# Chapter 3
# Aviation Activity Forecasts



# Introduction and Overview

This chapter provides updated aviation activity forecasts for Packwood Airport (55S) for the 20-year planning horizon (2022-2042). The most recent Federal Aviation Administration (FAA) approved aviation activity forecasts for the Airport were developed in the December 2009 Airport Layout Plan report.[1]

The forecasts presented in this chapter are consistent with the facility's current and historical role as a local general aviation airport serving the community and surrounding area. The forecasts are unconstrained and assume Lewis County will be able to make the facility improvements necessary to accommodate the anticipated demand unless specifically noted. The County will consider if any unconstrained demand will not or cannot be met through the evaluation of airport development alternatives later in the Airport Master Plan (AMP).

The Airport accommodates primarily single-engine aircraft and helicopters. Multi-engine aircraft use is occasional and is limited by available runway length (2,356 feet).

As noted in Chapter 2 - Existing Conditions, the 2017 Washington Aviation System Plan (WASP) defines Packwood Airport as a "Local" airport. Local airports support General Aviation (GA) activities including personal transportation, recreational flying, pilot training, and agricultural activities. Local airports are typically located outside of metropolitan areas and regional centers; have paved primary runways; and have 15 or fewer based aircraft. In addition to traditional general aviation (GA) activity, the Airport is strategically located to support aerial wildfire response. In late summer 2022, the Airport was closed to non-emergency use for six weeks to support a sustained helicopter response to a nearby fire.

In the federal airport system, Packwood Airport is classified as a "Basic" GA airport in the 2023 National Plan of Integrated Airport Systems (2023-2027) report to Congress. Basic airports provide a means for GA flying and link the community to the national airport system. Basic airports support GA activities such as emergency response, air ambulance service, flight training, and personal flying.

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1    Packwood Airport – Airport Layout Plan Report (Century West Engineering, 2009)

# FAA Forecasting Process

The FAA provides aviation activity forecasting guidance for airport master planning projects. *FAA Advisory Circular (AC) 150/5070-6B, Airport Master Plans*, outlines seven standard steps involved in the forecast process:

1. **Identify Aviation Activity Measures:** The level and type of aviation activities likely to impact facility needs. For general aviation, this typically includes based aircraft and operations.

2. **Previous Airport Forecasts:** May include the FAA Terminal Area Forecast (TAF), state or regional system plans, and previous master plans.

3. **Gather Data:** Determine what data are required to prepare the forecasts, identify data sources, and collect historical and forecast data.

4. **Select Forecast Methods:** There are several appropriate methodologies and techniques available, including regression analysis, trend analysis, market share or ratio analysis, exponential smoothing, econometric modeling, comparison with other airports, survey techniques, cohort analysis, choice and distribution models, range projections, and professional judgment.

5. **Apply Forecast Methods and Evaluate Results:** Prepare the actual forecasts and evaluate for reasonableness.

6. **Summarize and Document Results:** Provide supporting text and tables, as necessary.

7. **Compare Forecast Results with FAA's TAF:** Follow guidance in *FAA Order 5090.5, Field Formulation of the National Plan of Integrated Airport Systems and Airport Capital Improvement Program*. In part, the Order indicates that forecasts should not vary significantly (more than 10%) from the TAF. When there is a greater than 10% variance, supporting documentation should be supplied to the FAA. The aviation demand forecasts are then submitted to the FAA for their approval.

## KEY ACTIVITY ELEMENTS

As noted above, general aviation airport activity forecasting focuses on two key activity segments: based aircraft and aircraft operations (takeoffs & landings). Detailed breakdowns of these activity segments include:

- Aircraft fleet mix
- Peak activity
- Distribution of local and itinerant operations
- Determination of the critical aircraft (also referred to as the design aircraft)

The critical aircraft represents the most demanding aircraft type or family of aircraft that uses an airport on a regular basis (a minimum of 500 annual takeoffs & landings). The critical aircraft is used to establish a variety of FAA design categories, which then establish design standards for airfield facilities. FAA airport design standard groupings reflect the physical requirements of specific aircraft types and sizes. Design items, such as runway length evaluations, are determined by the requirements of current/future critical aircraft. The activity forecasts also support the evaluation of several demand-based facility requirements including runway and taxiway capacity, aircraft parking, and hangar capacity.

# Population and Economic Conditions

Historically, downturns in general aviation activity often occur during periods of weak economic conditions while growth typically coincides with favorable economic conditions. The historic depth of the 2008 Great Recession dramatically impacted regions and local communities and rippled throughout general aviation for several years after the recession. Following a slow economic recovery, a 10-year period of sustained economic growth leading into 2020 significantly improved conditions in general aviation. This upward trend included increased flight activity and growth in new aircraft deliveries, particularly in the business aviation, helicopter, light sport aircraft, and experimental (kit) aircraft segments.

The U.S. economy was abruptly impacted at the onset of the COVID-19 pandemic in early 2020. The effects of the pandemic and the related impacts affected the aviation industry in a variety of ways in 2020 and 2021. Signs of rebound within general aviation began to appear heading into 2021 as part of the national recovery. This upward trend has been sustained through a period of economic uncertainty that has persisted into early 2023.

The FAA's current long-term Aerospace Forecast, Fiscal Years 2022-2042 reflects overall strength in both the U.S. and regional economies, and projects modest growth in aviation activity over the long-term. The forecast reflects areas of depressed general aviation activity in the near term and the assumption that general aviation will return to pre-COVID activity levels later in the forecast period, before resuming previously forecast growth.

## POPULATION

The population within an airport's service area, in broad terms, affects the type and scale of aviation facilities and services that can be supported. Changes in population often reflect broader economic conditions that may also affect airport activity. The service area for Packwood Airport includes the local community and eastern Lewis County. For forecasting aviation activity, an evaluation of population for Lewis County and the Packwood area provides a reasonable indication of trends within the Airport's service area.

### Historical Population (2010-2022)

The 2022 Washington Office of Financial Management (OFM) estimate for Lewis County's population was 83,400, up 10.5% (net gain of 7,945 residents) since 2010. Most of the net increase is concentrated in the western section of the county. The 2022 draft Packwood Subarea Plan notes that the Packwood area (zip code tabulation area 98361) had population of 1,073 in 2020, making up slightly less than 2% of Lewis County population (2020 Census). The population for zip code 98361 in the 2000 Census was 1,209.

OFM data indicate that annual population growth in Lewis County between 2010 and 2022 averaged 0.84%[2], which trailed statewide population growth (1.31% AAGR) during this period. Also worth noting, population growth in unincorporated Lewis County, which includes areas the Packwood area, averaged 0.93% AAGR over this 12-year period.

Recent historical population data and average annual growth rates for Lewis County (overall and unincorporated areas) and Washington are summarized in **Table 3-1**.

**Table 3-1: Lewis County Population Summary (Historical)**

|  | AAGR[1] | 2010 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|
| Washington | 1.31% | 6,724,540 | 7,310,300 | 7,427,570 | 7,546,410 | 7,707,047 | 7,766,975 | 7,864,400 |
| Lewis County (total) | 0.84% | 75,455 | 79,477 | 80,250 | 81,151 | 82,149 | 82,700 | 83,400 |
| Unincorporated Lewis County | 0.93% | 44,892 | 47,612 | 48,137 | 48,770 | 49,461 | 49,840 | 50,185 |

Source: U.S. Census Bureau (2010, 2020); WA Office of Financial Management (OFM) Postcensal Estimates (2017-2022)
1 AAGR: 2010-2022

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2    AAGR = Average Annual Growth Rate (compounded over time)

## Forecast Population

In Washington state, OFM is responsible for developing long term population forecasts to support various local and state government programs. OFM also generates postcensal estimates of population on April 1 each year to supplement available census data. OFM periodically generates three 20-year population forecasts for Growth Management Act (GMA) counties for use in their comprehensive planning. The medium or "middle series" forecast scenarios are often selected by counties as the most realistic forecasts for long term planning. The 2017 Lewis County Comprehensive Plan presents an adopted 2040 population figure that fell between the 2017 medium and high OFM forecasts for the county. The most recent OFM Lewis County forecasts (updated in 2022) reflect slightly lower long-term population growth (post Covid) than previously forecast.

The most recent Washington state long range forecast (2023-2050) was issued by OFM in November 2022. This projection matches OFM's statewide 2022 GMA middle series forecast. A summary of current county and statewide forecasts is presented in **Table 3-2**.

**Table 3-2: Lewis County Population Forecast**

|  | AAGR[1] | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 |
|---|---|---|---|---|---|---|---|
| Lewis County (2022 GMA) medium | 0.59% | 82,149 | 87,957 | 87,746 | 90,188 | 92,313 | 94,187 |
| Lewis County (2022 GMA) high | 1.1% | 82,149 | 91,754 | 95,616 | 99,103 | 102,248 | 105,122 |
| Washington (2022 Forecast) | 0.93% | 7,706,310 | 8,100,384 | 8,502,764 | 8,884,512 | 9,248,473 | 9,598,597 |

Source: WA Office of Financial Management (OFM)
1 AAGR: 2010-2022

The long-term forecasts reflect the same differentials for county-versus-statewide growth as the 2010-2022 historical data indicate. In both cases, Lewis County's annual population growth rate tracks at about 2/3 the statewide growth rate.

## Summary – Population

The long-term population growth projected for Packwood and eastern Lewis County is expected to have a modest, yet positive effect on activity at Packwood Airport. Incremental growth in year-round and part-time residents will increase opportunities to attract new Airport tenants requiring aircraft storage (hangar, tiedown space).

## ECONOMY

Lewis County's economy historically relied on the forest products industry, supplemented by trade, services and government employment. **Table 3-3** summarizes the county's leading employment sectors. Other significant employment sectors include construction, other services, farm employment, transportation and warehousing, administrative and waste services, and real estate & rental & leasing.

**Table 3-3: Lewis County Employment (2021)**

|  | Number of Jobs | Share of Employment |
|---|---|---|
| State and Local Government | 5,310 | 13.9% |
| Health Care and Social Assistance | 4,620 | 12.1% |
| Retail Trade | 4,560 | 11.9% |
| Manufacturing | 3,710 | 9.7% |
| Accommodation and Food Services | 2,930 | 7.7% |
| All other industries | 17,160 | 44.8% |
| Total | 38,290 | 100% |

Source: Woods & Poole Economics, 2021 State Profile (WA/OR/ID)

Among the unique economic segments in Packwood and eastern Lewis County is tourism and recreational visitor spending, which translates into hotel/motel, campground, and vacation rentals. One indicator of this activity may be found in the composition of private home use in the local area. The U.S. Census reports housing units—including the number of occupied versus vacant homes—in the 98361-zip code tabulation area (ZCTA), which includes

Packwood are the surrounding area. For census recording purposes, occupied dwellings have full time year-round occupants and vacant dwellings include part-time occupancy (seasonal, weekend, vacation, etc.) and short-term rental. **Table 3-4** summarizes the local housing trends from 2000 to 2020. The data identify two unique trends: both the overall growth in housing units and the percentage of unoccupied homes in 98361 ZCTA have increased, but at different rates. The increase in total housing units has averaged less than 1% annually (0.8%) since 2000, while the number of vacant units has increased at an average of 3.3% annually. The data suggest that the local housing market includes a significant and growing number of part-time, or second home residents and vacation rentals. Based on 2020 Census data, 76% of total housing units in ZCTA 98361 were reported as vacant.

**Table 3-4: Local Area Housing Occupancy (ZCTA 98361)**

|                      | 2000  | 2010  | 2020  |
| -------------------- | ----- | ----- | ----- |
| Total Housing Units  | 1,369 | 1,525 | 1,600 |
| Occupied             | 729   | 587   | 381   |
| Vacant               | 640   | 938   | 1,219 |

Source: U.S. Census Bureau

## Personal Income

Lewis County trails state and national per capita and household income levels. The county has a higher level of poverty than the state, but lower than the nation. The current Washington Employment Security Department (ESD) profile for Lewis County provides the following summaries related to personal income:

- Inflation-adjusted per capita income in Lewis County in 2020 was $47,752 compared to $67,126 (Washington) and $59,510 (U.S.).
- Median household income in 2019 was $58,911 in Lewis County, compared to $78,687 (Washington) and $65,712 (U.S.).
- 11.6% of Lewis County population was living below the poverty level in 2019—a higher rate than Washington (9.8%), but lower than the U.S. rate (12.3%).

These economic indicators (trends) are well established in Lewis County and as such, are not expected to change significantly during the current planning period.

## Unemployment

Typically, peak unemployment levels in Lewis County[3] occur during the winter months, while the rest of the year remains fairly constant. A review of 2015 to 2022 data reveals relatively consistent seasonal unemployment levels, except for 2020 when COVID-19-induced unemployment spiked above 15% in April and May. Typically, the average high-low spread for monthly unemployment in Lewis County throughout the year is less than 3 percentage points. In 2020, the spread was 11.9 points. Unemployment levels began a steady improvement in late 2020 and have remained relatively stable since, fluctuating between 5% to 8%. The county's unemployment rates for the first three months of 2023 are generally comparable to the same period in 2019, nearly a year before the onset of the pandemic in the U.S.

Similar to income, historical unemployment levels in Lewis County reveal relatively predictable seasonal fluctuations. While overall levels may improve as ongoing economic expansion occurs both locally and throughout the county, changes in current trends would most likely be incremental and not significantly impact airport activity during the current planning period.

## Economic Outlook

The Washington Employment Security Department (ESD) generates annual short and long-term employment forecasts by region. Lewis County is in the Pacific Mountain region, which also includes Pacific, Grays Harbor, Mason, and Thurston counties. The ESD projections show expected changes in employment by industry and occupation, current and projected employment counts, estimated growth rates and average annual openings. **Table 3-5** summarizes the region's near-term employment outlook, which ranges from 1% to 2% annual growth through 2030.

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3    Centralia (Lewis County) data WA ESD, not seasonally adjusted.

**Table 3-5: Pacific Mountain Region Employment Forecast By Industry (Updated July 2022)**

| Job Categories | Estimated employment 2020 | Estimated employment 2025 | Estimated employment 2030 | Average annual growth rate 2020-2025 | Average annual growth rate 2025-2030 |
|---|---|---|---|---|---|
| TOTAL NONFARM | 185,500 | 204,800 | 218,300 | 2.00% | 1.28% |
| NATURAL RESOURCES and Mining | 1,400 | 1,400 | 1,400 | 0.00% | 0.00% |
| Logging | 1,100 | 1,100 | 1,100 | 0.00% | 0.00% |
| Mining | 300 | 300 | 300 | 0.00% | 0.00% |
| CONSTRUCTION | 10,300 | 11,500 | 12,500 | 2.23% | 1.68% |
| MANUFACTURING | 10,400 | 10,900 | 11,200 | 0.94% | 0.54% |
| Durable Goods | 6,500 | 6,600 | 6,700 | 0.31% | 0.30% |
| Wood Product Manufacturing | 3,300 | 3,300 | 3,300 | 0.00% | 0.00% |
| Nonmetallic Mineral Product Manufacturing | 600 | 600 | 600 | 0.00% | 0.00% |
| Primary Metal Manufacturing | 600 | 700 | 700 | 3.13% | 0.00% |
| Fabricated Metal Product Manufacturing | 300 | 300 | 300 | 0.00% | 0.00% |
| Machinery Manufacturing | 100 | 100 | 100 | 0.00% | 0.00% |
| Aerospace Product and Parts Manufacturing | 0 | 0 | 0 | 0.00% | 0.00% |
| Other Transportation Equipment | 0 | 0 | 0 | 0.00% | 0.00% |
| Other Durable Manufacturing | 700 | 700 | 800 | 0.00% | 2.71% |
| Non-Durable Goods | 900 | 900 | 900 | 0.00% | 0.00% |
| Food and Beverages Manufacturing | 3,900 | 4,300 | 4,500 | 1.97% | 0.91% |
| Paper Manufacturing | 2,600 | 2,700 | 2,900 | 0.76% | 1.44% |
| Printing and Related Support Activities | 400 | 400 | 400 | 0.00% | 0.00% |
| Other Non-Durable | 200 | 200 | 200 | 0.00% | 0.00% |
| WHOLESALE TRADE | 5,800 | 6,200 | 6,400 | 1.34% | 0.64% |
| RETAIL TRADE | 21,200 | 22,900 | 24,200 | 1.55% | 1.11% |
| Food and Beverage Stores | 4,200 | 4,500 | 4,700 | 1.39% | 0.87% |
| Motor Vehicle and Parts Dealers | 2,600 | 2,700 | 2,800 | 0.76% | 0.73% |
| Other Retail Trade | 14,400 | 15,700 | 16,700 | 1.74% | 1.24% |
| TRANSPORTATION, WAREHOUSING AND UTILITIES | 5,500 | 5,400 | 5,900 | -0.37% | 1.79% |
| Utilities | 500 | 500 | 500 | 0.00% | 0.00% |
| Transportation and Warehousing | 5,000 | 4,900 | 5,400 | -0.40% | 1.96% |
| INFORMATION | 1,700 | 2,000 | 2,100 | 3.30% | 0.98% |
| Software Publishers | 200 | 300 | 300 | 8.45% | 0.00% |
| Other Information | 100 | 100 | 100 | 0.00% | 0.00% |
| FINANCIAL ACTIVITES | 1,400 | 1,600 | 1,700 | 2.71% | 1.22% |
| Finance and Insurance | 6,200 | 6,400 | 6,700 | 0.64% | 0.92% |
| Real Estate, Rental and Leasing | 4,200 | 4,300 | 4,500 | 0.47% | 0.91% |
| PROFESSIONAL and BUSINESS SERVICES | 2,000 | 2,100 | 2,200 | 0.98% | 0.93% |
| Professional, Scientific and Technical Services | 15,600 | 17,600 | 19,700 | 2.44% | 2.28% |
| Management of Companies and Enterprises | 6,600 | 7,700 | 8,600 | 3.13% | 2.24% |
| Other Professional Services | 1,100 | 1,200 | 1,300 | 1.76% | 1.61% |
| Employment Services | 5,000 | 5,200 | 5,700 | 0.79% | 1.85% |
| EDUCATION and HEALTH SERVICES | 27,500 | 30,600 | 34,200 | 2.16% | 2.25% |
| Education Services | 2,900 | 3,300 | 3,700 | 2.62% | 2.31% |
| Health Services and Social Assistance | 24,600 | 27,300 | 30,500 | 2.10% | 2.24% |
| LEISURE and HOSPITALITY | 15,900 | 21,700 | 23,400 | 6.42% | 1.52% |
| Arts, Entertainment and Recreation | 1,700 | 2,200 | 2,300 | 5.29% | 0.89% |
| Accommodation and Food Services | 14,200 | 19,500 | 21,100 | 6.55% | 1.59% |
| OTHER SERVICES | 6,800 | 7,600 | 7,900 | 2.25% | 0.78% |
| GOVERNMENT | 57,200 | 60,600 | 62,700 | 1.16% | 0.68% |
| Federal Government | 1,400 | 1,400 | 1,500 | 0.00% | 1.39% |
| State and Local Government Other | 41,300 | 43,400 | 44,700 | 1.00% | 0.59% |
| Government Educational Services | 14,500 | 15,800 | 16,500 | 1.73% | 0.87% |

Source: Washington Employment Security Department/LMEA, Pacific Mountain Region (July 2022 update)

## Woods & Poole Forecasts

A review of Woods & Poole Economics, Inc., forecasts for the Pacific Northwest region reflect similar long-term growth expectations as other existing Washington State agency forecasts. Woods & Poole forecasts are recognized nationally for the demographic detail provided down to the county level, with additional breakouts provided for a variety of defined place designations.

The Woods & Poole 2021 State Profile Series[4] forecast contains regional data and projections for all Combined Statistical Areas (CSAs), Metropolitan Statistical Areas (MSAs), Micropolitan Statistical Areas (MICROs), Metropolitan Divisions (MDIVs), and counties in the region. The current forecasts extend to 2050 and provide a useful comparison to shorter term projections developed by state or local government. Although some differences in data organization may exist from the forecasts noted earlier, the overall growth rates within the forecasts provide relevant evaluations of long-term economic growth for comparison. **Table 3-6** summarizes key growth rates for Lewis County from the Woods & Poole 2050 forecasts. The economic data are presented in 2012 dollars, referred to as "constant" dollars, which are used to measure real change in earnings and income when inflation is considered.

**Table 3-6: Lewis County – Forecast Annual Growth Rates (2021-2050)**

| Data Category | Average Annual Growth Rate |
| --- | --- |
| Total Population | 0.49% |
| Total Employment (includes farm employment) | 0.65% |
| Total Earnings (2012 $) | 1.40% |
| Personal Income (2012 $) | 1.74% |
| Income Per Capita (2012 $) | 1.35% |
| Mean Household Income (2012 $) | 1.37% |
| Gross Regional Product (2012 $) | 1.41% |

Source: Woods & Poole Economics, 2021 State Profile Series (Idaho, Washington, Oregon)
2012 referenced data represents "constant" dollars used to measure real change over time when inflation is considered.

## Summary – Economic Outlook

Modest population growth is expected for Lewis County during the current 20-year planning horizon. Annual growth is projected to average about 0.59% over this period, which is lower than the historical growth experienced over the last 10+ years. As with historical population trends, local growth is expected to be slower than statewide growth. It is noted that long term economic forecasts project more robust growth in terms of employment levels and measures of economic output (post-COVID-19 pandemic recovery).

The Draft Packwood Subarea Plan (December 2022), currently being developed by Lewis County, projects robust near-term and long-term population growth in the local Packwood area (zip code tabulation area 98361). Final projections are expected in mid-2023, but the preliminary projection for the 2040 full-time residential population is 1,250, up from 1,073 recorded in the 2020 Census. This projection reflects an average annual growth rate of 0.77%, which exceeds the county-wide growth rate (medium series) currently forecast by Washington OFM.

Growth in local population and economic output is expected to be modest during the current planning period, and this in turn will contribute to future air traffic demand at Packwood Airport that is consistent with events in the community and its surroundings. Packwood Airport has not historically generated high levels of activity. However, the importance of the facility to the local community, Lewis County, and region is reflected in its unique ability to serve a remote and sparsely populated area.

The recreation and tourism segments of the local economy are especially capable of contributing to the Airport's future transient general aviation (GA) activity. Growth in transient activity would be expected to increase demand for facilities such as aircraft parking. Growth in seasonally based aircraft is also possible as part-time residents or extended stay visitors increase. The Airport's ability to accommodate critical patient transport (air ambulance

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4    2021 State Profile – Idaho, Oregon, and Washington. Copyright 2021, Woods & Poole Economics, Inc.

flights) is well established, and demand for those services would be expected to increase as the resident population and visitor levels grow. This activity would benefit from basic facility improvements such as a lighted helicopter parking area that could support aircraft and ground support (EMS) needs. The frequency, size, and location of wildfires in Washington is random, but it is reasonable to assume that recent fire trends in the region may continue or worsen. The need for an effective aerial response supported by Packwood Airport will become increasingly important to protect human life, safety, and property as new development and a growing population requires additional resources. For planning purposes, fire-related airport activity comparable to 2022 levels are assumed to randomly occur during the 20-year planning period.

# Historical Aviation Activity

Historical activity data for Packwood Airport is limited to the FAA National Based Aircraft Inventory Program (validated counts), FAA Airport Record Forms (5010-1), the FAA TAF, and previous airport plans. Airport sponsors are required by FAA to periodically update 5010 forms and the validated based aircraft count based to accurately reflect local conditions. As noted earlier, the primary data used in general aviation airport planning includes based aircraft and annual aircraft operations. This chapter will document existing activity that will serve as the baseline for updated based aircraft and aircraft operations forecasts. The methods used to develop these data are described below.

The National Based Aircraft Inventory Program validated count for Packwood Airport is 0 aircraft (updated November 2022). The current validated count is not yet reflected in the February 2023 TAF update, but it is accepted as the baseline for developing new based aircraft forecasts. An updated aircraft operations estimate for 2022 is presented later in this chapter and will serve as the baseline for the 2022-2042 aircraft operations forecasts.

The current TAF and 5010 for Packwood Airport provide the most recent historical based aircraft and annual aircraft operations totals. The current 5010 reports 0 based aircraft (updated in late 2022) and 3,100 total operations for 12 months ending 12/31/2020. The current TAF reports one based aircraft and 3,100 annual aircraft operations for 2021. The 5010's based aircraft total is consistent with the Airport's validated based aircraft count updated by airport management in late 2022.

## FAA TERMINAL AREA FORECAST

The February 2023 TAF provides a summary of historical activity (estimates) for the Airport that extends from 1990 to 2021. The range of data for based aircraft and annual aircraft operations is significant and there are several extended periods where numbers are unchanged year-over-year. As a result, the TAF does not appear to provide a consistently accurate record of actual historical activity at Packwood Airport.

Between 1990 and 2021 (32 years), the TAF provides only three different annual operations totals and these totals are repeated. The most common number (8,800 annual operations) appears in two extended runs that accounted for 26 of the 32 years of data. Annual operations for 2005-2009 were reset to 1,050, which matched the 2005 baseline from the FAA-approved 2009 ALP Report forecasts. In 2010 the annual operations were again reset to 8,800, where they were maintained until 2021 (3,100 operations). Similar deviations will need to be considered by FAA when the updated Airport Master Plan forecasts are compared to future year TAF data, as required by FAA.

A summary of current and historical TAF activity data for the Airport is presented in **Figure 3-1**.

**Figure: 3-1: Based Aircraft & Annual Aircraft Operations - FAA TAF (Packwood – 55S)**



Legend: Historical TAF - Based Aircraft — 2022 Validated Count



Legend: Historical TAF - Aircraft Operations — Baseline (2022)
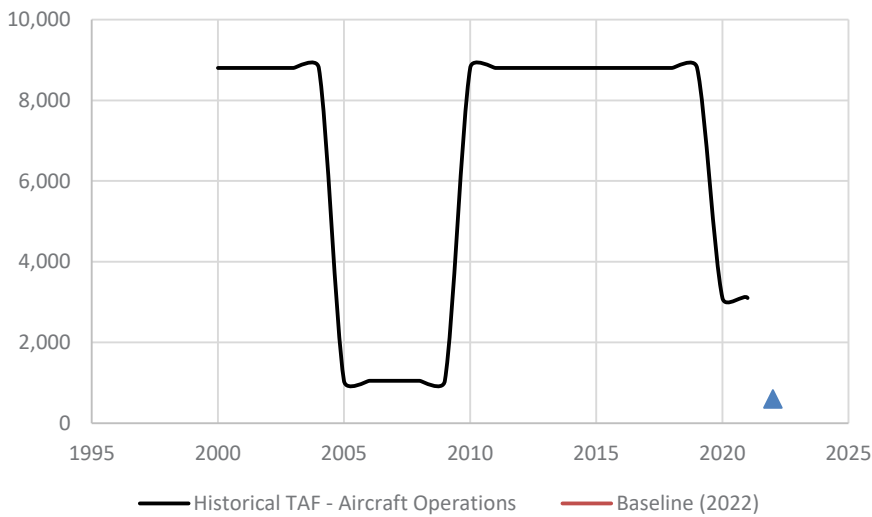
# Current Aviation Activity

As noted earlier, existing activity at the Airport is low. There are currently no year-round based aircraft. GA operations (takeoffs and landings) are generated by transient aircraft and part-time aircraft that are located at the Airport for extended periods. The Airport also accommodates seasonal helicopter firefighting and limited military helicopter activity.

Since no tabulated records of air traffic are available for the Airport, an updated estimate of current aircraft operations was developed to provide a baseline for the 2022-2042 forecasts. The baseline activity is summarized below and in **Table 3-7**.

It is recognized that activity levels will vary from year to year based on a variety of factors unrelated to the Airport. However, for planning purposes the 2022 baseline provides a reasonable indication of activity that may be experienced at the Airport in any given year during the current 20-year planning period. Annual fluctuations above or below this level should be expected and accounted for when defining facility needs such as aircraft parking apron.

## General Aviation (GA)

Current GA activity typically includes a small number of aircraft that are located at the Airport for extended periods during the year and transient aircraft. Transient activity is generated by events such as the Airport Fly-In, local area visitors (recreational, vacation rentals, etc.), and by small aircraft flying through the area on the popular White Pass VFR route that connects western Washington with eastern Washington.

FAA Order 5090.5 Formulation of the NPIAS and ACIP, suggests a methodology for non-towered airports that relies on a general formula for estimating operations by utilizing an activity ratio that is applied to based aircraft. The Order identifies a typical range of 250 to 450 operations per based aircraft (OPBA) for distinct types of general aviation airports depending on the airport's role in the NPIAS. Consistent with FAA NPIAS guidance, the recommended multiplier (250 OPBA) for a Basic General Aviation airport was applied to an equivalent of 1 based aircraft at Packwood Airport. This was done to capture a basic measure of GA activity that would otherwise be unquantified with a calculation based on 0 based aircraft. Based on this estimate, the Airport accommodated 250 annual GA operations in 2022.

Aircraft takeoffs and landings are defined as operations by FAA, with a single takeoff or landing counted as one operation. A touch-and-go landing is counted as two operations since it involves both a takeoff and landing.

## Wildfire Activity

In 2022, Lewis County closed the Airport to public use for about 6 weeks in August and September to support a major aerial wildfire response coordinated by USDA -Forest Service. During this period, the runway was closed by NOTAM with yellow "X" markers placed at each end. Several heavy-lift helicopters and a variety of smaller helicopters were dispatched to the Airport. Multiple large helicopters were parked on the closed runway; other aircraft were parked in areas adjacent to the runway. The daily volumes of flight activity varied during the extended response, which included active and stand-by modes. Based on airport management information, this activity was estimated to average 50 operations per week, or 300 operations over the 6-week period. Although this level of flight activity is not expected to occur consistently every year, it is common enough to assume it as a regular part of activity at the Airport going forward. It is also noted that higher flight volumes or multiple events may also occur. As such, the baseline level provides a reasonable indication of this activity.

## Military

Military use of the Airport is limited but typically includes helicopters involved in local area search and rescue operations and related training operations. Occasional training operations generated by helicopters traveling between Joint Base Lewis-McChord and the Yakima Training Center, along the visual flight route through White Pass has also been noted in previous plans.



**Table 3-7: Airport Activity Summary (2022)**

| Operator | A/C Type | ARC | Annual Operations |
|---|---|---|---|
| Local & Transient GA Activity[1] | Single-Engine Piston, Fixed Wing Experimental, LSA | A-I | 250 |
| Fire Related[2] | Bell 206 - Boeing CH47 | Heli | 300 |
| Military[3] | Helicopter | Heli | 50 |
| TOTAL OPS - ALL | | | 600 |
| TOTAL OPS - A-I | | | 250 |
| TOTAL OPS - HELI | | | 350 |
| TOTAL OPS - ALL A/C | | | 6 |
| Based Aircraft[4] | | | 0 |

1. Operations are estimated using 250 OPBA applied to the equivalent of 1 based aircraft to account for part-year based aircraft and transient aircraft use.
2. Operations estimated based on fire days (# days airport closed to regular traffic).
3. Nominal amount of airport activity associated with routine overflights between JBLM and Yakima Training Center, and local search and rescue or emergency response activity (training and live response).
4. Seasonal or part-time aircraft not included in based aircraft count.

# Existing Aviation Activity Forecasts

Existing forecasts for Packwood Airport include the FAA TAF and the previous ALP Report completed in 2009. The 2017 Washington Aviation System Plan (WASP) does not provide forecasts for individual airports. The forecasts developed in the previous state aviation system plan, the 2007 Washington Long Term Air Transportation Study (LATS), are now considered obsolete. Each of the existing forecasts have relevancy issues that do not support valid comparisons with current activity or updated forecasts presented later in this chapter.

## FAA TERMINAL AREA FORECAST

The current TAF (Issued February 2023) for Packwood Airport lists 1 based aircraft and 3,100 annual operations for the most recent historical year (2021) and maintains these numbers unchanged through 2050. The TAF based aircraft number roughly corresponds (+1 aircraft) to the 2022 baseline activity defined for the master plan update, however, the TAF aircraft operations totals are significantly higher than the 2022 baseline. The variance of 1 based aircraft is not significant. The variance in aircraft operations is significant in percentage terms, although the annual operations totals are both consistent with "low activity" GA airports. The deviations will need to be considered by FAA when the recommended airport master plan forecasts are compared to the TAF, as required by FAA. In addition to the variance in current activity, the TAF's future year projections show no growth through 2050, which will deviate from any growth projection. **Table 3-8** summarizes the 2023 TAF and notes the 2022 baseline activity estimates.

**Table 3-8: 2023 FAA TAF – Packwood Airport (55S)**

| Forecast | AAGR | 2022 | 2027 | 2032 | 2037 | 2042 |
|---|---|---|---|---|---|---|
| Based Aircraft | 0.0% | 1 | 1 | 1 | 1 | 1 |
| Annual Aircraft Operations | 0.0% | 3,100 | 3,100 | 3,100 | 3,100 | 3,100 |
| 2022 Baseline (Based Aircraft) | - | 0 | - | - | - | - |
| 2022 Baseline (Aircraft Operations) | - | 600 | - | - | - | - |

Source: FAA Terminal Area Forecast (55S) – Issued February 2023. Century West Engineering (2022 Baseline)
AAGR: Average Annual Growth Rate

## 2009 ALP REPORT FORECASTS

The 2009 ALP Report provided forecasts for the 2005-2025 planning period. The forecast projected based aircraft to increase from 3 to 4 By 2025, which represents an average annual growth rate of 1.45%. As noted in the table, in 2022 Airport had 0 based aircraft. Annual aircraft operations were projected to increase from 1,050 to 1,300, which represents an average annual growth rate of 1.10%. The 2022 baseline operations estimate is 600.

The 2009 ALP forecasts did not anticipate the loss of the locally based aircraft fleet or the corresponding decline in aircraft operations. Although the forecast growth expectations were modest, the incremental changes in activity illustrate how any projection can become obsolete when working with small numbers. The updated baseline data noted above can be compared to the 2022 forecast to determine current relevance. **Table 3-9** summarizes the 2009 ALP Report forecasts and notes the 2022 baseline activity.

**Table 3-9: 2009 ALP Report – Forecast Summary**

| Forecast | AAGR | 2005 | 2010 | 2015 | 2020 | 2025 |
|---|---|---|---|---|---|---|
| Based Aircraft | 1.45% | 3 | 3 | 4 | 4 | 4 |
| Annual Aircraft Operations | 1.10% | 1,050 | 1,050 | 1,300 | 1,300 | 1,300 |
| 2022 Baseline (Based Aircraft) | - | - | - | - | 0 | - |
| 2022 Baseline (Aircraft Operations) | - | - | - | - | 600 | - |

Source: Century West Engineering; AAGR: Average Annual Growth Rate

## WASHINGTON STATE AVIATION SYSTEM PLAN FORECAST

The 2017 WASP does not include individual airport activity forecasts. The most recent system plan forecasts prepared for individual airports were included in the 2007 LATS. The LATS was replaced with the 2017 WASP, although no new airport specific forecasts were included. The LATS forecasts are considered obsolete and are not currently used by WSDOT to support its system planning analyses.

# Updated Aviation Activity Forecasts

Updated aviation activity forecasts developed for the ALP Report's 20-year planning period (2022-2042) are presented in this section. The updated activity forecasts use the common baseline activity data presented earlier in **Table 3-7** and provide projections in 5-year increments. A review of the preliminary based aircraft and annual aircraft operations models presented is provided at the end of this section, with recommended forecasts identified for each.

The recommended ALP Report forecasts will be compared to the TAF (APO TAF Detail Report 2020-2045, Issued March 2022) when presented to FAA for review and approval. Additional information about the TAF based aircraft and operations comparison is presented at the end of the chapter.

### BASED AIRCRAFT

Four new based aircraft forecasts were developed for evaluation. All the forecasts use the 2022 validated based aircraft count of 0 described earlier as the baseline for the 20-year projections. The updated forecast models are summarized in **Table 3-10** and depicted in **Figure 3-3**. The current TAF projection is added to **Figure 3-3** for reference.

It should be noted that the absence of any existing based aircraft at the Airport and the actual loss of aircraft that occurred since the 2009 ALP report make any statistically based forward-looking projections unreliable. The ability to apply positive or negative growth rates to a base of "0" has limited value. As a result, applying broader FAA-defined forecast growth rates for general aviation or market share calculations will not produce a meaningful projection for the Airport. A more practical approach was used to develop the based aircraft forecast models described below. The models assume flat or modest incremental net growth in actual aircraft consistent with the Airport's historical activity and future growth expectations within the community. With this approach, however the resulting forecast growth rates are not relevant as the measure of relevancy to compare with the FAA TAF or other broad forecasts. For example, the addition of just 1 or 2 aircraft above current levels during the 20-year planning period would represent overall increases in the range of 100% to 200%. The resulting average annual growth rates would far exceed FAA long-term forecasts for the national GA fleet.

Based aircraft forecasts are primarily intended to identify future facility needs in forthcoming sections of the AMP, particularly aircraft storage – apron parking and hangar space. The use of development reserves is recommended for defining activity-dependent facility needs that may exceed forecasted growth. A basic long-term development reserve should have the capacity to accommodate 100% of the projected net of based aircraft over the planning period.

### Model #1 – No Growth

This model assumes that no locally based aircraft will be located at the Airport during the 2022-2042 planning period. The projection essentially maintains the Airport's recent decline from 3 to 0 based aircraft since the last plan but does not drive future based aircraft totals lower than 0. The model projects an **average annual growth rate of 0%** and maintains the current 0 based aircraft total at Packwood Airport through 2042.

### Model #2 – Low Growth

This model assumes partial replacement of the Airport's recent peak of 3 based aircraft over the current 2022-2042 planning period. The current availability of two small airplane hangar spaces and limited aircraft parking would fully support the increased activity. The projection increases based aircraft from **0 to 1 aircraft** at Packwood Airport by 2042. Due to the low starting point (2022: 0 based aircraft) in the forecast, the average annual growth rate is calculated from the first non-zero year (2027). The corresponding 15-year average annual growth rate (4.7%) is higher than would be generated with the same increase occurred over 20 years.

## Model #3 – Intermediate Growth

This model assumes full replacement of the Airport's recent peak of 3 based aircraft over the current 2022-2042 planning period. The current availability of two small airplane hangar spaces and limited aircraft parking would support near-term increases in activity and additional hangar construction is assumed to support long-term demand. The projection increases based aircraft from **0 to 3 aircraft** at Packwood Airport by 2042. As with Model #2, the average annual growth rate is calculated from the first non-zero year (2027). The corresponding 15-year average annual growth rate (7.6%) is higher than would be generated with the same increase occurred over 20 years.

## Model #4 –Moderate Growth

This model assumes nominal incremental growth beyond the Airport's recent peak of 3 based aircraft over the current 2022-2042 planning period. The current availability of two small airplane hangar spaces and limited aircraft parking would support near-term increases in activity and additional hangar construction is assumed to support long-term demand. The projection increases based aircraft from **0 to 4 aircraft** at Packwood Airport by 2042. As with Model #2 and #3, the average annual growth rate is calculated from the first non-zero year (2027). The corresponding 15-year average annual growth rate (9.7%) is higher than would be generated with the same increase occurred over 20 years.

**Table 3-10: Based Aircraft Forecast Models (55S)**

| Forecast | AAGR | 2022 | 2027 | 2032 | 2037 | 2042 |
|---|---|---|---|---|---|---|
| Model 1 – No Growth | 0.0% | 0 | 0 | 0 | 0 | 0 |
| Model 2 – Low Growth | 4.7% | 0 | 1 | 1 | 1 | 1 |
| **Model 3 – Intermediate Growth (Recommended)** | **7.6%** | **0** | **1** | **2** | **2** | **3** |
| Model 4 – Moderate Growth | 9.7% | 0 | 1 | 2 | 3 | 4 |

Source: Century West Engineering.
AAGR: Average Annual Growth Rate calculated from first non-zero year (2027) 15 years.

**Figure 3-2: Based Aircraft Forecast Models (55S)**
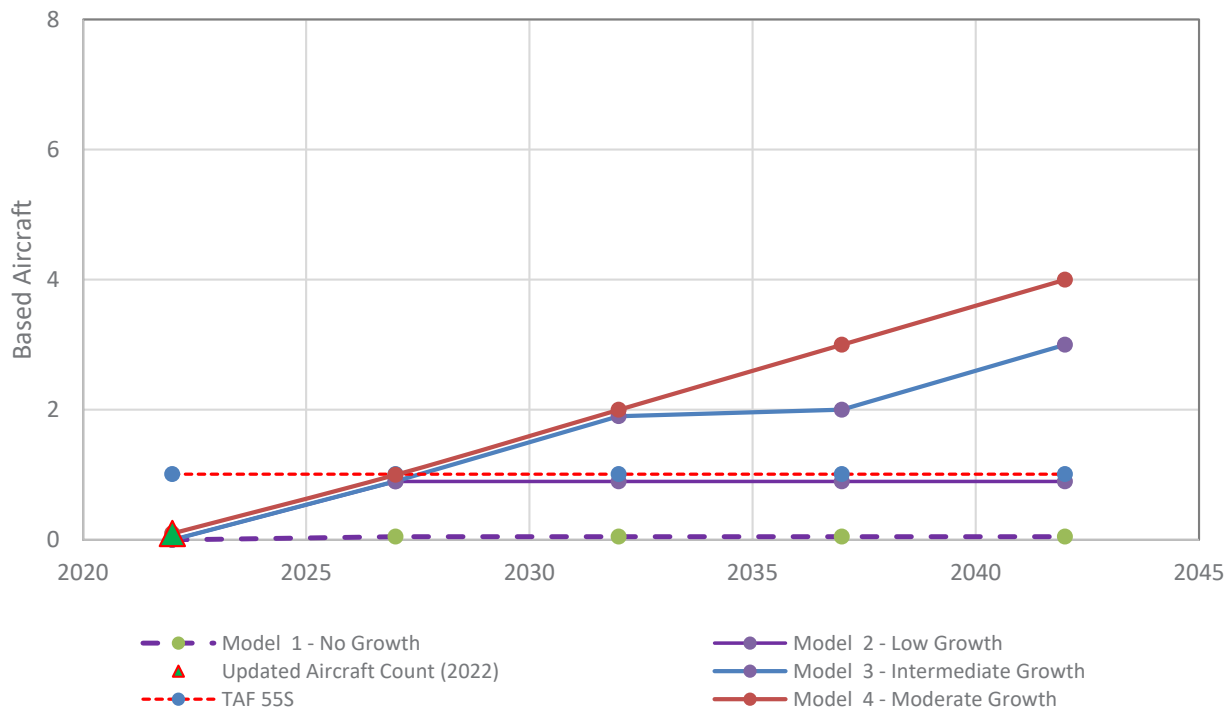
## RECOMMENDED AIRCRAFT OPERATIONS FORECAST

**Model 3 – Intermediate Growth** is the recommended based aircraft forecast for the 2022-2042 planning period for Packwood Airport. This model assumes that the anticipated economic and population growth in the local community will translate into airport activity that resembles the Airport's recent past activity.

The forecast model projects an increase from 0 to 3 based aircraft over the 20-year planning period. The projection results in 2 new based aircraft within the next 10 years and 1 additional aircraft added in the second half of the 20-year forecast period. When measured from 2027, the first year with an actual aircraft, the (15-year) average annual growth rate is 7.6%. For comparison, if projected the growth were to begin in 2022, the 20-year average annual growth rate would be 5.7%

This model assumes the Airport's future based aircraft fleet will be similar to its past fleet—consisting of traditional single-engine piston aircraft, with the possible addition of new-generation fixed-wing experimental (kit) aircraft, and light sport aircraft (LSA). The aircraft in these groups have similar operational requirements and currently generate transient operations at Packwood Airport.

## BASED AIRCRAFT FLEET MIX

Conventional single-engine piston aircraft, LSA, and experimental home-built aircraft account for 100% of the forecast-based aircraft fleet at Packwood Airport. This fleet mix is consistent with national aircraft ownership trends and represents a segment of aircraft that can currently operate on the 2,356-foot runway. **Table 3-11** summarizes the current and forecast fleet mix for the planning period.

Table 3-11: Forecast Based Aircraft Fleet Mix (55S)

| Aircraft Type | 2022 | 2027 | 2032 | 2037 | 2042 |
|---|---|---|---|---|---|
| Single Engine Piston | 0 | 1 | 2 | 2 | 3 |
| Multi Engine Piston | 0 | 0 | 0 | 0 | 0 |
| Turboprop | 0 | 0 | 0 | 0 | 0 |
| Jet | 0 | 0 | 0 | 0 | 0 |
| Helicopter | 0 | 0 | 0 | 0 | 0 |
| **TOTAL** | **1** | **1** | **2** | **2** | **3** |

Source: Century West Engineering

## AIRCRAFT OPERATIONS

Four new operations forecasts were developed from the air traffic mix in the 2022 baseline operations estimate and the based aircraft models described in the previous section. The aircraft operations forecast models are summarized in **Table 3-12** and depicted on **Figure 3-3**.

As with the baseline estimate, future aircraft operations at Packwood Airport include general aviation (GA), fire-related, and military activity. Fire and military activity is fixed at 250 annual operations in each of the forecast models through the planning period. This level is believed to represent typical annual activity that would occur during the planning period. As noted earlier, fire activity is highly variable and will fluctuate from year to year. It is recognized that the projected level of this activity may be exceeded in some years and not exist in other years.

General aviation activity is projected using a ratio of 250 operations per based aircraft (OPBA) for the forecast-based aircraft totals. The baseline equivalent of 1 based aircraft is used for forecast years with 0 aircraft to capture a nominal amount of seasonally based and transient GA activity.

## Model #1 – No Growth

This model effectively maintains current activity levels through the 2022-2042 planning period, consistent with Based Aircraft Forecast Model 1. A static projection of 250 annual operations for Fire and military helicopter operations is assumed during the planning period. Transient GA activity is maintained at 250 annual operations. The model projects an **average annual growth rate of -0.9%** due to the adjustment for military and fire activity from 300 to 250 annual operations, resulting in a decrease from **600 to 500 operations** at Packwood Airport by 2042.

## Model #2 – Low Growth

This model reflects incremental increases in annual operations in conjunction with the forecast increase in based aircraft in Based Aircraft Model 2. Fire and military helicopter operations are maintained at 250 per year, and GA operations are estimated based on the 250 OPBA ratio. The model projects an average **annual growth rate of 1.1%**, resulting in an increase from **600 to 750 operations** at Packwood Airport by 2042.

## Model #3 –Intermediate Growth

This model reflects an increase in annual operations in conjunction with the forecast increase in based aircraft in Based Aircraft Model 3. Fire and military helicopter operations are maintained at 250 per year, and GA operations are estimated based on the 250 OPBA ratio. The model projects an **average annual growth rate of 2.6%**, resulting in an increase from **600 to 1,000 operations** at Packwood Airport by 2042.

## Model #4 – Moderate Growth

This model reflects an increase in annual operations in conjunction with the forecast increase in based aircraft in Based Aircraft Model 4. Fire and military helicopter operations are maintained at 250 per year, and GA operations are estimated based on the 250 OPBA ratio. The model projects an **average annual growth rate of 3.7%**, resulting in an increase from **600 to 1,250 operations** at Packwood Airport by 2042.

## TERMINAL AREA FORECAST (TAF) – PACKWOOD AIRPORT (55S)

The current FAA TAF operations projection (issued February 2023) for Packwood Airport is provided for comparison. As noted earlier, the TAF projects a static 3,100 annual operations at Packwood Airport through 2050 (AAGR 0.00%). This projection is not consistent with the updated baseline operations estimate and the absence of future growth is not consistent with the Airport's potential.

### Table 3-12: Aircraft Operations Forecast Models (55S)

| Forecast | AAGR | 2022 | 2027 | 2032 | 2037 | 2042 |
|---|---|---|---|---|---|---|
| Model 1 – No Growth | -0.9% | 600 | 500 | 500 | 500 | 500 |
| Model 2 – Low Growth | 1.1% | 600 | 500 | 500 | 500 | 750 |
| **Model 3 – Intermediate Growth (Recommended)** | **2.6%** | **600** | **500** | **750** | **750** | **1,000** |
| Model 4 – Moderate Growth | 3.7% | 600 | 500 | 750 | 1,000 | 1,250 |

Source: Century West Engineering.
AAGR: Average Annual Growth Rate

**Figure 3-3: Aircraft Operations Forecast Models (55S)**
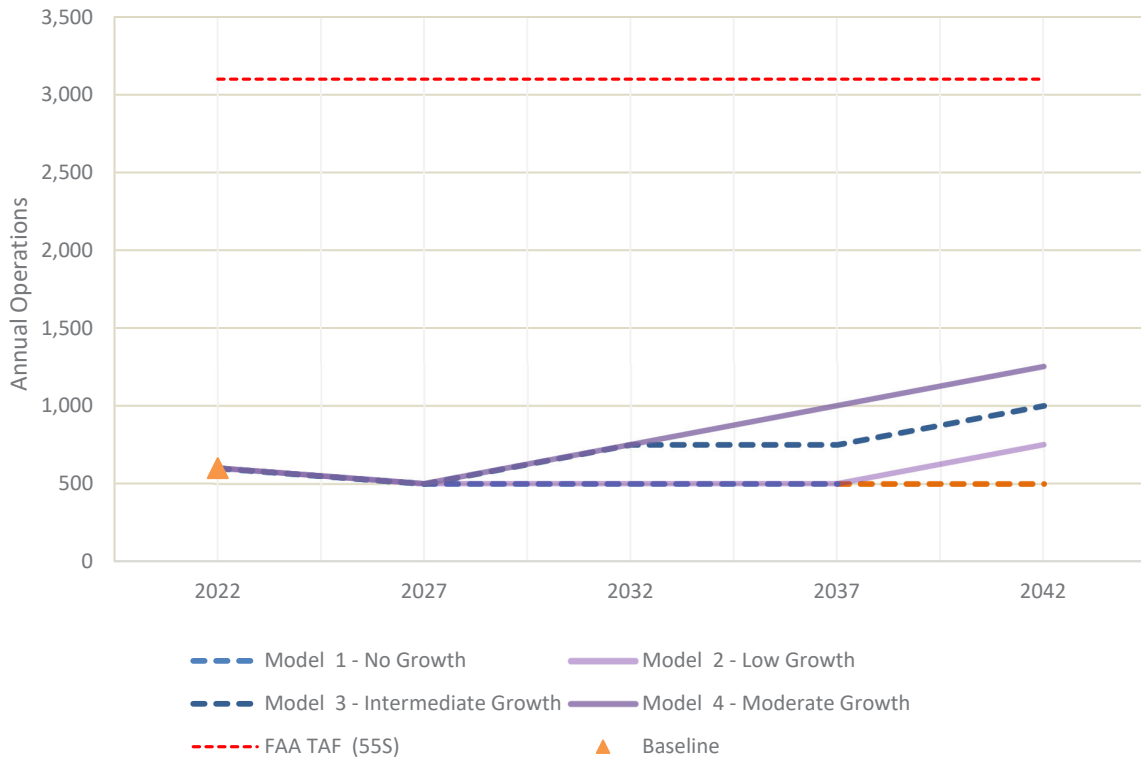


## RECOMMENDED AIRCRAFT OPERATIONS FORECAST

**Model 3 – Intermediate Growth** is the recommended aircraft operations forecast for the 2022-2042 planning period for Packwood Airport. This model is consistent with the recommended based aircraft forecast (Model 3 – Intermediate Growth), which reflects anticipated economic and population growth in the local community during the planning period. The forecast level of aircraft operations is comparable to previously estimated activity levels in 2005 (3 based aircraft, 1,050 annual operations). The forecast model projects an incremental increase from 600 to 1,000 annual aircraft operations at Packwood Airport over the 20-year planning period, which results in an **average annual growth rate of 2.6%**.

## LOCAL AND ITINERANT OPERATIONS

Aircraft operations are classified by FAA as local or itinerant. Local operations are conducted in the vicinity of an airport and include flights that begin and end at the airport. These include aerial applicators, flight training, training flights within the airport traffic pattern such as touch and go landings, and other flights that do not involve a landing at another airport. Itinerant operations include flights between airports such as on-demand air charter, air cargo/express, cross-country flight training, and personal or business travel.

The 2022 baseline estimate of operations indicate the local/itinerant operations split is approximately 50%/50%, when fire-related helicopter operations occur. In a non-fire year, the split would be expected to be 20% local and 80% itinerant. Since fire-related operations at the Airport typically require using the runway for helicopter parking and servicing, this activity does not drive non-emergency landside facilities such as aircraft parking apron. For regular use, a 20%/80% operational split is recommended for use in the forecast.

The local and itinerant distribution for each forecast year is summarized in **Table 3-13**.

**Table 3-13: Itinerant/Local Aircraft Operations (55S)**

| Activity | 2022 | 2027 | 2032 | 2037 | 2042 |
|---|---|---|---|---|---|
| Itinerant Operations (80%*) | 300 | 400 | 600 | 600 | 800 |
| Local Operations (20%*) | 300 | 100 | 150 | 150 | 200 |
| **Total Local & Itinerant Operations** | **600** | **500** | **750** | **750** | **1,000** |

*50/50 spilt in 2022

## AIRCRAFT OPERATIONS FLEET MIX

Single-engine piston aircraft account for nearly all fixed-wing aircraft operations at Packwood Airport. The runway can also accommodate limited use by single-engine turboprops and light twin-engine piston aircraft. The baseline operations estimate indicates that helicopters accounted for about 50% of air traffic at the Airport in 2022. The aircraft operations fleet mix forecast is summarized in **Table 3-14**.

**Table 3-14: Aircraft Operations Fleet Mix (55S)**

| Aircraft Type | 2022 | 2027 | 2032 | 2037 | 2042 |
|---|---|---|---|---|---|
| Single Engine Piston | 250 | 400 | 600 | 600 | 800 |
| Helicopter | 350 | 100 | 150 | 150 | 200 |
| **TOTAL** | **600** | **500** | **750** | **750** | **1,000** |

Source: Century West Engineering

# Critical Aircraft

The selection of design standards for airfield facilities is based upon the characteristics of the most demanding aircraft that are expected to use an airport, which is designated as the "critical aircraft." This designation does not mean that other types of aircraft can't operate at the Airport, although it does typically define FAA funding eligibility for facilities based on the applicable dimensional standards.

The FAA provides the following definition for critical aircraft:

> *"The critical aircraft is the most demanding aircraft type, or grouping of aircraft with similar characteristics, that make regular use of the airport. Regular use is 500 annual operations, including both itinerant and local operations, but excluding touch- and-go operations. An operation is either a takeoff or landing."* (FAA AC 150/5000-17)

The characteristics of the critical aircraft (Aircraft Approach Category and Airplane Design Group) were previously used by FAA to define the Airport Reference Code (ARC), which represented the airport's highest Runway Design Code (RDC). Current FAA guidance eliminates use of the ARC, in favor of runway design codes and taxiway design groups. Since Packwood Airport has one runway, the previous ARC designation was also consistent with the RDC for Runway 1/19.

The aircraft component of the RDC is defined by the Aircraft Approach Category (AAC) and the Airplane Design Group (ADG) of the critical aircraft. The AAC is determined by the approach speed, or 1.3 times the stall speed of the aircraft in its landing configuration at its maximum landing weight. AAC categories A to E provide a wide range of approach speeds (<91 - ≥ 160 knots). ADG is determined by aircraft wingspan and tail height. Most small aircraft (12,500 pounds or less) are included in AAC A (<91 knots) or AAC B (<121 knots) and ADG I or II.

Historically, most fixed wing aircraft traffic at Packwood Airport has consisted of ADG I, and this trend is expected to continue in the 2022-2042 forecast. The 2009 ALP does not list a specific current and future critical aircraft, although A-I (small) designation is listed.

**Figure 3-4** depicts the aircraft design criteria used to define RDC, and representative aircraft in each category. The applicable dimensional standards for Packwood Airport are shown in bold.

**Figure 3-4: Critical Aircraft & Airport Reference Code (ARC)**

| Aircraft Approach Category | Aircraft Approach Speed knots | Airplane Design Group | Aircraft Wingspan |
|---|---|---|---|
| A Existing/Future | less than or equal to 91 | I - Existing/Future | less than or equal to 49' |
| B | 92 to 121 | II | 50' to 79' |
| C | 122 to 141 | III | 80' to 118' |
| D | 142 to 166 | IV | 119' to 171' |

**A-I**
**12,500 lbs. or less**



Beech Baron 55
Beech Bonanza
**Cessna 182**
Piper Archer

**B-I(small)**
**12,500 lbs. or less**



**Beech Baron 58**
Beech King Air C90
Cessna 402
Cessna 421

**A-II, B-II**
**12,500 lbs. or less**



Super King Air 200
**Pilatus PC-12**
DCH Twin Otter
Cessna Caravan

**ARC - B-II**
**Greater than 12,500 lbs.**



Super King Air 300, 350
Beech 1900
**Cessna Citation**
Falcon 20, 50

**A-III, B-III**
**Greater than 12,500 lbs.**



DHC Dash 7, Dash 8
**Q-200, Q-300**
DC-3
Convair 580

**C-I, D-I**



**Lear 25, 35, 55, 60**
Israeli Westwind
HS 125-700

**C-II, D-II**



Gulfstream II, III, IV
**Canadair 600**
Canadair Regional Jet
Lockheed JetStar

**C-III, D-III**



Boeing Business Jet
**Gulfstream 650**
B 737-300 Series
MD-80, DC-9

**C-IV, D-IV**



**B - 757**
B - 767
DC - 8-70
DC - 10

Source: Century West Engineering

## CURRENT & FUTURE CRITICAL AIRCRAFT

The current and future critical aircraft identified for Packwood Airport is a single-engine piston aircraft, represented by a 4-seat Cessna 172 (C-172). This aircraft is representative of small GA aircraft commonly used throughout the region. The C-172 is classified as a small airplane based on a maximum takeoff weight of less than 12,500 pounds, and it is included in Aircraft Approach Category A and Airplane Design Group I, which corresponds to RDC A-I (small). **Table 3-15** summarizes forecast operations for Packwood Airport by AAC + ADG.

**Table 3-15: Aircraft Operations by RDC (55S)**

| Activity | 2021 | 2026 | 2031 | 2036 | 2041 |
|---|---|---|---|---|---|
| TOTAL OPS – A-I | 250 | 250 | 500 | 500 | 750 |
| TOTAL OPS – HELI (AAC A) | 350 | 250 | 250 | 250 | 250 |
| **TOTAL OPS – ALL A/C** | **600** | **500** | **750** | **750** | **1,000** |

Source: Century West Engineering; AAGR Average Annual Growth Rate; "%" based on 2021 air traffic estimate.

Activity by Approach Category B aircraft may increase over the course of the planning period, although the available runway length and mountainous terrain are significant factors in aircraft use and this activity is not expected to be significant.

# Operational Peaks

Activity peaking is evaluated to identify potential capacity related issues that may need to be addressed through facility improvements or operational changes. The Peak Month represents the month of the year with the greatest number of aircraft operations (takeoffs and landings). The peak month for most general aviation airports occurs during the summer when weather conditions and daylight are optimal.

The 2009 ALP forecast estimated peak month to be in the summer, accounting for approximately 15% of annual activity. For planning purposes, peak month activity will be increased to 20% in the 2022-2042 forecast to account for increased seasonal activity, including the annual airport fly-in.

**Peak Day** operations are defined by the average day in the peak month (Design Day) and the busy day in the typical week during peak month (Busy Day). The **Design Day** is calculated by dividing peak month operations by 30. For planning purposes, the **Busy Day** is estimated to be 50% higher than the average day in the peak month (Design Day x 1.5), based on common activities generating significant surges in flight activity.

The peak activity period in the Design Day is the **Design Hour**. For planning purposes, the Design Hour operations are estimated to account for 20% of Design Day operations (Design Day x 0.20).

The operational peaks for each forecast year are summarized in **Table 3-16**. This level of peaking is consistent with the mix of airport traffic and is expected to remain unchanged during the planning period. These measures of activity are considered when calculating runway/taxiway capacity and transient aircraft parking requirements. No significant runway or taxiway capacity issues have been identified at the Airport based on current or forecast activity levels.

**Table 3-16: Peak Operations (55S)**

| Aircraft Type | 2022 | 2027 | 2032 | 2037 | 2042 |
|---|---|---|---|---|---|
| Annual Operations | 600 | 500 | 750 | 750 | 1,000 |
| Peak Month Operations (20%*) | 250 | 100 | 150 | 150 | 200 |
| Design Day Operations (average day in peak month) | 8 | 3 | 5 | 5 | 7 |
| Busy Day Operations (assumed 150% of design day) | 13 | 5 | 8 | 8 | 10 |
| Design Hour Operations (assumed 20% of design day) | 2 | 1 | 1 | 1 | 1 |

Source: Century West Engineering. * 2022 Peak Month estimated to be approximately 42% (fire activity)

# Military Activity

The current level of military use is estimated to be 50 annual operations (helicopters), consisting of emergency response, search and rescue, and training activities (Washington Army National Guard, etc.). The FAA Terminal Area Forecast (TAF) lists 100 military operations (current and projected static through 2050). Maintaining the baseline level of 50 annual military operations is recommended.

# Air Taxi Activity

Air taxi activity at Packwood Airport is not reported by airport management and is not noted in the TAF.

Air taxi activity includes for-hire charter flights, medevac flights, and some scheduled commercial air carriers operating under FAR Part 135. It is noted that some aerial firefighting aircraft are operated under FAR Part 135 as contractors to the USDA Forest Service or Washington DNR. Small fixed-wing aircraft and helicopters used in Part 135 charter or air ambulance operators can use the Airport as needed, although a specific volume of activity is not projected.

# Forecast Summary

A summary of the based aircraft and annual aircraft operations forecast is presented in **Table 3-17**. The forecast projects modest growth over the 20-year planning period that is consistent with the growth anticipated in the Packwood area over the next 20 years and beyond. As noted earlier, a portion of the forecast demand assumes the Airport's based aircraft fleet will be gradually reestablished during the planning period. The remaining activity will be driven by growth in the transient activity and periodic public safety requirements (wildfire response).

The forecast average annual growth rate for aircraft operations is 2.59% between 2022 and 2042.

Table 3-17: Forecast Summary

| Activity | 2022 | 2027 | 2032 | 2037 | 2042 |
|---|---|---|---|---|---|
| **Itinerant Operations** | | | | | |
| General Aviation | 200 | 200 | 400 | 400 | 600 |
| Air Taxi | 0 | 0 | 0 | 0 | 0 |
| Military | 50 | 50 | 50 | 50 | 50 |
| **Total Itinerant Operations** | **250** | **250** | **450** | **450** | **650** |
| **Local Operations** | 350 | 250 | 300 | 300 | 350 |
| **Total Local & Itinerant Operations** | **600** | **500** | **750** | **750** | **1,000** |
| | | | | | |
| Based Aircraft | 0 | 1 | 2 | 2 | 3 |
| Operations per Based Aircraft | N/A | 500 | 375 | 375 | 333 |

Source: Century West Engineering

## TERMINAL AREA FORECAST COMPARISON

As discussed previously, the evaluation of the current TAF for Packwood Airport has identified issues related to data accuracy. Data from the most recent historical year (2021) is presented for all future years through 2045 for both based aircraft and annual aircraft operations in the TAF. FAA review will be required for both the based aircraft and the aircraft operations models for comparison to the current TAF, as presented in **Figure 3-5**.

**Figure 3-5: FAA TAF and ALP Forecast Comparison**

### Forecast Summary

| 55S | | | | Base Year: 2022 | | | Average Annual Compound Growth Rates | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Base Yr. Level | Base Yr.+1yr. | Base Yr.+5yrs. | Base Yr.+10yrs. | Base Yr.+15yrs. | | Base Yr. to +1 | Base Yr. to +5 | Base Yr. to +10 | Base Yr. to +15 |
| **Passenger Enplanements** | | | | | | | | | | |
| Air Carrier | 0 | 0 | 0 | 0 | 0 | | N/A | N/A | N/A | N/A |
| Commuter | 0 | 0 | 0 | 0 | 0 | | N/A | N/A | N/A | N/A |
| TOTAL | 0 | 0 | 0 | 0 | 0 | | N/A | N/A | N/A | N/A |
| **Operations** | | | | | | | | | | |
| _Itinerant_ | | | | | | | | | | |
| Air carrier | 0 | 0 | 0 | 0 | 0 | | N/A | N/A | N/A | N/A |
| Commuter/air taxi | 0 | 0 | 0 | 0 | 0 | | N/A | N/A | N/A | N/A |
| Total Commercial Operations | 0 | 0 | 0 | 0 | 0 | | N/A | N/A | N/A | N/A |
| General aviation | 200 | 200 | 200 | 400 | 400 | | 0.0% | 0.0% | 7.2% | 4.7% |
| Military | 50 | 50 | 50 | 50 | 50 | | 0.0% | 0.0% | 0.0% | 0.0% |
| _Local_ | | | | | | | | | | |
| General aviation | 350 | 250 | 250 | 300 | 300 | | -28.6% | -6.5% | -1.5% | -1.0% |
| Military | 0 | 0 | 0 | 0 | 0 | | N/A | N/A | N/A | N/A |
| TOTAL OPERATIONS | 600 | 500 | 500 | 750 | 750 | | -16.7% | -3.6% | 2.3% | 1.5% |
| **Instrument Operations** | 0 | 0 | 0 | 0 | 0 | | N/A | N/A | N/A | N/A |
| **Peak Hour Operations** | 1 | 1 | 1 | 1 | 1 | | 0.0% | 0.0% | 0.0% | 0.0% |
| **Cargo/mail (enplaned + deplaned tons)** | 0 | 0 | 0 | 0 | 0 | | N/A | N/A | N/A | N/A |
| **Based Aircraft** | | | | | | | | | | |
| Single Engine (Nonjet) | 0 | 0 | 1 | 2 | 2 | | n/a | n/a | n/a | n/a |
| Multi Engine (Nonjet) | 0 | 0 | 0 | 0 | 0 | | 0.0% | 0.0% | 0.0% | 0.0% |
| Jet Engine | 0 | 0 | 0 | 0 | 0 | | 0.0% | 0.0% | 0.0% | 0.0% |
| Helicopter | 0 | 0 | 0 | 0 | 0 | | 0.0% | 0.0% | 0.0% | 0.0% |
| Other | 0 | 0 | 0 | 0 | 0 | | 0.0% | 0.0% | 0.0% | 0.0% |
| TOTAL | 0 | 0 | 1 | 2 | 2 | | n/a | n/a | n/a | n/a |
| **GA Operations Per Based Aircraft** | 0 | 0 | 500 | 375 | 375 | | n/a | n/a | n/a | n/a |

### Airport Planning and TAF Forecast Comparison

| | Year | Airport Forecast | TAF | AF/TAF (% Difference) |
|---|---|---|---|---|
| **Passenger Enplanements** | | | | |
| Base yr. | 2022 | 0 | 0 | 0.0% |
| Base yr. + 5yrs. | 2027 | 0 | 0 | 0.0% |
| Base yr. + 10yrs. | 2032 | 0 | 0 | 0.0% |
| Base yr. + 15yrs. | 2037 | 0 | 0 | 0.0% |
| | | | | |
| **Commercial Operations** | | | | |
| Base yr. | 2022 | 0 | 0 | 0.0% |
| Base yr. + 5yrs. | 2027 | 0 | 0 | 0.0% |
| Base yr. + 10yrs. | 2032 | 0 | 0 | 0.0% |
| Base yr. + 15yrs. | 2037 | 0 | 0 | 0.0% |
| | | | | |
| **Total Operations** | | | | |
| Base yr. | 2022 | 600 | 3,100 | -80.6% |
| Base yr. + 5yrs. | 2027 | 500 | 3,100 | -83.9% |
| Base yr. + 10yrs. | 2032 | 500 | 3,100 | -83.9% |
| Base yr. + 15yrs. | 2037 | 750 | 3,100 | -75.8% |

Legend:
"N/A" No Activity for this Category
"n/a" formula error generated for forecasts due to "0" base year data

Note: TAF data is on a U.S. government fiscal year basis (October through September).

## FIFTY-YEAR FORECAST

Fifty-year demand projections were prepared as required in the FAA-approved airport master plan scope of work by extrapolating the average annual growth rates (AAGR) for the recommended 20-year aircraft operations forecasts. The fifty-year based aircraft projections approximate the incremental increases projected in the 20-year planning period. This method is recommended over extrapolating the high average annual growth rate generated by increases in a very small, based aircraft data set (0 to 3 aircraft). The purpose of the 50-year projection is to provide an estimate of demand to approximate long-term aviation use land requirements for the Airport. **Table 3-19** summarizes the 50-year forecast including the intermediate 30- and 40-year projections.

**Table 3-19: 50-Year Forecast (55S)**

|  | 2022 | 2042 | 2052 | 2062 | 2072 |
|---|---|---|---|---|---|
| Annual Operations (2.59 % AAGR) | 600 | 1,000 | 1,292 | 1,669 | 2,154 |
| Based Aircraft (4.06% AAGR*) | 0 | 3 | 4 | 5 | 6 |

Source: Century West Engineering *45-year AAGR projected from first forecast year (2027-2072)