million in taxes (See (Idaho Department of Transportation, 2010).
e) Implicit measure adapted from Oxford Economics by Mead and Hunt (Economic Considerations). Oxford estimates *direct* air travel expenditures equates to 1.5% of GDP. Palouse GRP was $2.8 billion (EMSI, 2013) and employing a sales/GRP ratio of 1.85 equates to $79.2 million in sales transactions and 684 corresponding jobs.[vii]

Results: Economic Impacts PUW Airport Realignment Construction

The airport realignment project begins in 2015 and will be completed in 2019. The annual five year economic impacts from the construction was calculated using a 2013 Washington State IMPLAN model with the results reported in constant 2014 dollars. A Washington State model was employed because the construction companies and crews will arise from various cities in the state particularly Spokane and Seattle.

The direct job creation is 93 jobs. Factoring in the multiplier effects, PUW construction realignment will create $45.6 million in sales transactions, $20.1 million in gross regional product, $14.3 million in total compensation, and 226 total jobs for five years (Figure 7).

Total annual taxes including the multiplier effects generated by the PUW are $0.50 million in local taxes (mostly property); $2.5 million in sales taxes and other state taxes, for a total of $3.0 million in local and state taxes annually.

Mead and Hunt Construction Estimates: Mead and Hunt average five year economic impact estimate was 221 jobs, $19.68 million in output (GRP), and $1.85 million in sales and excise taxes for five years and comparable to the results of this study.[viii]

Results: Forecasts and Projects

PUW Impact Projections: A forecast of the jobs and sales transactions of the PUW airport was made, derived from the adjusted Mead and Hunt baseline forecast. Actual PUW enplanement growth rates over the last year are already exceeding these forecasts. Actual enplanement growth from 2014 to 2015 was 20%, from 41,525 to 49,830 enplanements. The forecast projects that total employment created by the PUW will increase from 300 jobs to 744 jobs by 2038, a 148% increase. Total gross regional product is projected to increase from $17.4 million to $43.2 million (Figure 8).

A simulation was conducted to estimate the economic impacts if the passenger leakage was eliminated. The regional enplanement market (catchment area) projection for 2015 was 135,164. PUW's actual enplanement passengers was 49,830 enplanements, much higher than the earlier projections. At the current level of 49,830 enplanements the PUW is at 37% of its market potential (up from approximately 26% of its previous forecasted level). If the PUW captured all of the air travel enplanement passengers, the total PUW sales transactions would be $97.7 million, gross regional product would be $47.2 million, total compensation $28.5 million, total jobs impacts at 814, and total taxes at $7.4 million (including the multiplier effects) (Figure 9).

The PUW has two ways to grow in the future. It can decrease the regional passenger leakage to other regional airports and/or it can grow from the increase in regional economic growth. Both strategies offer potential for substantial growth.

Regional Economy Landscape

Eastern Washington and Northern Idaho is a tale of two worlds: One urban, one rural. Geographically the region is one of the most rural in the U.S. However, the region has pockets of rapidly increasing urban populations. The economy also reflects two contrasts: One based on agriculture, wood products, and other natural resource industries; and one based on a rapidly growing high technology, service, tourist, and other emerging industries. These two separate realities and economies reflect the past, present, and future of the region. They complement each other and also compete with each other for resources.

Political boundaries and economic boundaries are sometimes very different. Washington and Idaho are an important example of this phenomenon. Washington is economically two distinct states: Western Washington (West of the Cascade Mountains) centered at Seattle, and Eastern Washington (East of the Cascade Mountains) centered mostly at Spokane, Washington (Northeast) and in the Southeast at the Tri-Cities.

Idaho's economy is divided into three integrated regional economic areas that spill into six surrounding states. The regional economic area for Northern Idaho and much of Eastern Washington is centered in the Coeur d'Alene, Idaho-Spokane, Washington corridor, which includes Northern Idaho, Eastern Montana, and a portion of Southern Canada.

FIGURE 7: THE ECONOMIC IMPACTS OF CONSTRUCTION, ANNUALLY FOR FIVE YEARS 2015-2019

Five Year Annual Construction Impacts of the Pullman-Moscow Regional Airport

In Constant 2014 Dollars

(Direct, Indirect, and Induced Impacts i.e. Multiplier Effects)

Total Jobs	Sales Transactions	Gross Regional Product
226	$ 45,615,102	$ 20,099,201
Total Compensation	**Local Taxes**	**State Taxes**
$ 14,305,791	$ 499,643	$ 2,467,006

FIGURE 8: FORECAST OF PUW ECONOMIC IMPACTS TO 2038

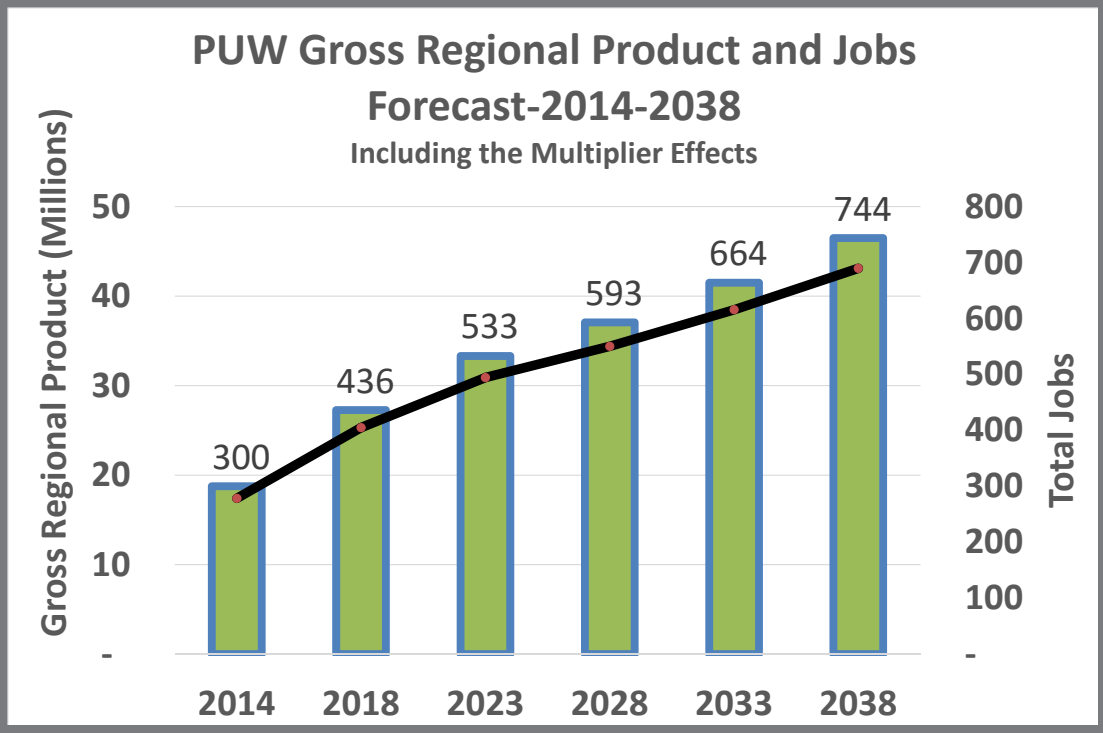


FIGURE 9: SIMULATION OF THE PUW ECONOMIC IMPACTS IF ALL REGIONAL CATCHMENT PASSENGERS USED THE AIRPORT

Potential Annual Economic Impacts of the Pullman-Moscow Regional Airport

if All Regional Airplane Passangers Traveled Via the Pullman-Moscow Regional Airport

Operation Category	Direct Jobs	Sales Transactions	Gross Regional Product	Total Compensation	Total Jobs
		Includes the Direct, Indirect, and Induced Impacts (i.e. Multiplier Effects)			
PUW Operating/Capital	106	$ 11,170,324	$ 5,776,748	$ 4,061,137	139
PUW Support Services	46	$ 7,542,369	$ 4,321,751	$ 2,470,812	66
General Aviation	130	$ 36,988,928	$ 16,260,348	$ 9,601,953	217
Commercial Aviation	109	$ 24,394,623	$ 11,956,605	$ 7,555,895	165
Commercial Visitor Spending	101	$ 9,751,371	$ 4,931,488	$ 2,685,993	127
General Aviation Visitor Spending	82	$ 7,839,090	$ 3,964,406	$ 2,159,261	102
Total	574	$ 97,686,705	$ 47,211,346	$ 28,535,051	814

Tax Impacts	Property	Sales	Other Taxes	Total
Local and State Taxes	$ 2,274,146	$ 3,627,590	$ 1,472,544	7,374,280

Boise is the center of the state and dominates the economic area of Southwestern Idaho and includes Eastern Oregon, a portion of Northern Nevada, and Western Utah. The economy of Southeastern Idaho is centered in Salt Lake City, Utah. It includes the cities of Pocatello, Idaho Falls, and the regions of Western Wyoming and Southern Montana. Thus Idaho's political boundaries bear little relationship to its economic boundaries (Figure 1). Spokane, Washington; Boise, Idaho; and Salt Lake City, Utah; all represent the "central place" of the surrounding communities. The central place is the focus of economic activity for each hub. It is where major industries are located, where the majority of shopping and retail trade establishments exist, and where medical centers and other vital services are located.

The Quad County region lies in the Spokane, Washington Economic "orbit" as does most of Eastern Washington.

University Air Travel

WSU and UI are heavily dependent on air travel. Approximately 26,199 university related flights occurred in 2015. (WSU: 15,499, UI: 10,700) costing approximately $9.0 million. About, 11,000 of these flights originated from the PUW airport (42%). University production of cutting edge research and world-class faculty and students depends on the availability of air travel.[ix]

Economy Overview

The Quad County economy has been a stable but historically a slow growing region. Regional population and employment growth has been increasing over the last decade. The region's primary industries are:

a. Wood and paper products (Clearwater Paper, Bennett Lumber, and Idaho Forests Group).
b. High technology manufacturing and services whose epicenter is Schweitzer Engineering Laboratories (SEL).
c. Three regional universities and several smaller colleges – Washington State University WSU), University of Idaho (UI), and Lewis-Clark State College (LCSC).
d. Ammunition and gun manufacturing.
e. Dryland agriculture dominated by wheat production.
f. Recreation manufacturing industries led by Northwest River Supply (NRS), jet boat manufacturing, in the Lewis-Clark Valley.
g. Three ocean-going ports (Ports of Lewiston, Clarkston, and Whitman County), with five water-borne locations and 11 industrial parks.
h. Several dozen emerging small high technology manufacturing and service companies such as EMSI (an economic data and consulting firm), Alturas Analytics, Anatek Labs, Populi, AHA Products Group, Amplicon Express, Decagon Devices (R&D), Digilent, Inc., and Metriguard.
i. Two major airports (PUW – Pullman/Moscow and LWS-Lewiston) and several smaller ones.
j. Vibrant recreation and tourism industry as the Gateway to Hells Canyon, Moscow Mountain recreation, regional bicycling and bike trails, and many other forms of recreation.
k. A strong health care industry with five major hospitals and several dozen clinics and surgery centers.
l. The Nez Perce Tribe which has been an important engine of growth and is one of the region's largest employers.
m. A vibrant arts community and several farmers market, the largest of which is the Moscow Farmers Market.

The region's largest historic natural resource industry of wood products has been struggling but is rebounding and currently stabilizing. The Bennett Mill at the Port of Wilma (Port of Whitman County) reopened this last year (hiring 77 Full Time and 5 part time workers) and Clearwater Paper has begun a $160 million industrial upgrade that will keep the paper mill competitive and stabilize its Lewiston employment.[x]

The major growth engines have been the increased student enrollment at WSU, over 3,000 students over the last 15 years and the growth of Schweitzer Engineering Laboratories that has added over 1,000 employees over the same time period. An ammunition and small arms manufacturing cluster of industries have been a major growth engine in the Lewis-Clark Valley now employing about 1,700 workers.

The three universities had 36,294 regional students in the 2013 academic year which constituted 25% of the region's population. The importance of student growth on the regional economy cannot be understated: Every college student creates about $56,000 in sales, $33,000 in wage and salary earnings, and 0.71 of a job in the region, assuming that in the long-run all university activities and expenditures are dependent on student enrollments.[xi]

Regional trade flows (wholesale/retail trade patterns and commuting) move mostly East-West with some North-South elements. The economies of Pullman and Moscow are woven tightly together as are the economies of Lewiston and Clarkston. The dominant geographical location in the trade hierarchy is Spokane, Washington, which is followed by the local trade "hub" of Lewiston, Idaho. The primary trade and commuting patterns on the Palouse and in the Lewis-Clark Valley run East-West. In Idaho particularly this is complicated by the political

boundaries that run North-South. The economic center of gravity for northern Idaho is Spokane, Washington but the political center of gravity is Boise, Idaho.

Population Growth: The Quad County has historically been a slow-growing but stable economic region situated in two relatively fast growing states (Figure 10 and Figure 11). Whitman County transformed over the last twenty years from one of the region's slowest growing regions to one of the fastest growing regions. In 2015 Whitman County had a population of 47,311, Nez Perce County (40,211), Latah County (38,688), and Asotin County (22,331). The Quad County population was 148,542 in 2015 and by 2025 is expected to reach 152,893.

Employment Growth: Total full and part-time 2015 Quad County employment was 80,383 jobs of which 25,975 jobs in Nez Perce County, Whitman County (25,677), Latah County (20,194), and Asotin County (8,537). Whitman County employment grew 20% cumulatively from 2001 to 2015, Asotin County (9.6%), Latah County (6.4%), and Nez Perce County (3.1%) Figure 12 illustrates the actual regional job growth by county and region from 2001 to 2015; and presents forecasts from 2015 to 2025.[xii]

FIGURE 10: QUAD COUNTY POPULATION 2001-2015 WITH FORECAST

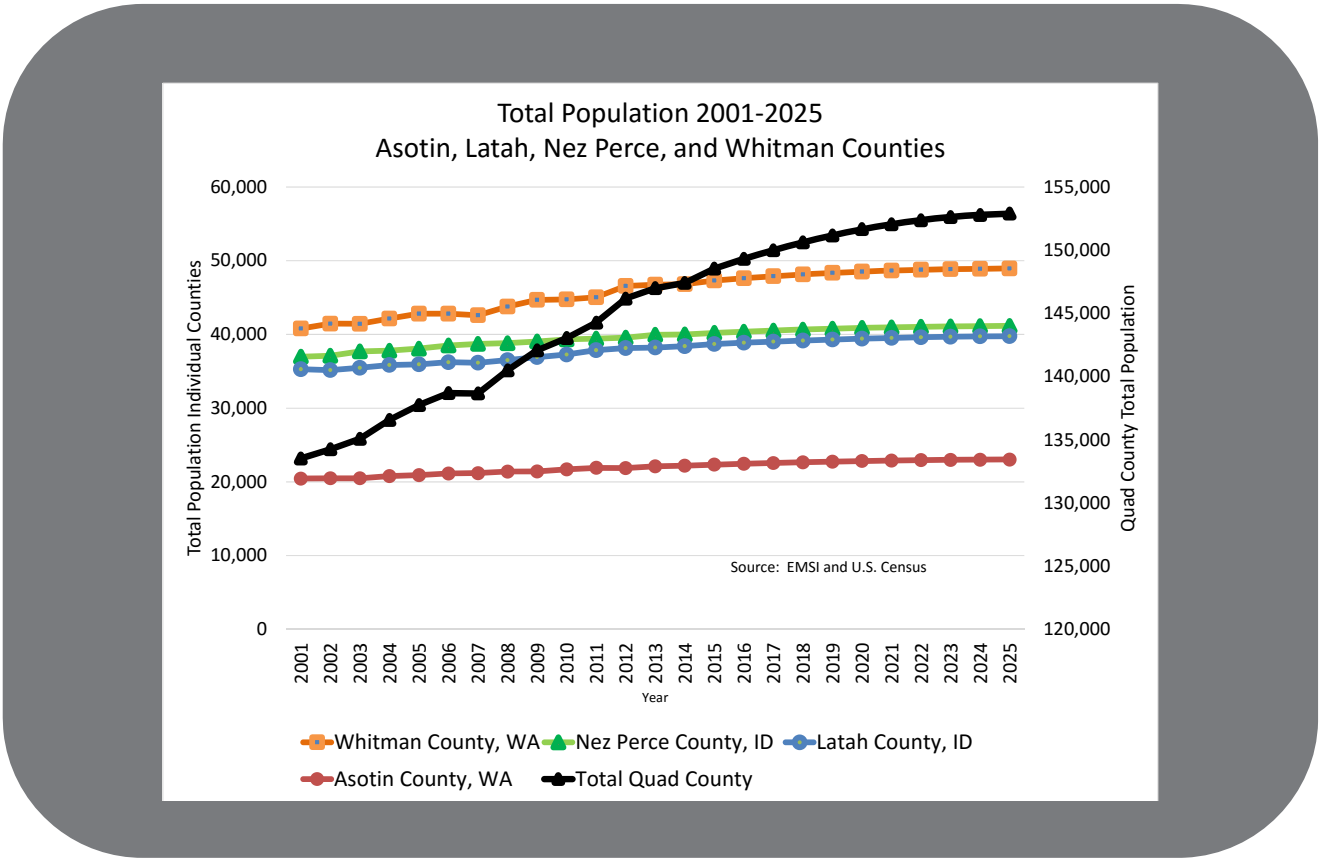


FIGURE 11: REGIONAL POPULATION GROWTH WITH PROJECTIONS

Total Population growth - 2001 to 2015 and 2015 to 2025

Year	Whitman	%	Asotin	%	Nez Perce	%	Latah	%
2001	40,803	-	20,447	-	36,997	-	35,274	-
2015	47,311	16.0%	22,331	9.2%	40,211	8.7%	38,688	9.7%
2025	48,942	3.4%	23,032	3.1%	41,155	2.3%	39,764	2.8%

Year	Palouse	%	Quad County	%
2001	76,077	-	133,521	-
2015	86,000	13.0%	148,542	11.2%
2025	88,706	3.1%	152,893	2.9%

Source: EMSI and U.S. Census

FIGURE 12: TOTAL JOB GROWTH IN THE REGIONAL ECONOMY

Total Regional Job growth - 2001 to 2015 and 2015 to 2025
BEA Measured Total Jobs (Covered and Self-Employed)

Year	Whitman	%	Asotin	%	Nez Perce	%	Latah	%
2001	21,382	-	7,789	-	25,204	-	18,972	-
2015	25,677	20.1%	8,537	9.6%	25,975	3.1%	20,194	6.4%
2025	29,680	15.6%	9,521	11.5%	27,800	7.0%	22,365	10.8%

Year	Palouse	%	Quad County	%
2001	40,354	-	73,347	-
2015	45,871	13.7%	80,383	9.6%
2025	52,045	13.5%	89,366	11.2%

Source: EMSI and BEA

Quad County Employment Rankings: Figure 13 presents the economic impacts of the region's most import industries. The first column is Quad County industry. Column two is the direct (actual) employment. Column three is the total employment including the multiplier effects. Column four is the total sales transactions. Column five is gross regional product (a subset of sales transactions). Column Seven is total compensation (a subset of gross regional product) (Figure 13).[xiii]

Higher Education: The region's largest and most important industries are its university system. The three universities (WSU, UI, and LCSC) directly employ 13,946 people regionally and create 25,935 jobs including the multiplier effects. They contribute $2.0 billion in total sales transactions, $1.6 billion in gross regional product, and $1.2 billion in regional payrolls.

Statewide impacts: Overall WSU contributes $3.4 billion to Washington's economy and the UI contributes $1.1 billion to Idaho's economy. [xiv]

- The three universities have 36,294 students regionally (about 32,000 on the Palouse) and 43,729 statewide, respectively. WSU generates $341 million research dollars and the UI generates $100 million for a total of $441 million annually. Air transportation is an essential infrastructure for university research support, attracting and retaining world class faculty and staff, student recruitment, and support for sports teams. [xv] The presidents of the Palouse universities (WSU and UI) fly frequently to their respective state capitals (Olympia, Boise) and rely on air travel nationally for their official activities.[xvi]

FIGURE 13: ECONOMIC IMPACTS OF QUAD COUNTIES LARGEST INDUSTRIES

Economic Impacts of the Quad County Top Industries

Quad County Industry	Direct Employment	Total Employment	Sales Transactions	Gross Regional Product	Total Compensation
		Including the Multiplier Effects			
Other Manufacturing	1,184	2,155	$ 536,794,650	$ 194,127,914	$ 74,961,288
Ammunition	1,689	3,045	$ 640,925,093	$ 250,836,176	$ 118,206,889
Construction	2,974	3,268	$ 321,367,131	$ 144,571,765	$ 89,052,365
Wood Products	3,129	5,393	$ 1,265,218,391	$ 370,673,594	$ 228,958,291
Agriculture	4,020	5,970	$ 636,680,553	$ 236,224,610	$ 65,858,837
High Tech. Manu/Serv.	4,285	7,170	$ 1,268,800,052	$ 438,421,634	$ 260,798,455
Higher Ed (WSU, UI, LCSC)	13,946	25,935	$ 2,031,869,145	$ 1,565,135,205	$ 1,198,842,806
Total	31,227	52,936	$ 6,701,655,015	$ 3,199,990,898	$ 2,036,678,931

High Technology Manufacturing and Services: Schweitzer Engineering Laboratories (SEL) forms the core of a new emerging high technology manufacturing and service sector. SEL began as a start-up firm founded by Ed

Schweitzer, a former WSU faculty member. Today this sector consists of over two dozen firms and directly employs 4,285 in the Quad County region and 3,650 jobs on the Palouse. Including the multiplier effects:

Quad County – 7,170 jobs, $1.3 billion in sales transactions, $438 million in gross regional product, and $261 million in total compensation (payrolls).

Palouse Region (a subset of Quad County) –6,107 jobs, $1.1 billion in sales transactions, $374 million in gross regional product, and 222 million in total compensation (payrolls).

This industry effectively did not exist 20 years ago. It is highly dependent on air transportation. SEL, for example, has four jets stationed at the PUW airport and its corporate headquarters is situated in Pullman. Many of the other smaller firms are also dependent on air transportation as their gateway to national and international markets.

Agriculture and Agricultural Services: This industry (mostly dryland agriculture/wheat) directly employs about 4,020 employees and creates a total of 5,970 jobs and $236 million in gross regional product, including the multiplier effects.

Wood Products and Forestry Services: This industry is one of the historic drivers of the region consisting of four sawmills, a paper mill, logging, and some smaller operations. It directly employs about 3,129 employees and creates a total of 5,393 jobs and $370.8 million in gross regional product, including the multiplier effects.

Construction: Directly employs about 2,974 employees and creates a total of 3,268 jobs and $144.6 million in gross regional product, including the multiplier effects.

Ammunition: The region has a vibrant ammunition and small arms manufacturing sector which directly employs about 1,689 employees and creates a total of 3,045 jobs and $250.8 million in gross regional product, including the multiplier effects.

Other Manufacturing: All other manufacturing firms directly employs about 1,184 employees and creates a total of 2,155 jobs and $194.1 million in gross regional product, including the multiplier effects.

The focus of this analysis was on the primary (export) economic generators of the regional economy. There are several other important industries that were not presented including tourism, health care, arts and entertainment, and many other smaller firms and operations.

Palouse and Quad County Manufacturing and High Technology Center

The Quad County top industries constitute about 66% of the regional economy as measured by jobs (52,936/80,383) including the multiplier effects (Figure 13). The *Palouse* high technology manufacturing and service sector alone *directly* employs 3,650 jobs, increasing to 4,285 jobs in the greater Quad County economy. *Total* manufacturing and high technology services industries (i.e. all manufacturing jobs and high technology service jobs) directly employ 4,595 jobs on the Palouse, increasing to 9,496 jobs in the greater Quad County economy (Figure 14).

FIGURE 14: HIGH TECHNOLOGY AND MANUFACTURING REGIONAL JOBS 2001-2015-FORECASTS 2015-2025

High Technology Manufacturing and Service Jobs

Region	2001 Jobs	2015 Jobs	% 2001-15	2025 Jobs	% 2015-25
Whitman County	879	2,887	228%	4,110	42%
Palouse Counties	1,466	3,650	149%	4,966	36%
Quad County	1,781	4,285	141%	5,737	34%
U.S.	5,086,354	6,139,721	21%	7,070,691	15%

Total (All) Manufacturing Jobs

Region	2001 Jobs	2015 Jobs	% 2001-15	2025 Jobs	% 2015-25
Whitman County	688	2,830	311%	4,205	49%
Palouse Counties	1,132	3,341	195%	4,789	43%
Quad County	4,336	7,749	79%	9,756	26%
U.S.	16,914,034	13,082,925	(23%)	13,273,335	1%

Total (ALL) Manufacturing and High Technology Service Jobs

Region	2001 Jobs	2015 Jobs	% 2001-15	2025 Jobs	% 2015-25
Whitman County	1,155	3,362	191%	4,815	43%
Palouse Counties	2,186	4,595	110%	6,196	35%
Quad County	5,705	9,496	66%	11,745	24%
U.S.	20,241,885	18,024,535	(11%)	19,151,275	6%

Source: EMSI and BEA

FIGURE 15: ECONOMIC IMPACTS OF HIGH TECHNOLOGY MANUFACTURING AND SERVICES ON THE PALOUSE

Economic Impacts of Palouse High Technology Manufacturing and Services Industries

Latah County and Whitman County

Including the Direct, Indirect, and Induced Impacts (i.e. Multiplier Effects)

Year	Jobs	Sales Transactions	Gross Regional Product	Total Compensation	Local Taxes	State Taxes
2015	6,108	$ 1,080,774,804	$ 373,451,321	$ 222,150,368	$ 4,051,381	$15,689,937
2025*	8,310	$ 1,470,445,939	$ 508,098,427	$ 302,246,227	$ 5,616,972	$ 21,346,912

*Source Forecast Growth Rate: EMSI

Factoring in the multiplier effects:

- Palouse high technology manufacturing and service sector employs 6,108 jobs, increasing to 7,170 jobs in the greater Quad County (Figure 15).
- All manufacturing and high technology service industries constituted 22% (17,764 job) of the Quad County economy (17,764/80,383) (Figure 16).
- The region is an industrial and high technology powerhouse.

East-West Trade and Regional Linkages

Trade flows (wholesale, retail trade and commuting patterns) observed for the region have strong East-West and some North-South elements (Figure 17). The dominant geographical location in the trade hierarchy is Spokane, Washington, which is the regional economic hub encompassing Eastern Washington, Northern Idaho, Western Montana, and Southwestern Canada. Spokane provides the widest range of goods and services for local businesses and households, and the most competition within each of the markets for goods and services. At the next level in the system of trade centers forming the trade hierarchy, is the local trade "hub" of Lewiston, Idaho. The number of goods and services, and the degree of competition in markets, is measurably smaller for Lewiston than for Spokane. At the third level of the trade center hierarchy the towns of Pullman-Moscow, Grangeville, and Orofino appear as local trade hubs.

Commuting patterns run primarily east-west between Pullman and Moscow, and East-West between Clarkston and Lewiston. Whitman County (primarily Pullman) is a net job exporter as residents from surrounding counties commute daily to their jobs in Whitman County. On average (net), approximately 2,171 individuals commute into Whitman County for work. Latah County (primarily Moscow) is a net job importer. Approximately (net) 2,152 residents commute out of the county to employment elsewhere (primarily Pullman and Lewiston).

Nez Perce County (primarily Lewiston) is a net job exporter as residents from surrounding counties commute daily to their jobs into Nez Perce County. On average, approximately 3,683 individuals commute into Nez Perce County for work from the surrounding counties. Asotin County (primarily Clarkston) is a job importer. Approximately 3,203 residents commute out of the county to employment elsewhere (primarily Lewiston and Pullman). These are net estimates. Commuting flows also run in reverse but at a lessor magnitude. For example, 684 residents of Whitman County are employed in Latah County (Figure 18).

The commuting patterns affect income flows throughout the region. Latah County has a (positive) net income inflow of $152.3 million in 2014 whereas Whitman County had a (negative) net outflow of $138.7 million. Asotin County has a (positive) net income inflow of $162.2 million in 2014 whereas Nez Perce County had a (negative) net outflow of $173.6 million. These (primarily) East-West income flows demonstrates the regional connectivity and interdependence.[xvii]

The interdependence has been increasing over the last two decades as measured by the increasing positive and negative residents' adjustment (i.e. income flows from commuting) as seen in Figure 19 between Whitman County and Latah County.

FIGURE 16: QUAD COUNTY ECONOMIC IMPACTS OF HIGH TECHNOLOGY MANUFACTURING/SERVICES

Economic Impacts of Quad County Total Manufacturing and High Technology Service Industries

Counties of Asotin, Latah, Nez Perce, and Whitman

Including the Direct, Indirect, and Induced Impacts (i.e. Multiplier Effects)

Year	Jobs	Sales Transactions	Gross Regional Product	Total Compensation
2015	17,764	3,711,738,186	1,254,059,318	682,924,923
2025*	22,364	$ 4,673,082,688	$ 1,578,862,138	$ 859,803,271

*Source Forecast Growth Rate: EMSI

FIGURE 17: REGIONAL TRADE HIERARCHY

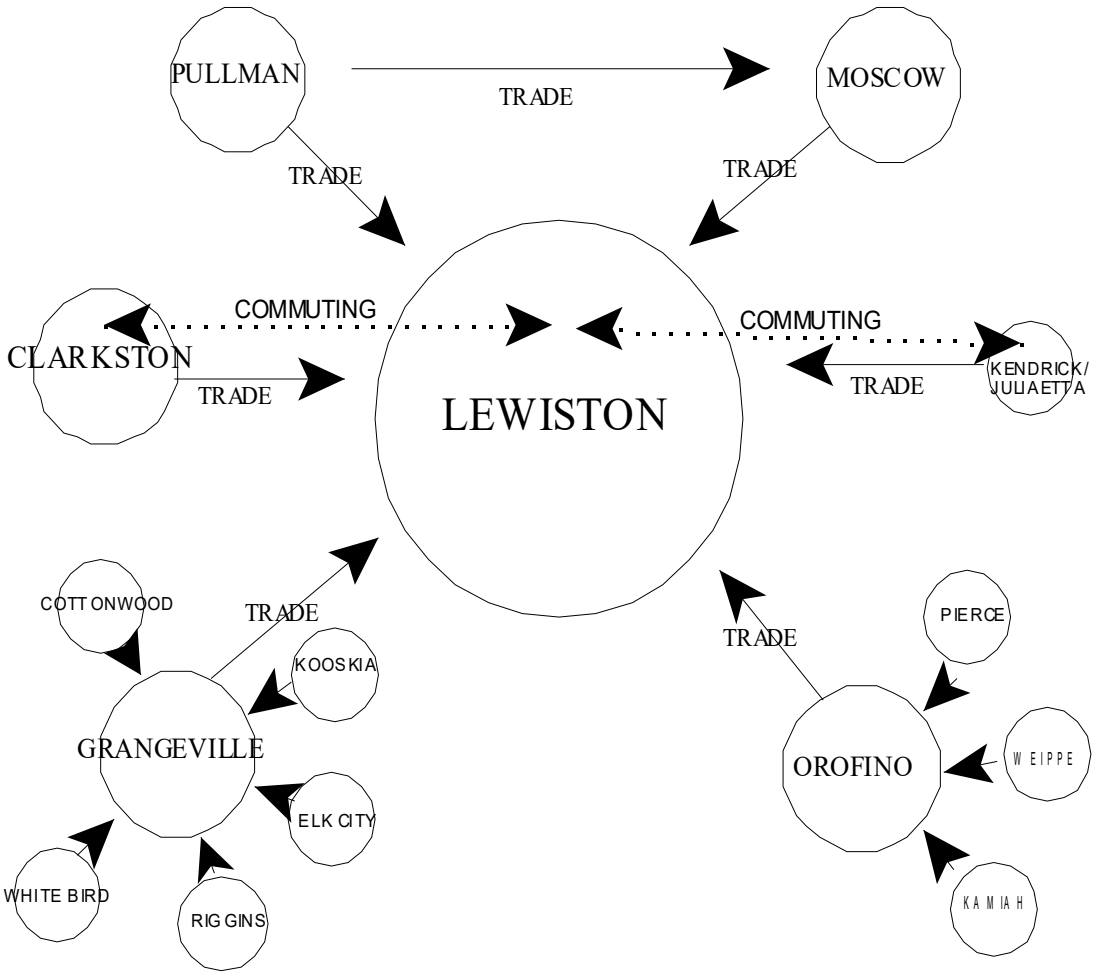


FIGURE 18: NET COMMUTING PATTERNS QUAD COUNTY REGION

Net 2013 Regional Job Flows	Job Flows
Whitman County	-2,171
Latah County	2,152
Nez Perce County	-3,683
Asotin County	3,203

Source: U.S. Census (On-the-Map)
http://onthemap.ces.census.gov/

FIGURE 19: NET RESIDENCE ADJUSTMENT – INJECTIONS AND LEAKAGES FROM COMMUTING

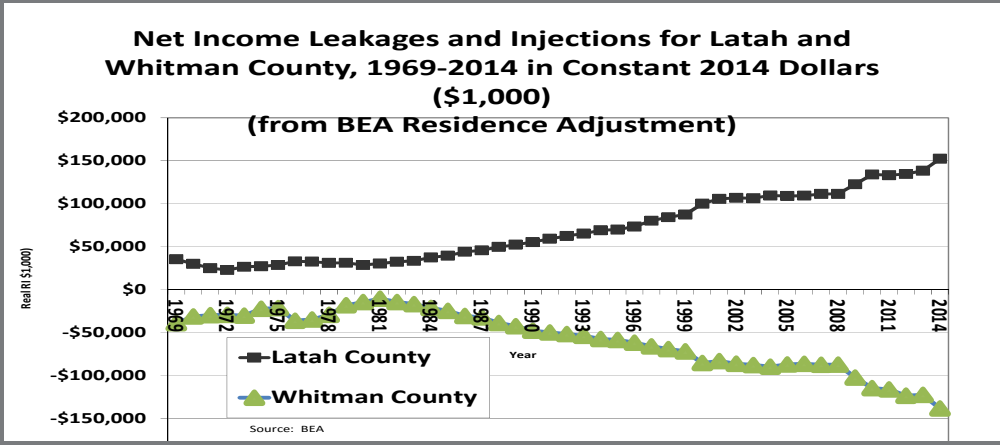


FIGURE 20: ANNUAL COMMUTING IMPACT CONTRIBUTIONS TO THE LATAH COUNTY ECONOMY

Annual Commuting Impacts to the Latah County Economy

(Direct, Indirect, and Induced Impacts i.e. Multiplier Effects)

Total Jobs	Sales Transactions	Gross Regional Product
818	**$ 77,744,965**	**$ 41,995,200**
Total Compensation	**Local Taxes**	**State Taxes**
$ 21,547,171	**$ 1,546,434**	**$ 3,109,009**

An analysis of the net economic impacts of these income flows to Latah County from commuting was estimated. The $152.3 million inflow created 818 jobs, $77.7 million in sales transactions, $42.0 million in gross regional product, $21.6 million in total compensation, $1.6 million in local taxes and $3.1 million in state taxes, including the multiplier effects (Figure 20[xviii]).

Regional Total Employment Growth and Projections

Whitman County is projected to surpass Nez Perce County as the region's largest employer as early as 2016 (26,332 jobs versus 26,171 jobs) according to EMSI projections and most probable before 2020 given the population and job growth of the county. WSU, the county's largest employer is growing both in terms of budgets and number of students. A high technology manufacturing and service cluster is developing robustly in both Whitman County and Latah County. The retail trade sector is growing in Whitman County and closing the differential with Latah County. The emerging multi-sector economic growth in Whitman County reinforces the need for the PUW airport and air transportation to facilitate regional growth (Figure 21).

Retail Trade Growth

Employment in the retail trade industries is consistent with the regional trade hierarchy and trade patterns. In 2014 Nez Perce County (the regional trade hub) had 3,018 retail trade workers as measured by the BEA, Latah County had 2,331 workers, Whitman County (1,864) and Asotin County (1,354) for a grand total of 8,567. Both Whitman County and Latah County are second tier trade hubs respectively. Retail trade is an important sector in creating economic cohesion and supporting the base or export industries including tourism. Retail trade job growth has been increasing over the last decade while Nez Perce County and Latah County's retail trade employment declined after the 2007-2009 recession and is currently recovering. (Figure 22).

The Economic Census produced by the U.S. Department of Commerce, Bureau of the Census, is conducted every five years and includes estimates of retail trade and the components of retail trade. In 2012 Nez Perce County had $705 million in retail sales (in constant 2015 dollars), Latah County ($368 million), Whitman County ($344 million), and Asotin County ($295 million). Whitman County and Asotin County both increased retail trade sales (in real terms) from 2002 to 2012. Nez Perce County and Latah County both faced declines from the 2007-2009 recession and are now recovering. Whitman County's retail trade sector has been increasing over the last 15 years which is reducing leakages out of the regional economy (Figure 23).

Regional Construction

The construction industry is an important component to the Palouse and broader Quad County economies. On average from 2000-2014 the Palouse (Whitman County and Latah County) averaged 409 private sector construction units valuing $49.0 million annually. Construction is heavily affected by the business cycle which can be seen in Figure 24. The peak year 2005 at 434 units valuing $85.6 million. The lost year was 2011 at 180 units valuing $25.6 million. Governmental construction units or valuation are not included in these totals so actual construction is greater. In 2014 Whitman County had 218 units ($30.2 million in value) and Latah County had 136 units ($23.8

million in value). The airport will add nearly 50% to the average annual private Palouse construction expenditures for 5 years (Figure 24).

FIGURE 21: TOTAL QUAD COUNTY EMPLOYMENT GROWTH WITH FORECASTS TO 2025

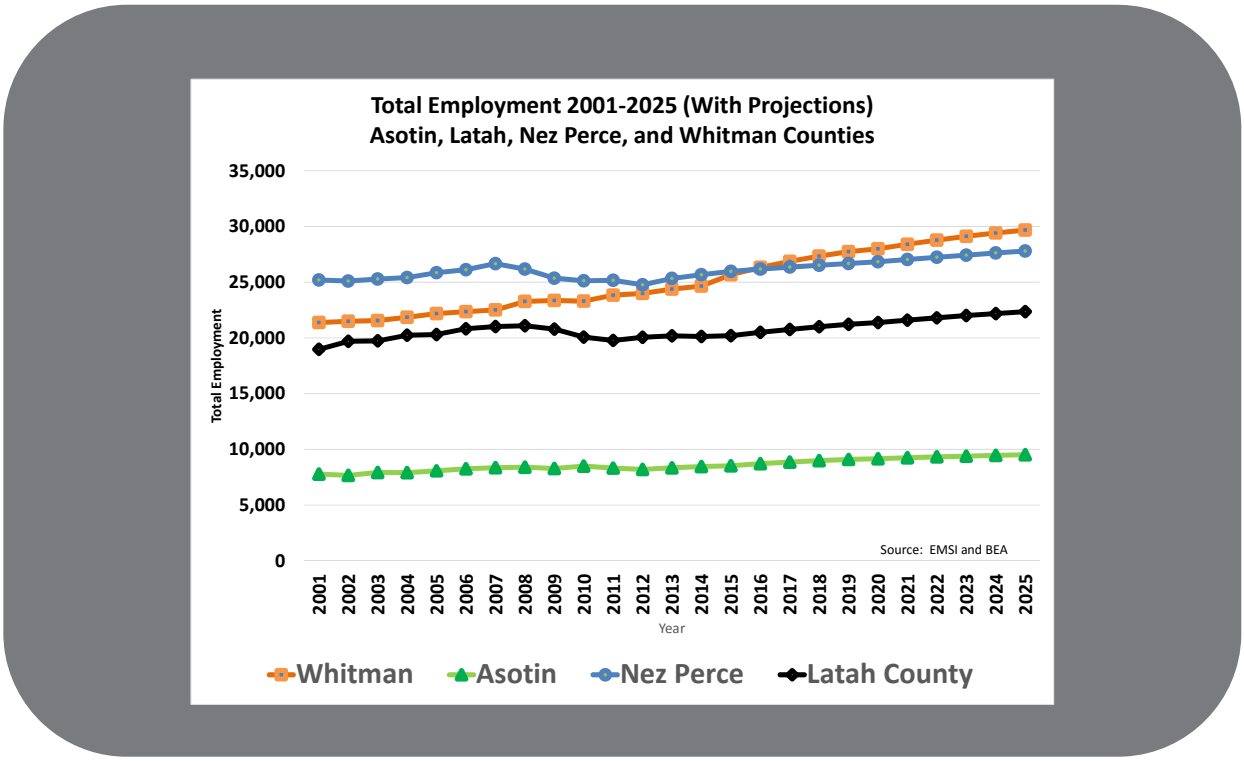


FIGURE 22: RETAIL TRADE EMPLOYMENT IN THE QUAD COUNTY REGION

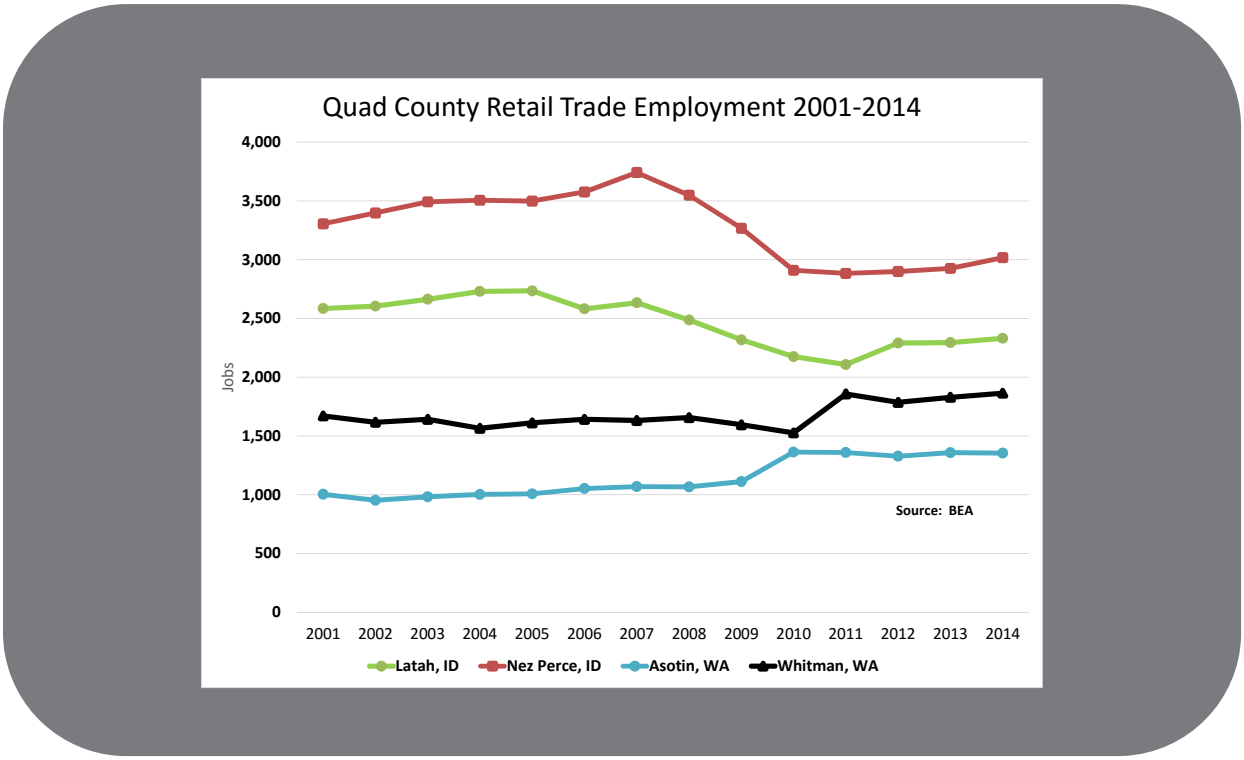
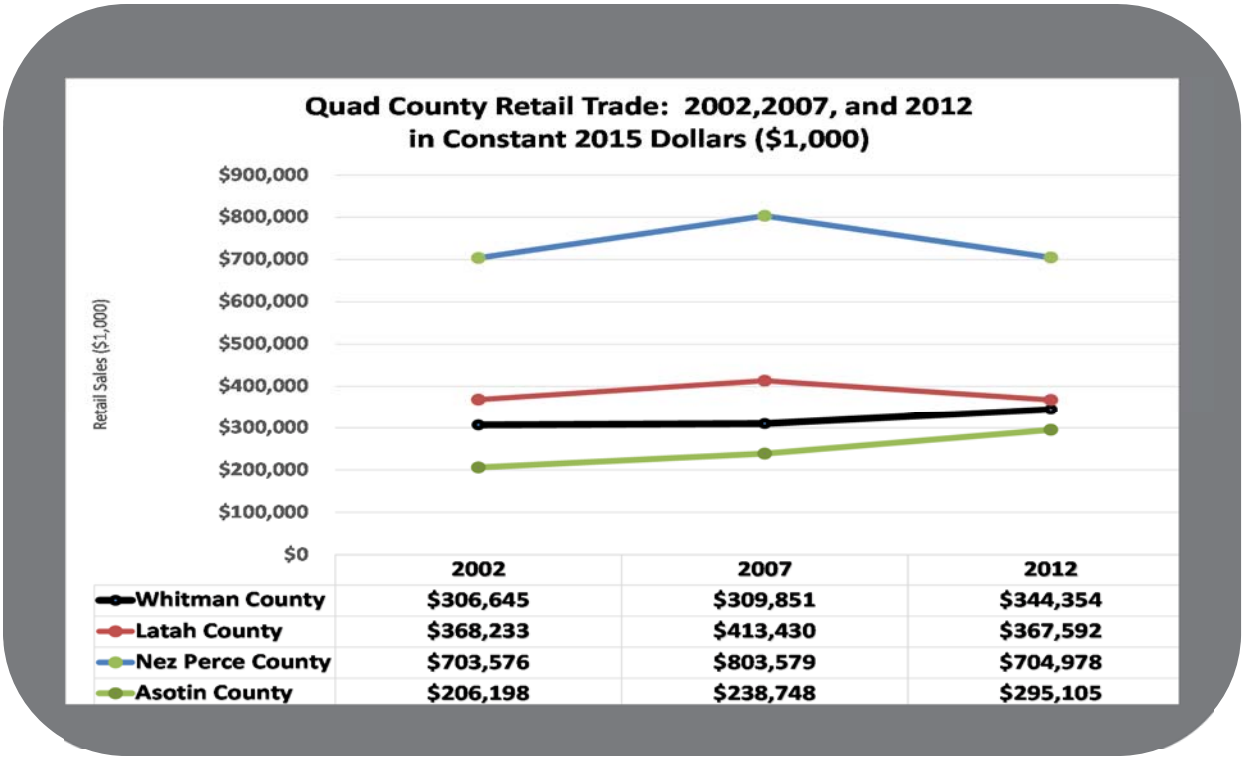
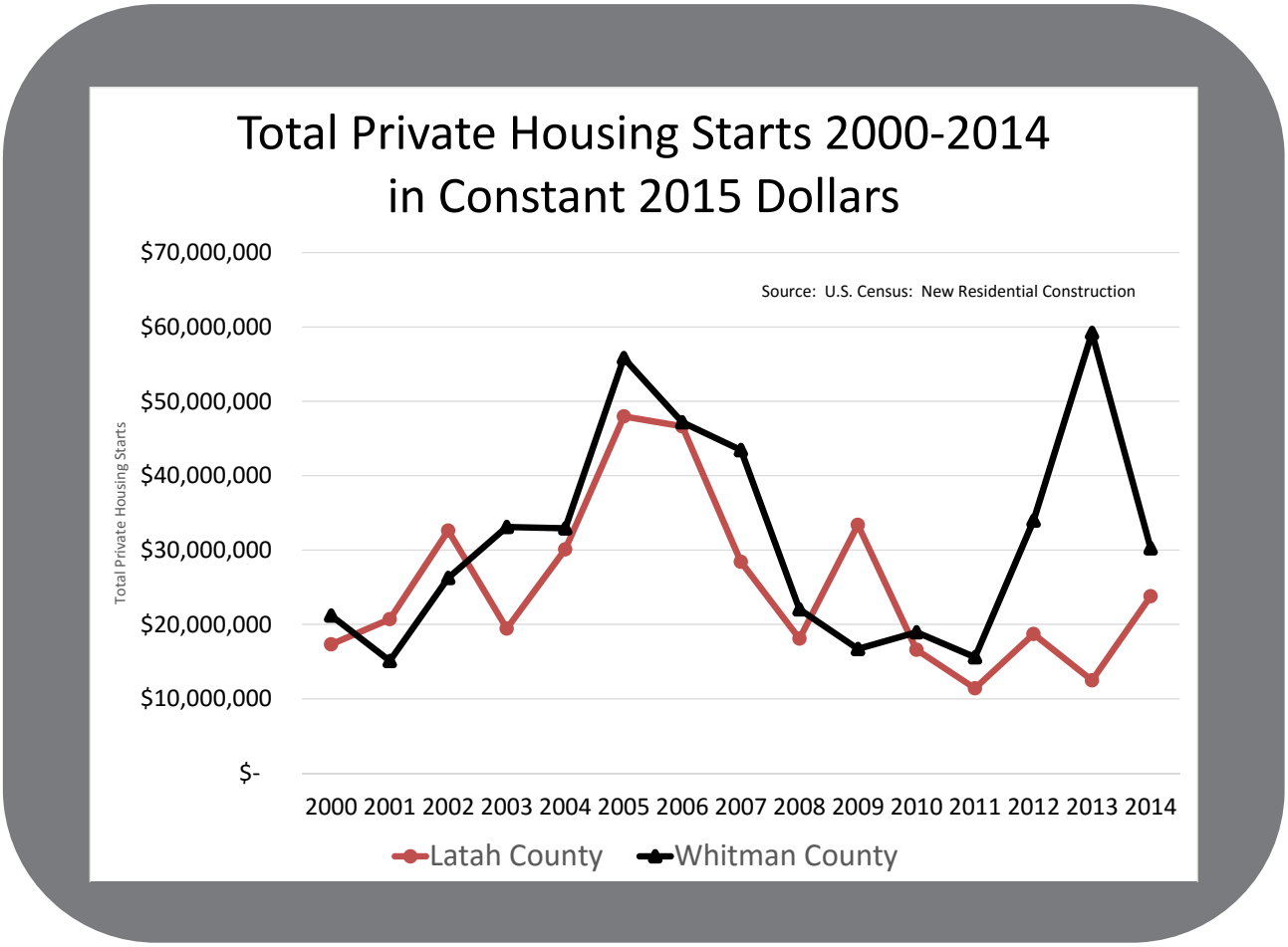


FIGURE 22: RETAIL TRADE REVENUES BY COUNTY IN 2014 DOLLARS



	2002	2007	2012
Whitman County	$306,645	$309,851	$344,354
Latah County	$368,233	$413,430	$367,592
Nez Perce County	$703,576	$803,579	$704,978
Asotin County	$206,198	$238,748	$295,105

FIGURE 23: TOTAL PRIVATE HOUSING STARTS IN CONSTANT 2015 DOLLARS (2000-2014)



In the 21st century, airports have emerged as a regional economy's most prominent, if not the most important, transportation network. Airports, even more than modern computer networks, tie the modern world together. In the Palouse region (Moscow, Idaho - Pullman, Washington), air travel is especially important. The PUW airport is an essential infrastructure component to the Palouse economy:

Construction Realignment Impacts: The PUW airport construction activities will directly employ 93 workers for five years, increasing to 226 workers when the multiplier effects are included, adding $20.1 million to gross regional product, and $2.5 million in state and local taxes each year.

Current Operational Impacts: The PUW airport operations and activities directly employs 212 workers, increasing to 300 workers when the multiplier effects are included, adding $17.4 million to gross regional product, and $2.7 million in state and local taxes annually.

Expected Future Growth of Operations: The PUW airport has two major sources of potential growth: 1) Future growth and expansion of the Palouse regional economy, and 2) Greater capture of market share from its catchment region:

- Palouse Regional Growth: The operational impacts increase to 744 workers including the multiplier effects (for the baseline forecast in 2038), and will add $43.1 million to gross regional product, and $6.7 million in state and local taxes.
- Capturing Market Share: At *current* full market share, the operational impacts would increase to 814 workers including the multiplier effects (for 100% market capture), and will add $47.2 million to gross regional product, and $7.4 million in state and local taxes at that time.
- Capturing Both: Proportionally, future impacts will include both future Palouse economic growth and capturing greater market share, so these impacts could increase further.

Loss of the PUW Airport: Impacts of the Status-Quo --no Realignment:

- The immediate loss of 226 jobs due to the construction, $20.1 million in gross regional product and $3.0 million in state and local taxes (including the multiplier effects).
- Short-term: The loss of commercial air service that will reduce 3/4ths of the PUW's current operation as it transforms to a general aviation airport, costing 225 jobs, $13 million in gross regional product, and $2 million in local and state taxes.
- Intermediate-term: An *additional* loss of general aviation services and a reduction of high technology industry employment related to air transportation and general company transportation services. It will cause an estimated reduction in Palouse employment of 200 total jobs and $12 million in gross regional product including the multiplier effects.
- Long-term (*possible impacts*): The potential loss of one or more major high technology employers creating an additional 3,347 jobs and $204 million in gross regional product, including the multiplier effects.
- Long-term (*possible impacts*): Loss of regional competitiveness, greater difficulty in attracting new firms and to the regional economy, reduction in regional attractiveness for professional employees and researchers, slowing of university growth, and reduced tourism and visitor spending.

- Export activity: Any product or service whose sales bring money into a community from the outside. Sales of products to firms or consumers in other states are examples of export activity. Other examples include nonresident tourist spending, federal government payments, and income transfers.
- Sales: Total dollar transactions from direct, indirect, and induced economic activity.
- Earnings: Wage, salary, and other income payments including all fringe benefits to workers.
- Value-added (gross regional product): This is a measure of gross domestic product at the local or regional level. Value added is a measure of total net production and activity.
- Jobs: Total employment resulting from economic activity. The economic model reports these as full-time and part-time jobs.
- Indirect taxes: All taxes generated from economic activity excluding personal and corporate income taxes. These consist of mostly sales taxes and property taxes.
- Base industries: Any economic activity that brings money into the local economy from the outside is considered a base industry. For example, Ada County base industries include high-technology companies, medical services, retail services, federal government, and other manufacturing and service firms.
- Non-base industries: Any economic activity within a region that support's local consumers and businesses re-circulating incomes generated within the region. These activities include shopping malls that -he local population, business and personal services consumed locally, and local construction contracts. Non-base industries support the base industries.
- Economic impacts: Economic impacts measure the magnitude or importance of the expenditures of base (export) industries. Our economic model estimates multipliers for each industry. If you have a multiplier of 1.61, for example, every dollar of base expenditures creates $1.61 dollars of new spending in the community. The total multiplier has three components: direct effects, indirect effects, and induced effects.
- Direct effects (spending): This represents the actual sales, income, and jobs from airport operations.
- Indirect effects: These are the downstream economic effects on sales, payroll, jobs, and indirect taxes that results from direct spending in the regional economy. For example, an airport purchases community goods and services which supports other area businesses. These firms, in turn, purchase even more goods and services as the effects ripple throughout the economy. They are part of the overall multiplier effects.
- Induced effects: These are downstream economic effects of employee and consumer spending on the economy. They are part of the multiplier effects.
- Full-time equivalent jobs: The gross number of hours worked in a firm or entity from all employees divided by the maximum number of allowable hours for a single employee in a work year— usually 2,080 hours. The economic model is measuring total full-time and part-time job.

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Notes

[i] This is an updated estimate from the Mead and Hunt 2009 analysis which showed the PUW capture rate at 26.2%, the Spokane (GEG) capture rate at 52.7%, and Lewiston (LWS) capture rate at 11.5%. The PUW enplanements over the last 5 years have been increasing rapidly and the reported increased PUW capture rate is based on the *earlier* Mead and Hunt forecast. If the actual catchment enplanement growth exceeds the original forecast, then the PUW capture rate will be reduced. (See Mead and Hunt (2014). "Pullman-Moscow Regional Airport - Final Environmental Assessment.").

[ii] The original Mead and Hunt baseline forecast has been adjusted upward to reflect the rapid increase in PUW enplanements over the last five years. The original 2038 baseline forecast was 84,000 enplanements unadjusted.

[iii] The IDT study found that approximately 49% of the PUW commercial passenger enplanements were transient visitors and they spent an average of $300 per visit. The analysis in this report adapted the spending average per visit of the ITD study (after adjusting the input numbers for inflation to model year). However, this study took a more conservative approach and counted only approximately ½ of the visitors used in the Idaho State study (or 24% of the total 2014 enplanement passengers). We counted only ½ of the eligible visitors as measured by the IDT study for the following reason: Many of these visitors would have traveled to the Palouse through other means (in the absence of the PUW airport) and spent the same amount of money locally in their visits. The IDT study did not account for this effect and *implicitly* assumed that *all* of visitor spending would leak out of the region in the absence of the airport. It should be noted that if the PUW airport did not exist, travel patterns throughout the Palouse would change. Visitors most likely would fly into (or out of) Spokane (GEG) airport or Lewiston (LWS) airport. Some general aviation visits would not occur at all, particularly those related to business or certain types of recreation. There would be a reduction in local motel stays, car rentals, eating and drinks, shopping, and recreation spending. Overall after *all* adjustments the economic impacts of both commercial and general aviation visitors in this report was approximately 40% of the total possible had the exact IDT methodology been followed using 2014 commercial and general aviation visitor numbers.

[iv] The IDT study found there were 10,423 PUW general aviation transient arrivals with 2.82 visitors per arrival, totaling 29,400 transient visitors per year each spending $170 per visit. The analysis in this report adapted the spending average per visit of the ITD study (after adjusting the input numbers for inflation to model year). The estimates for general aviation visitors is less exact than commercial visitors, so the 2007 IDT visitor numbers were used in this analysis. There has been an increase in general aviation visitors from 2007 to 2014. The flow of general aviation visitors has likely increased since this study, so the results likely understate the current impacts of general aviation visitor spending. As in the commercial aviation visitor estimates reported earlier in this report, only 50% of the general aviation transient visitors were counted as unique.

[v] U.S. Travel Association (2014). "Flight Cancellations from Latest Storm Cost Economy $95 Million."

[vi] The jobs estimates is derived from parameters obtained from an IMPLAN 2011 Palouse model; which calculated the average Palouse job is supported by $115,782 in sales transactions.

[vii] Mead and Hunt used a 2.1% measure from the Oxford Report based on $3.2 billion Woods and Poole measure to GSP to arrive at a $66.9 million contribution to GRP. If we had included the multiplier effects in our adaptation of Mead and Hunt/Oxford, the total would reach 3.7% of GSP or $104 million in sales transactions and 901 jobs in PUW economic impacts. Oxford estimated that aviation including tourism contributed 4.9% of U.S. GDP and 4.9% of all U.S. jobs including the multiplier effects.

[viii] The Mead and Hunt analysis (Economic Considerations) was based on $89 million so the results were adjusted for the $119 million current construction estimate. The Mead and Hunt results were annualized for five years. It was assumed that the output measure was gross regional product and the tax estimates did not include property or income taxes.

[ix] These are estimates derived from data provided by Washington State University and University of Idaho travel administrators. Total air travel is difficult to fully capture because of the complicated nature of universities and their related budgeting processes.

[x] Betsy Russell (2015). "Clearwater Paper plans $160 million factory upgrade." The Spokesman-Review

[xi] Steve Peterson (2014). *Economic Drivers: The Economic Impacts of the Higher Education and Health Care Sectors*

[xii] Forecasts are derived from EMSI forecasts.

[xiii] The economic base assessment was modified from: Abelardo Rodríguez, Willem J. Braak, and Philip Watson (2011). "Getting to Know the Economy in Your Community: Automated Social Accounting."

[xiv] See: CAI Community Attributes (2015). "Washington State University Economic Reach and Impact" and EMSI (2015). "The Economic Value of the University of Idaho." Data was also obtained from WSU and UI Institutional Research Offices. The *state-wide* numbers are presented for purposes of illustration in terms of magnitude. The methodology used in the state studies for WSU and UI differ and they were conducted by different firms.

[xv] Universities are complicated entities. Direct employment includes faculty, staff, institutional contract employees, other contract employees, outsourcing firms, and graduate students. If we include all of these factors in terms of head count, total employment would easily exceed 20,000 in the Palouse region. Expenditures related to universities include direct university spending, outsourcing and contract firm spending, student spending, and visitor traffic created from students and university events.

[xvi] Shanon Quinn (2015). "UI president purchases new home away from home." Moscow-Pullman Daily News. Nick Perry (2006). "Condo, offices make Cougs' leader more visible in Seattle." The Seattle Times.

[xvii] Residents Adjustment is from the BEA regional accounts and were adjusted for inflation to 2014 dollars using the Consumer Price index. http://www.bls.gov/cpi/. The commuting patterns comes from the Bureau of the Census, On-the-Map application, http://onthemap.ces.census.gov/.

[xviii] The residents' adjustment income economic impacts was estimated using an IMPLAN model of Latah County and measured as an increase in regional household income. The inputs were adjusted from taxes and savings (20% of the total).