

**APPENDICES TO THE ECONOMIC IMPACT REPORT**

Section I - Additional Explanation of Economic Impact Methodology

Section II - Overview of IMPLAN

Section III - Direct Impacts by Airport to Regional Economies

## **Section I: Additional Explanation of Economic Impact Methodologies**

This section describes methodologies for economic impact analyses in addition to what is presented in the main text of the report for:

1. On-airport Activities
2. Visitor Spending
3. Reliance on Aviation of Oregon Businesses

### **On-Airport Employment, Wages and Business Sales.**

Economic activity on each airport was documented in six steps:

1. Airport Managers Survey
  2. Business Survey
  3. Establishment data bases including Claritas (in tandem with its GIS component), Dun and Bradstreet and InfoUSA, airport web sites and the IMPLAN modeling package.
  4. Field work by the project team
  5. Review and feedback by airport managers
1. Fifty-three airport managers responded to the Airport Managers Survey and reported air services/airport administration employment. Forty-seven managers reported wages and 51 reported other expenditures for the year. These “other expenditures” plus wages equal the annual budget of the airport. Managers of 22 state airports claimed the same 16 state employees, along with prorated shares of wages and expenditures. Jobs for each of these 22 airports were calculated according to the share of wages paid.
  2. A total of 126 businesses responded to the business survey, but just 67 of these respondents answered “yes” to the question if the business is located on an airport. These on-airport businesses represented five commercial airports and 17 general aviation airports.
  3. To develop the list of airport tenants to supplement the survey response, the Claritas program was used as our primary tool, because it has a GIS component. We drew custom polygons around the property of each airport as delineated by the GIS component. Data received included business names, economic sector and employment of on-airport businesses. Additional steps to develop these data are listed below
    - \*Employment was not reported for all businesses located. We used Dun and Bradstreet and InfoUSA data to fill in missing values. Both allow searches by business names and zip codes;
    - \*We checked web sites of air-carrier and larger GA airports
    - \*When these data sets did not list the businesses, we phoned them to ask about employment;
    - \*We used regional IMPLAN data sets to estimate wages and business sales; and
    - \*When business established found through Claritas matched responses of the business survey, survey data were used.

When wages and expenditures were reported alongside employment, we used the survey data (adding wages to expenditures to arrive at these airports’ budgets). When only employment was reported, we used the IMPLAN modeling package for the respective regions to estimate wages and expenditures.<sup>1</sup> When one of the

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<sup>1</sup> The IMPLAN package was calibrated for each of the six regions in Oregon, and provides ratios of wages per job and output per job. IMPLAN data are based on state and county data sets of the US Departments of Commerce, Labor and Agriculture.

monetary factors were provided (wages or expenditures), we used IMPLAN to calculate the missing factor on a scale with the factor that was provided

4. The project team, by virtue of visiting the airports in this study, was able to list 48 airports where there are not any business tenants. (Please see the table below.)

#### Airports without Tenants

Alkali Lake State	Memaloose USFS
Arlington Municipal	Miller Memorial Airpark
Beaver Marsh	Monument Municipal
Boardman Airport	Nehalem Bay State Airport
Cape Blanco State Airport	Oakridge State
Cascade Locks State Airport	Owyhee Reservoir State
Chiloquin State Airport	Pacific City State Airport
Christmas Valley Airport	Paisley
Condon State Airport-Pauling Field	Pinehurst State Airport
Cottage Grove State Airport-Jim Wright Field	Portland Downtown Heliport
Country Squire Airpark	Powers Hayes Field
Crescent Lake State Airport	Prospect State Airport
Davis Field	Rome State
George Felt	Santiam Junction State
Jordan Valley	Seaside Municipal Airport
Joseph State Airport	Siletz Bay State Airport
Lake Billy Chinook	Silver Lake USFS
Lake Woahink SPB (Closed)	Skyport
Lakeside State	Toketee State
LaPine	Toledo State Airport
Lexington Airport	Valley View
Malin	Vernonia Municipal
McDermitt State Airport	Wakonda Beach State
McKenzie Bridge State	Wasco State Airport

5. On Airport impacts, including airport administration and fixed base operators, and other tenants, in terms of accounting for an accurate list of tenant companies, employment, personal income and business sales were vetted by Project Advisory Committees in meetings of February 26, 2007 and March 14, 2007, consisting of ODA staff and airport representatives. In addition, following the February 26 meeting, the list of airport tenants was sent to each airport for further review. Responses from airports were incorporated into the on-airport data base.

### Visitor Spending

#### 1. Commercial

Commercial visitor spending are airport-specific averages from the passenger survey with outliers removed for Mahlon Sweet Field, Rogue Valley International, Roberts Field, Eastern Oregon Regional and Klamath Falls Airport. Survey responses were not received from Southwest Oregon Regional Airport, after discussion among the project team and consultation with ODA, spending at Southwest was assumed to be the same as at Mahlon Sweet Field in Eugene, as

both airports in Oregon's Southwest region. This assumption was presented and approved at two meetings of the Project Advisory Committee.

Data were collected for spending in the following sectors: hotel, food and drink, retail,<sup>2</sup> entertainment and transportation.<sup>3</sup> Moreover, survey data allowed us to separately analyze visitors from outside of Oregon (arriving from other states or countries), and Oregonians traveling within state. The latter passengers cause economic impacts to the region being visited, but not to the state of Oregon, whereas spending of out-of-state visitors brings new money into Oregon as well as into regional economies. Thus, for commercial airports, visitor spending impacts are higher as regional impacts than state impacts.

The splits between intra-state visitors and out-of-state visitors were estimated base on FAA data that reports a ten percent sample of ticketed passengers. Using these data, we are able to estimate the state and destination of arrivals to commercial airports in Oregon.<sup>4</sup>

Totals by airport for each of the five sectors represent local business sales. We used the regionally appropriate ratios from IMPLAN by to calculate jobs and wages based on business sales. Direct impacts of commercial visitors represent the summation of jobs, wages and business sales generated by their spending.

## 2. General Aviation

A small survey response required the project to implement secondary methods to estimate visitor spending due to GA operations, as the passenger spending survey contained eight responses from two airports. Therefore, per-passenger spending per transient GA passenger was estimated using additional responses from similar surveys conducted by the study team, including the Oregon responses.<sup>5</sup> Each response included passenger spending (for hotel, food and drink, retail, local transportation and entertainment) and passengers in the traveling group. From this, total passenger spending was determined for each response. We then removed 20 responses with high spending totals (greater than \$900 per passenger).

A linear regression explained passenger spending, using spending per trip per person from surveys as the dependent variable, and percent of transient operations and median household income as independent (or explanatory) variables. Both explanatory variables were significant with 95% confidence. We then used these parameters to estimate GA visitor spending for Oregon's GA airports based on median household income and percent transient operation values (using the same data sources).

The parameter estimates were based on airports with an average of 181 total operations per day, with a minimum of 3 operations per day. Therefore, it is not appropriate to apply these parameter estimates to airports with fewer than three operations per day. To compliment the regression analysis, therefore, the project team developed an estimate of \$0 - \$40 spending for GA visitors based on field work, accounting for small and relatively isolated airports. (Please see the table below.) The use of minimal spending values is based on the studies conducted in Virginia and Colorado.

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<sup>2</sup> Retail sales were calculated "at the margin" to assure that only Oregon benefits are counted.

<sup>3</sup> Care was taken not to double count off airport transportation and on-airport car rental.

<sup>4</sup> Airline Origin and Destination Survey (DB1B), Bureau of Transportation Statistics, US Department of Transportation is a 10% sample of airline tickets from reporting carriers. Data includes origin, destination and other itinerary details of passengers transported. Reporting often covers 75% - 90% of operations. Data were adjusted to account for all operations at Oregon's commercial airports.

<sup>5</sup> The study incorporated survey data from 68 airports in Oregon, Virginia, Vermont and Colorado.

The allocation of total spending into categories is based on percentages calculated for the total dataset. For the airports assigned up to \$40 of spending per visitor, we assumed two-thirds of the spending is food and drink, and one-third is for retail.

#### Visitor Spending - Rural Airports

Airport	Dollar Amount	Airport	Dollar Amount
Alkali Lake State	\$20	Miller Memorial Airpark	\$0
Arlington Municipal	\$20	Monument Municipal	\$0
Beaver Marsh	\$30	Nehalem Bay State Airport	\$20
Cape Blanco State Airport	\$30	Oakridge State	\$20
Cascade Locks State Airport	\$30	Owyhee Reservoir State	\$0
Chiloquin State Airport	\$30	Paisley	\$20
Christmas Valley Airport	\$30	Pinehurst State Airport	\$20
Condon State Airport-Pauling Field	\$30	Powers Hayes Field	\$0
Country Squire Airpark	\$20	Prospect State Airport	\$30
Crescent Lake State Airport	\$30	Rome State	\$0
Davis Field	\$0	Sandy River	\$20
George Felt	\$20	Santiam Junction State	\$0
Lake Billy Chinook	\$30	Skyport	\$0
Lakeside State	\$20	Toketee State	\$0
Lenhardt Airpark	\$20	Toledo State Airport	\$20
Lexington Airport	\$20	Valley View	\$20
Malin	\$20	Vernonia Municipal	\$20
McDermitt State Airport	\$20	Wakonda Beach State	\$40
McKenzie Bridge State	\$0	Wasco State Airport	\$20

## Aviation Dependence in the Oregon Economy

Airport dependent impacts represent area businesses that are dependent on an airport for just-in-time shipping, a high degree of corporate travel, or specialized airport facilities and services such as free trade zones, U.S. Customs, and U.S. Immigration and Naturalization Services. These businesses would relocate or suffer substantial loss if the airport were not available. This impact is not included in traditional economic impact methodology and is provided as an indicator of the importance of airports to area businesses.

Oregon counties were aggregated into the five substate regions consistent with Connect Oregon. Data from the United States Departments of Agriculture, Commerce and Labor compiled by IMPLAN were used to determine employment levels at three digit or higher NAICS sectors.<sup>6</sup>

Next, the US absorption table for each industry (how much one industry buys from another). The fraction of industry output that is used to purchase air transportation services was extracted for each industrial sector.<sup>7</sup> Multiplying the absorption ratios by employment levels for each commodity resulted with an estimate of the fraction of employment, by sector, reliant on air travel in each of Oregon's six regions. Ratios of business sales to jobs and business sales to wages for each sector compiled by IMPLAN were used to calculate aviation reliant wages.

In order to separate business travel from the value of exports from Oregon's airports we aggregated domestic and international export values for each region. To calculate international trade exports we took data from the Bureau of Census International Trade Administration for airports in Oregon--averaging the results for 2004 and 2005. In order to only attribute the value of those goods produced in Oregon, the amount originating from Oregon was divided by the total export value in each region (taking a weighted average of this ratio for 2004 and 2005). The list of over 80 industries given by ITA was reduced to an aggregation of 9 industries for use in the model. These industries include: industrial machinery, optic/photo equipment, electrical machinery, chemicals, furs/skins, aircraft, wood products, other manufacturing and other agriculture.

Data from the PDX website and the Bureau of Transportation Statistics for enplaned international and domestic goods (exports) were used to account for exports to United States' locations. Only the total weight was provided for each category so it was assumed that the distribution of industries was the same as international shipments. Taking the ratio of domestic to international exports we could extrapolate the total amount for the industries listed above.

These data were filtered by removing those exports that were within Oregon (i.e. a flight from an airport in Oregon to Portland International) in order to avoid double counting, and were further adjusted to avoid double counting with air-reliant industries listed above. We found that products shipped from Portland International Airport account for about 90% of all state air exports.

The working assumption for this analysis is that products shipped from Portland originate throughout Oregon, and is based on the proportional size of each relevant industry among the regions. Using IMPLAN models for each region and the state we found the proportion of the export industries manufactured, grown or extracted in each region. We then applied these proportions to the value of goods coming from Portland International to get the best estimation of where the goods were produced. For other airports, we assume that goods exported from a given region (that were produced in Oregon) came from that region.

In converting the pounds into dollars, values per pound were calculated from the international trade figures (which provide both weight and value) for each region and then applied that ratio to weights of domestic shipments, by region.

<sup>6</sup> North American Industrial Classification System

<sup>7</sup> It was assumed that national averages applied to Oregon.

## **Section II: Overview of IMPLAN Modeling Package**

This section reviews our use of the IMPLAN Model System.

To estimate the indirect and induced (“multiplier”) economic effects for each project, this study utilized the IMPLAN model system. IMPLAN stands for “Impact Analysis for Planning” and is now the most widely used input-output economic modeling system in the US, with a client list of 500 public and private agencies including several federal agencies and numerous state agencies. It utilizes U.S. Commerce Department (“National Income and Product Accounts”) data on inter-industry technology relationships (also known as input-output structural matrices), countywide employment and income data from the Bureau of Economic Analysis (BEA) and Bureau of Labor Statistics (BLS), and its own industry and county-specific estimates of local purchasing rates (“regional purchase coefficients”). It is enhanced over most other input-output models in that it also includes coverage of public sector activity and consumer activity (reflected in its “social accounting matrix”). The industry detail is at the level of 509 industries, and is based on categories of the US Bureau of Economic Analysis (BEA), which correspond to 2 to 5 digit groups in the North American Industry Classification System (NAICS).

For this study, the direct job and income effects for on-airport, visitor spending and related jobs were documented and then assigned to specific sector groups, based on information from interviews and surveys completed for this project, and based on experience in aviation and freight economies internationally. The IMPLAN model was then calibrated for each of the five regions in Oregon as well as for the state, and run given the direct effects on specific industry groupings with the classifications of on-airport employment, off-airport visitor spending and manufactures and agricultural products shipped from Oregon airports. The result was an estimate of the indirect and induced (and overall) job, business revenue and income impacts for each segment of airport beneficiary. The analysis of retail impacts was adjusted to account for retail markup margins and the concentration of sales in airports and in visitor industries. Retail portions of multiplier effects also incorporate these margins.

Regardless of whether economic impacts are measured in terms of jobs, income or business sales, these impacts can be classified into three categories:

- **Direct economic effects** are the changes occurring at the project site as a direct consequence of the public investment, project or program. This is represented as the net increase in business activity associated with new relocations of business to the project site, expansion of existing businesses at that site, or new business startups there.
- **Indirect economic effects** are the broader effects on business activity for off-site suppliers to the directly-affected businesses. This can include production, distribution and transportation for suppliers of goods and services.
- **Induced economic effects** are further shifts in spending on food, clothing, shelter and other consumer goods and services, as a consequence of the change in workers and payroll of directly and indirectly affected businesses.

In this report, we combine indirect and induced impacts under the header of “spin-off impacts,” which account for the total multiplier effects.

EDR Group assembled classifications of the 509 sectors in the IMPLAN modeling package to best mirror types of industries on airports, types of visitor spending and industries related to commodities exported by air from Oregon. The classification scheme used for this study for on-airport and visitor spending impacts are shown in the table below.

**Section III: Direct Impacts by Airport to Regional Economies**

The tables below list direct economic contributions of each airport profiled in this study to the economies of their home region. Note, that without the Port of Portland, the Portland/Metro region includes just seven airports, compared to 16 – 29 airports in each of the other four regions in the state.

<b>Airports in the Portland/Metro Region</b>			
<b>Airport</b>	<b>Jobs</b>	<b>Wages</b>	<b>Business Sales</b>
Cascade Locks State	1	\$15,000	\$45,000
Country Squire Airpark	2	\$62,000	\$174,000
Hood River	24	\$345,000	\$943,000
Mulino	44	\$801,000	\$2,404,000
Portland Downtown Heliport	18	\$340,000	\$989,000
Scappoose Industrial Airpark	191	\$9,989,000	\$37,243,000
Skyport	1	\$18,000	\$50,000
Starks Twin Oaks Airpark	82	\$1,614,000	\$4,372,000
<b>Total Regional Impacts of Airports</b>	<b>363</b>	<b>\$13,183,000</b>	<b>\$46,220,000</b>
<b>Port of Portland</b>			
Hillsboro	595	\$24,713,000	\$59,154,000
Portland International	38,571	\$809,600,000	\$4,905,400,000
Troutdale	93	\$3,622,000	\$7,452,200
<b>Port of Portland Total</b>	<b>39,259</b>	<b>\$837,935,000</b>	<b>\$4,972,007,000</b>
<b>Total Amount</b>	<b>39,622</b>	<b>\$851,118,000</b>	<b>\$5,018,227,000</b>

<b>Airports in the Willamette Valley &amp; Coast Region</b>			
<b>Airport</b>	<b>Jobs</b>	<b>Wages</b>	<b>Business Sales</b>
Albany Municipal	31	\$455,000	\$1,514,000
Astoria Regional	274	\$8,873,000	\$24,025,000
Aurora State	999	\$25,923,000	\$75,083,000
Chehalem Airpark	97	\$2,132,000	\$5,944,000
Columbia Gorge/Dalles	21	\$391,000	\$1,207,000
Corvallis Municipal	377	\$12,468,000	\$54,120,000
Cottage Grove State	31	\$462,000	\$1,474,000
Creswell Hobby Field	42	\$665,000	\$2,609,000
Davis	1	\$18,000	\$50,000
Florence Municipal	70	\$2,038,000	\$9,637,000
Independence State	51	\$875,000	\$2,741,000
Lebanon State	12	\$183,000	\$584,000
Lenhardt Airpark	18	\$607,000	\$1,691,000
Mahlon Sweet Field Airport	2,455	\$45,393,000	\$136,666,000
McKenzie Bridge State	0	\$0	\$0
McMinnville Municipal	127	\$2,615,000	\$4,801,000
Nehalem Bay State	1	\$14,000	\$44,000
Newport Municipal	395	\$9,862,000	\$35,033,000
Oakridge State	1	\$7,000	\$24,000
Pacific City State	3	\$42,000	\$138,000
Salem McNary Field	1,043	\$33,134,000	\$140,356,000
Sandy River	2	\$64,000	\$180,000
Santiam Junction State	0	\$0	\$0

Siletz Bay State	4	\$54,000	\$178,000
Sportsman Airpark	33	\$877,000	\$3,182,000
Tillamook	566	\$17,709,000	\$78,063,000
Toledo State	0	\$7,000	\$22,000
Vernonia	1	\$31,000	\$90,000
Wakonda Beach State	2	\$22,000	\$73,000
<b>Total Regional Impacts of Airports</b>	<b>6,658</b>	<b>\$164,921,000</b>	<b>\$579,527,000</b>

<b>Airports in the Southwest Region</b>			
<b>Airport</b>	<b>Jobs</b>	<b>Wages</b>	<b>Business Sales</b>
Ashland Municipal	217	\$5,132,000	\$20,575,000
Bandon State	6	\$93,000	\$299,000
Brookings	4	\$59,000	\$197,000
Cape Blanco State	0	\$5,000	\$17,000
George Felt	1	\$26,000	\$76,000
Gold Beach Municipal	7	\$129,000	\$392,000
Grants Pass	319	\$10,416,000	\$35,185,000
Illinois Valley	6	\$114,000	\$308,000
Lakeside Municipal Airport	1	\$24,000	\$70,000
Myrtle Creek Municipal	6	\$122,000	\$361,000
Pinehurst State	0	\$3,000	\$9,000
Powers	1	\$18,000	\$50,000
Prospect State	1	\$8,000	\$26,000
Rogue Valley International	2,673	\$51,835,000	\$152,793,000
Roseburg Regional	64	\$1,340,000	\$4,447,000
Seaside Municipal	5	\$101,000	\$301,000
Southwest Oregon Regional Airport	1,305	\$43,920,000	\$151,465,000
Toketee State	0	\$0	\$0
Valley View	1	\$29,000	\$86,000
<b>Total Regional Impacts of Airports</b>	<b>4,618</b>	<b>\$113,376,000</b>	<b>\$366,657,000</b>

<b>Airports in the Central Region</b>			
<b>Airport</b>	<b>Jobs</b>	<b>Wages</b>	<b>Business Sales</b>
Alkali Lake State	0	\$1,000	\$2,000
Arlington Municipal	0	\$3,000	\$9,000
Beaver Marsh	0	\$1,000	\$4,000
Bend Municipal Airport	1,614	\$68,363,000	\$293,788,000
Chiloquin State	2	\$25,000	\$81,000
Christmas Valley	2	\$36,000	\$107,000
Condon State	3	\$42,000	\$134,000
Crescent Lake State Airport	0	\$3,000	\$9,000
Klamath Falls Airport	965	\$27,230,000	\$45,099,000
Lake Billy Chinook	1	\$19,000	\$52,000
Lake County	6	\$144,000	\$421,000
Madras City-County	7	\$219,000	\$624,000
Malin	1	\$21,000	\$60,000
Paisley	1	\$19,000	\$54,000
Prineville	12	\$437,000	\$1,309,000
Roberts Field Airport	1,593	\$31,141,000	\$102,879,000
Sisters Eagle Air	3	\$74,000	\$218,000
Sunriver	50	\$903,000	\$2,770,000
Wasco State	1	\$9,000	\$28,000
<b>Total Regional Impacts of Airports</b>	<b>4,260</b>	<b>\$128,690,000</b>	<b>\$447,650,000</b>

<b>Airports in the Eastern Region</b>			
<b>Airport</b>	<b>Jobs</b>	<b>Wages</b>	<b>Business Sales</b>
Baker City Municipal	24	\$571,000	\$1,796,000
Boardman	2	\$36,000	\$107,000
Burns Municipal	8	\$170,000	\$509,000
Eastern Oregon Regional Airport	263	\$8,249,000	\$23,309,000
Enterprise Municipal	6	\$100,000	\$307,000
Grant Co. Reg./Ogilvie Field	47	\$1,063,000	\$3,439,000
Hermiston Municipal	100	\$2,818,000	\$8,881,000
Joseph State	4	\$56,000	\$183,000
La Grande/Union Co.	30	\$438,000	\$1,671,000
Lexington	1	\$14,000	\$47,000
McDermitt State	1	\$11,000	\$38,000
Miller Memorial Airpark	1	\$36,000	\$100,000
Monument Municipal	1	\$18,000	\$50,000
Ontario Municipal	13	\$185,000	\$587,000
Owyhee Reservoir State	0	\$0	\$0
Rome State	0	\$0	\$0
<b>Total Regional Impacts of Airports</b>	<b>501</b>	<b>\$13,766,000</b>	<b>\$41,028,000</b>