Chapter 2
ORS FORECASTS

2.1 INTRODUCTION TO FORECASTS

Approximating future growth and aviation demand at the Orcas Island Airport (ORS) is an important element in the master planning process because the forecast drives the amount of airport expansion and types of changes the airport needs. If an airport is poised to see growth, the master plan defines the steps that need to be taken to accommodate that demand. Conversely, if an airport is forecasted to have a reduction of activity, then other steps will be needed. Forecasting can have a large influence on the recommendations of a master plan. Collecting the appropriate information and applying reasonable judgement with approved methodologies to help forecast the level of activity and the types of aircraft at ORS are at the core of the airport master planning forecast process.

To ensure the best possible use of future money and resources for airport development, the FAA developed an approved airport master planning process. While the master plan process is somewhat rigid, it also allows for some necessary flexibility. Chapter 7 of the FAA Advisory Circular (AC) 150/5070-6B, "Airport Master Planning", provides the core guidance for airport master plan forecasts. The forecast chapter of an airport master plan is one of only two elements of an airport master plan that must be approved by the FAA. The other element that requires FAA approval is the Airport Layout Plan (ALP). FAA approval is required because the forecasting chapter wields a heavy influence on the rest of the master plan and future funding and development of an airport.

Some of the more stringent aspects of the FAA guidance on aviation forecasting in an airport master plan include specific items that must be forecast and how they are projected into the future. Developing forecasts for smaller commercial service and GA airports, like ORS, is challenging because there is limited published data available regarding total aircraft operations, equipment and enplanements at these airports. The ORS Airport Master Plan forecast is consistent with FAA Advisory Circular (AC) 150/5070-6B, and the July 2001 FAA guidance paper entitled "Forecasting Aviation Activity by Airport." Historic air traffic data, prior forecasts, an examination of local, county, and applicable US Census data reflecting past and future demographic trends were used to augment the final forecast. Interviews and input with airport management, representatives of commuter airlines, based aircraft owners, WSDOT Aviation, the Seattle FAA ADO specialists and other informed parties was especially important in determining current trends and types of operations at the airport in the absence of some measurable or quantifiable data. The forecast relies heavily upon information obtained from the parties interviewed and incorporates their knowledge and judgment, as well as that of the forecaster.

The FAA suggests several methodologies for airport forecasting. The forecast for ORS for this master plan is derived primarily from trend analyses coupled with exponential smoothing and then the results of this analysis are compared to relevant market share and regression analysis. Specific local, regional and national aviation data was examined and then compared with previous and current forecasts. The data was used to establish a baseline and forecasts for specific operations and based aircraft at the airport, including itinerant and local GA and scheduled passenger aircraft operations, passenger enplanements, based aircraft, and instrument operations. Aircraft operation numbers were identified for commuter, GA and military operations. Although military activity is included in the forecast, current and future operations by military aircraft at ORS are expected to remain negligible over the forecast period. In addition, the critical aircraft and its design group were also established. The critical aircraft designation helps facility planners and the FAA determine the appropriate design criteria for development at the airport.

2.2 AIRPORT SERVICE AREA

The service area for an airport is based on factors that affect decisions made by potential travelers and others who use the facility. These factors are primarily driven by convenience, connectivity, costs, distance, services available, and geographic limitations. These items are then weighed against other airports within the geographic area that may compete directly for traveler business. For airports located within

the continental US and in areas with accessible roads, easily travelled terrain and commonly populated areas, a travel time of between 30 to 60 minutes can help delineate the boundary of an airport service area.

ORS is located on Orcas Island and in the community of Eastsound. The airport is somewhat unique because it serves a population that is isolated on an island off the continental mainland. The only reliable connectivity to the Island with other areas and population centers is by the airport and the intercoastal ferry system in the San Juan Islands. The only other viable option for travelers located on Orcas Island wishing to use scheduled commuter airline passenger service is to use one of the designated Seaplane Bases (SPBs) at Deer Harbor, West Sound and Rosario. (**Figure 2-1**). Deer Harbor and West Sound usually receive scheduled passenger seaplane services year-round and Rosario usually receives only seasonal service. Camp Orkila also has an SPB, but it is privately owned and has only limited availability for passenger service.

No other public airports for wheeled aircraft, other than ORS, are located on Orcas Island. Most passengers that use the SPBs on Orcas Island do so because their destination or departure point is close to that area of the Island or to one of the mainland lakes of the connecting flight. Most of the other users of the SPBs tend to be tourists who use the SPBs as part of their travel packages. Occasionally, one of the ORS scheduled passenger providers, Kenmore Air, will redirect customers that were scheduled to use wheeled aircraft to one of the SPBs when wheeled flights are cancelled. It is more common for float plane flights to cancel for weather and re-direct to wheels than for wheels to cancel and re-direct to floats due to the inherently greater reliance on VFR/low-wind conditions by float planes. Because the SPBs and ORS serve these very separate niches, there is very little competition between them for passenger dollars.

To save the cost of a connecting flight, some passengers who are accessing commuter airlines

Figure 2-1: Orcas Island Seaplane Bases

at Sea-Tac or other mainland airports will use the intercoastal ferry system to connect with the mainland and then travel directly to Sea-Tac Airport or other hub airports by vehicle, but this option significantly increases the travel time for passengers both in speed and intermodal delays. The only other nearby wheeled aircraft airport with scheduled passenger service is Friday Harbor Airport on San Juan Island. Friday Harbor Airport has nearly an identical set of factors determining its own airport service area, and it is unlikely that, except for some very small numbers of people located on nearby smaller islands, there is much competition for air services between the two airports. The two airports complement one another as Kenmore Air generally stops at both airports on their flights. In consideration of these factors, the airport service area for the ORS Airport is Orcas Island itself.

2.3 CURRENT AIRPORT DATA

2.3.1 Current Fleet Mix Info

With a runway length of just over 2900 feet and an elevation just above sea-level, ORS can handle most commonly used general aviation (GA) aircraft ranging from small single engine piston-type aircraft up to medium twin-engine turboprop and jet aircraft. The airport pavement is intended for aircraft weighing less than 12,500 pounds. Scheduled passenger air service and cargo operations constitute a major portion of the total operations at ORS. These operations heavily influence facility design needs. The largest scheduled passenger service aircraft commonly serving ORS is the single engine turboprop Cessna C-208B "Grand Caravan". Besides the Grand Caravan, other common smaller and larger single engine aircraft that use the facility include typical Cessna aircraft such as the 172, 182, 206 and 210s; Beech Bonanzas; Mooneys; as well as a Pilatus PC-12. Various sized twin engine aircraft that are more commonly seen at the facility include Piper Navajo and Seneca; Beech Baron; various models of the Beech King Air; and smaller variants of the Cessna Citation. Several types of helicopters also frequently use ORS.

Determining the fleet mix at non-towered airports like ORS can be challenging. One reliable method is to use a combination of available official data coupled with sponsor interviews and local knowledge of the facility. Official and recorded fleet data for non-towered airports is from databases that record IFR operations in and out of those particular facilities, such as the FAA Traffic Flow Management System Counts (TFMSC) as well as private sources such as FlightAware. **Appendix XX** contains a summary of the most significant types of aircraft that have used ORS within an IFR flight plan over the last 18 years and a detailed FlightAware summary of aircraft using the airport in 2017.

Airport representatives have verified that the aircraft fleet mix seen at ORS is essentially that described in this chapter. They also report that some higher performance twin engine aircraft are seen at the airport. These are critical to some services that the airport provides, such as aeromedical transport. Even though some FAA IFR databases have reported that high speed, high performance twin engine jets, such as a Citation X may have very rarely filed from ORS, it is extremely unlikely that the aircraft ever actually landed due to the limited amount of runway available for landing and takeoff. Airport management has also never received any significant inquiry or requests for the need of such high-performance aircraft to use ORS.

Most aircraft that use ORS fall within or below the FAA Airport Design Group (ADG) B-II category. This information is important in determining the critical aircraft for ORS. To determine the appropriate critical aircraft and what the airport might expect from future operations, it is important to analyze the different FAA categories for aircraft and their design groups as explained in the facility requirements chapter. For example, some of the aircraft that visit ORS, such as the Cessna Caravan and the Pilatus fall within the A-II category. Others, however, such as the Citation and the Beechcraft King Air, are members of the B-II design group. A more complete discussion of the critical aircraft design category for ORS follows in section 2.5.3.

2.3.2 Current Based Aircraft Information

ORS has a relatively large number of based aircraft on the field considering the size of Eastsound, as compared to most mainland US airports of similar size. This can be easily explained when examining the type of community that surrounds the facility. Eastsound/Orcas Island is a relatively stable community with a substantial number of affluent residents. It has a large proportion of second homes and retirement homes as compared to other similar sized communities within Washington. This demographic quality is similar to many other island communities. Airports serving these communities typically have higher than average numbers of hangars and based aircraft per capita. Many of the residents and local airport users use ORS to hangar their own private aircraft, or as a base to fly to other homes or areas of the country.

There is a significant amount of commercial scheduled passenger service and cargo operations in and out of ORS. With the exception of one very small operator, there are no based aircraft at ORS associated with these services. Most of the based aircraft on the island are single engine and light twin engine aircraft owned and operated by residents or part time residents of the island.

The latest FAA 5010 Master Record (**Table 2-1**) indicates that there are 56 based aircraft at ORS. This data was last updated in 2018 during the last 5010 master record inspection. The latest basedaircraft.com data (**Table 2-2**) lists the airport as having 61 based aircraft. This based aircraft data is generally considered more accurate than the 5010 data, as it is updated directly by the airport manager or official representatives of the airport. For these reasons, the based aircraft numbers for 2018 in Table 2-2 were chosen for the base year.

Areas for hangar leases are currently available, but limited. This is due primarily to the limited area the airport currently has available for new hangar development. Airport representatives have suggested that if more area were available for hangar development at reasonable costs, more aircraft owners would want to store their aircraft in hangars.

Table 2-1: FAA Master Record Based Aircraft

Based Aircraft	Number
90 Single Engine	54
91 Multi Engine	2
92 Jet	0
Total	**56**
93 Helicopters	0
94 Gliders	0
95 Military	0
96 Ultra-Light	0

Source: FAA 5010 Master Record

Table 2-2: National Based Aircraft Inventory Program

Based Aircraft	In 5010 as of Oct 2018	In Inventory*	Currently Validated**
Single Engine	54	65	60
Multi Engine	2	1	1
Jet	0	0	0
Helicopter	0	0	0
Total	**56**	**66**	**61**

Source - FAA basedaircraft.com as of 10/11/2018
*Type derived from FAA Aircraft Registration data.
**Total verified aircraft counts, excluding duplicates and aircraft not found in the FAA Aircraft Registration data.

2.3.3 Current Aircraft Operations

2.3.3.1 Current FAA 5010 Master Record Information

Since ORS has no control tower to provide accurate operations data, total GA aircraft operations can only be estimated. To estimate the number of aircraft operations at a non-towered airport such as ORS, several different sources of information may be examined. For GA operations, the only published estimated operations numbers are provided by the FAA 5010 Master Record database. The 5010 includes both commercial and GA operations. The numbers are estimated by the 5010 inspector using reasonable methodologies and available data and by conducting interviews with the airport manager or representatives. The FAA generally contracts with state agencies to perform 5010 master record inspections at all public use airports, usually once every three years, as a way of updating and maintaining critical information about airports. In the State of Washington, the inspections are conducted by personnel from WSDOT. Interviews with the inspectors were conducted as part of the forecasting effort to better determine how 5010 operation numbers were estimated. Airport manager, sponsor and tenant information about the operations at the airport also help in estimating the aircraft operations. Although GA operations can only be estimated, commercial operations are usually more accurate because they are based on records that are kept by the FAA and by the airport operator. **Table 2-3** depicts the latest FAA 5010 Master Record information for all operations at ORS. This data reflects an error due to the way it was originally reported since all scheduled passenger air taxi/commuter operations, such as those at ORS, should be listed strictly as "Air Taxi" operations in accordance with recent FAA 5010 guidelines. "Air Carrier" operations should only be reserved for Part 121 operations. Although this is a very common mistake seen on 5010 entries, anomalies like these underscore the importance of keeping individual operations records, as does the ORS airport management.

2.3.3.2 General Aviation (GA) Operations at ORS

GA operations at ORS include large numbers of both IFR and VFR flights. This is due to the weather that is common around the San Juan Islands, with a significant number of low ceiling and rainy days forcing aircraft to fly in Instrument Meteorological Conditions (IMC). GA flight operations also encompass some commercial activity in the form of personal business, corporate and medical transport.

Table 2-3: FAA 5010 Master Record Operations for ORS

Operations	Number
100 Air Carrier	6,800
102 Air Taxi	1,900
103 G A Local	15,000
104 G A Itinerant	18,000
105 Military	100
Total	41,800

Source: FAA 5010 database

Aerial medivac transportation is a critical element of flight operations that is often overlooked when examining flight operations in and out of airports. This is because the number of these flights often is relatively low, but their impact can be huge. Because surface access to Orcas Island involves infrequent and slow ferry service, access to medical care by medivacs is particularly important.

Because of the abundant scenic beauty of the area and the large numbers of tourists visiting Orcas Island, ORS has a higher number of transient operations than would normally be found for an airport serving a community of similar size without similar aesthetic draws. There are an estimated 15,000 annual GA operations, as noted in **Table 2-3**.

ORS does have a motion-activated camera on the field. However, the camera is often not in working order, and has not provided data reliable enough to be used to estimate aircraft operations. It does provide specific short-term data for use by management for other purposes. This data was reviewed and considered during the forecast process.

2.3.4 Scheduled Passenger Operations at ORS

Scheduled commercial passenger operations in and out of ORS can be more accurately determined than can GA activity. The FAA and the management of ORS require commercial passenger operators to file reports that list these types of operations. In addition, IFR flight data recorded and reported by the FAA and private sources, can also help to ascertain the number of IFR flights that are related directly to commercial operations. Comparing all the sources of information that were gathered as part of this master planning effort, including TFMSC, 5010 Master Records, Air Carrier Activity Information System (ACAIS), Bureau of Transportation Statistics (BTS), and FlightAware, the records collected by ORS management appear to be the most reliable for determining direct commercial scheduled passenger operations and historic trends. **Table 2-4** shows the most recent year's (2017) scheduled passenger aircraft operations activity at ORS, as reported by the carriers to ORS.

2.3.5 Current Instrument Operations

Instrument Flight Rules (IFR) activity is an important component of operations at ORS. ORS has three instrument approach procedures (IAPs) available to allow instrument flight in and out of the airport, as well as the ability for students and pilots to practice flying IAPs. Under most circumstances, having an IAP at a GA airport can greatly expand its utility, and allow for the provision of services that would normally not be found at airports without an instrument approach. In the case of ORS, however, it is even more important since the facility is very dependent upon the availability and use of the IAPs. This is due to frequent low ceilings and the limited availability of surface transportation to Orcas Island and the community of Eastsound. Flights during Instrument Meteorological Conditions (IMC) are particularly important for potentially lifesaving medivac flights. Although forecasting for instrument flight operations is not

Table 2-4: ORS Scheduled Passenger Aircraft Operations – 2017

Landings													
Carrier	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Totals**
Empire Airlines (freight)	41	29	46	39	33	41	40	46	39	41	37	37	**469**
Airpac Airlines	-	-	-	-	-	-	-	-	-	-	-	-	**0**
Island Air	15	15	20	21	15	28	66	48	45	66	53	41	**433**
Kenmore Air	89	69	81	70	137	149	173	176	161	138	104	99	**1,446**
Magic Air Tours	-	-	-	-	-	25	43	46	-	-	-	-	**114**
SJA New	86	80	129	157	158	183	276	270	185	137	99	108	**1,868**
Point2Point	-	-	-	-	-	8	6	6	-	-	-	1	**21**
Westwind Aviation	6	-	-	-	-	-	20	18	-	-	-	-	**44**
Totals	**237**	**193**	**276**	**287**	**343**	**434**	**624**	**610**	**430**	**382**	**293**	**286**	**4,395**
Total Operations	**474**	**386**	**552**	**574**	**686**	**868**	**1,248**	**1,220**	**860**	**764**	**586**	**572**	**8,790**

One operation = 1 landing and 1 takeoff
Source: ORS Records of Air Carrier Reported Activity

Table 2-5: IFR Operations for 2017

	FAA TFMSC Data			FlightAware Data
Month	Arrivals	Departures	Total IFR Operations During Month (Normalized)	Total IFR Operations During Month
Jan	48	69	138	179
Feb	39	55	110	114
Mar	80	68	160	170
Apr	87	57	174	178
May	89	112	224	274
Jun	104	133	266	345
Jul	131	182	364	500
Aug	175	202	404	551
Sep	119	159	318	419
Oct	98	108	216	347
Nov	87	101	202	260
Dec	79	100	200	237
Annual Total IFR Operations	**1136**	**1346**	**1776***	**3574**

Source: FAA TFMSC and FlightAware
*Total reflects normalized activity count.

usually a mandatory component of an airport master plan, IFR data can be a great tool in better understanding the airport's importance to a community and can provide clear examples of aircraft operations that would not have been possible without an instrument approach. Tracking this data can also provide other valuable supplementary information and trends at ORS over time and can help to understand potential future operations.

Two of the very best sources for tracking IFR operations in and out of an airport are the FAA's Traffic Flow Management System Counts (TFMSC) and private data collection services, such as FlightAware. TFMSCs are designed to provide information on traffic counts by airport and include various data about the types of aircraft, point of departure or arrival, identification numbers, types of operations, owners and various other data. They capture data for flights that fly under Instrument Flight Rules (IFR) and are collected by the FAA's enroute computers. VFR traffic is excluded. TFMSC source data are created when pilots file flight plans and/or when flights are detected by the National Airspace System (NAS), usually by radar. The private FlightAware information also uses the FAA TFMSC information and augments it with other sources of data. The relevant IFR data for ORS for calendar year 2017 as recorded by the FAA TFMSC and the IFR tracking information for the same period as captured by FlightAware is listed in **Table 2-5**.

The majority of IFR flights originated or terminated in Washington State. Other states included:

- Montana
- Oregon
- California
- Idaho
- North Dakota
- Utah
- Wyoming
- Colorado
- Alaska

International IFR flights were also recorded from British Columbia and Alberta Canada.

The primary reasons for the differences in the total IFR operations recorded between the two sources is the different types of data and the sources that each of the services captures. FlightAware data also captures relevant ADS-B and radar information that TFMSC does not capture. It is likely that some of the flights captured by FlightAware did not actually land or depart from ORS. However, the two sources of data complement one another for statistical purposes. The breadth and depth of recorded IFR activity in and out of ORS in 2017 substantiates the importance of instrument approach capabilities for the airport. A complete list of all IFR records can be found in **Appendix XX**.

2.3.6 Current Passenger Enplanements

FAA, through the AIP legislation, has established several categories of commercial service airports. The categories are based primarily on numbers of enplaned passengers, and establish levels of AIP financial support. **Figure 2-2** describes the various categories of commercial service as well as noncommercial service airports as defined by the AIP.

ORS is currently classified by the FAA as a "Non-Primary Commercial Service Airport". The categories are further defined as:

> **"Commercial Service Airports are publicly owned airports that have at least 2,500 passenger boardings each calendar year and receive scheduled passenger service. Passenger**

Figure 2-2: FAA Airport Categories

Airport Classifications		Hub Type: % of Annual Passenger Boardings	Common Name
Commercial Service: Publicly owned airports that have at least 2,500 passenger boardings each year and recieve scheduled passenger service **§47102(7)**	**Primary:** Have more than 10,000 passenger boardings each year **§47102(16)**	**Large:** 1% or more	**Large Hub**
		Medium: At least 0.25%, but less than 1%	**Medium Hub**
		Small: At least 0.05%, but less than 0.25%	**Small Hub**
		Nonhub: More than 10,000, but less than 0.05%	**Nonhub Primary**
	Nonprimary	**Nonhub**: At least 2,500 and no more than 10,000	**Nonprimary Commercial Service**
Nonprimary (Except Commercial Service)		Not Applicable	**Reliver §47102(23)** **General Aviation §47102(8)**

Table 2-6: 2017 Passenger Enplanements at ORS

Enplanements													
Carrier	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Island Air	8	4	5	13	6	13	49	39	35	34	25	19	**250**
Kenmore Air	354	271	387	411	551	696	916	1,102	743	638	500	421	**6,990**
Magic Air						49	86	88					**223**
SJA New	62	65	132	138	144	148	292	248	164	123	66	78	**1,660**
Point2Point						7	3	9				0	**19**
Westwind Aviation	6						20	?	12				**38**
TOTALS	**430**	**340**	**524**	**562**	**701**	**913**	**1,366**	**1,486**	**954**	**795**	**591**	**518**	**9,180**

One enplanement = 1 passenger leaving ORS
Source: ORS Airport Management Records
Note: ACAIS records show only 7,223 reported in 2017

boardings refer to revenue passenger boardings on an aircraft in service in air commerce whether or not in scheduled service. The definition also includes passengers who continue on an aircraft in international flight that stops at an airport in any of the 50 states for a non-traffic purpose, such as refueling or aircraft maintenance rather than passenger activity. Passenger boardings at airports that receive scheduled passenger service are also referred to as enplanements".

"Nonprimary Commercial Service Airports are Commercial Service Airports that have at least 2,500 and no more than 10,000 passenger boardings each year".

When an airport reaches at least 10,000 boardings per year, it meets the definition of a "Primary Commercial Service Airport". The differences between these two sub categories may seem subtle, but can be very significant in terms of funding for the airport. This is because once the 10,000-enplanement level is reached, the airport is usually eligible to receive FAA AIP entitlement funding, which can be substantial. The funding amount per airport is usually in excess of one million dollars annually, depending upon needs and capital improvement plans. As can be seen by the 2017 commercial enplanement figures that have been provided by ORS management and submitted to them by the carriers in **Table 2-6**, ORS may be approaching the 10,000-enplanement level. Enplanement records for the January through July of 2018 indicate that ORS may reach the 10,000-enplanement threshold this year. Airport management should continue to encourage full reporting by carriers.

2.4 RELEVANT HISTORIC TREND ANALYSIS AND EXISTING FORECASTS

2.4.1 Local Trends and Forecasts

2.4.1.1 Based Aircraft

Historic Based Aircraft Numbers

The number of based aircraft at ORS grew somewhat steadily and significantly from the mid-1980s (22 based aircraft in 1984) to a high in the mid-2000s (95 based aircraft in 2003), but since then has fluctuated up and down. Since 1984, the overall annual growth has averaged 3.91%. The reliability of these historic based aircraft numbers is uncertain. Numbers of based aircraft for many years were recorded primarily by updates to the FAA's 5010 master record program. In the early 2000s, the FAA needed a more reliable and accurate way of reporting based aircraft. There were several reasons for this, not the least of which was the sheer lack of reliability of the traditional reporting methods, as well as the need for FAA to be able to when necessary determine with more accuracy the location of specific aircraft. FAA now uses a more secure and reliable national based aircraft inventory program and provides reports at basedaircraft.com. This site mandates that airport sponsors and their representatives enter more detailed information regarding the number, types and registration information of specific aircraft at airports. For these non-Primary NPIAS airports, based aircraft counts for single-engine, multi-engine, jets, and helicopters for the FAA's Form 5010-1 (Items 90-93) must come from the data on this site and the program is now a component of their annual inspections. **Table 2-7** reflects the estimated based aircraft at ORS since 1985, as reported to the FAA through the 5010 Master Record program and other sources. Since 1990, the number of based aircraft at ORS has grown from a reported 42 aircraft to the current estimated number of 78 aircraft. The majority of these changes came in the early 1990s, and reported based aircraft numbers reached a peak in 1995. Current numbers have remained virtually unchanged since 2006 when 75 based aircraft were reported. The number dropped significantly after 2005, most likely due to lapses in reporting or other errors that were corrected over time. It is very likely that the overall based aircraft rate will grow very slowly until an additional catalyst occurs or expanded areas for developments are provided.

Table 2-7: Reported based aircraft at various intervals since 1984

Reported Year	Reported Based Aircraft
1984	22
1990	42
1995	64
2000	65
2005	93
2010	69
2015	76
2017	61

Source: 5010 Airport Master Records
Note: Decreases since 2005 have been due to a combination of the Great Recession, as well as the implementation of the FAA's basedaircraft.com database for tracking based aircraft.

Hangar Availability / Sponsor Input

The lack of availability of hangar space or imminent plans for additional hangar development can indicate the health of an airport and its potential for short term growth. It is not always a good marker for long term growth however. The data can quite effectively show near term trends, indicating where GA aircraft operations might be heading, and can heavily influence what near term future infrastructure development might be necessary at the airport. ORS representatives and stakeholders have expressed that recent demand for new or used hangars at ORS has been relatively light, but that development of additional hangars may entice more individual operators to base their aircraft at the airport.

Previous ORS MP Based Aircraft Forecast

The most recent Master Plan update conducted at ORS and published in March 2008 developed forecasts primarily based upon the FAA's TAF. The

TAF predicted average annual growth rates of 1.3%. When the study was conducted nearly 10 years ago, it reported 75 based aircraft at ORS. That master plan predicted that there would be approximately 85 aircraft at ORS in 2018. This forecast was optimistic, relying on the data available at the time, since based aircraft numbers have changed very little since 2008.

Current FAA TAF Based Aircraft Forecasts

Current FAA TAF forecasts for based aircraft at ORS over selected 5-year intervals is seen in **Table 2-8** and represent a forecast average annual increase of 3.76%. Analysis of recent trends and activity at ORS, as well as input by airport representatives and stakeholders, and the relatively limited existing areas for additional hangar development due to constraints at ORS would seem to indicate that the FAA forecast may be high.

Table 2-8: FAA TAF of ORS Based Aircraft (five-year intervals)

Forecast Year	Forecast Based Aircraft
2020	79
2025	102
2030	118
2035	140
2040	166
2045	199

Source: FAA TAF ORS data

Aircraft Operations Versus Based Aircraft

Hangars and outside storage of aircraft at ORS are used by fulltime residents, as well as many residents who have second homes or who vacation on the island. This is of no surprise since Orcas Island has a large resident population with second homes. Considering those facts along with the scheduled passenger activity and large numbers of itinerant aircraft operations at this tourist destination, suggests the airport is likely to have a relatively lower number of aircraft operations per based aircraft.

When a reliable forecast of aircraft operations is not available or needs to be supplemented or tested, an estimate of annual operations per based aircraft can be used to help determine forecasts or assist with their validity. General guidelines from the FAA are:

- 250 operations per based aircraft for rural general aviation airports with little itinerant traffic
- 350 operations per based aircraft for busier general aviation airports with more itinerant operations
- 450 operations per based aircraft for busy reliever airports
- 750 operations for busy airports with unusual circumstances or high itinerant operations

Dividing the current estimated operations of the airport - 41,800, by the current number of reported based aircraft - 78, results in a ratio of approximately 536 operations per based aircraft. This number seems reasonable given the number and types of operations at ORS. With GA operations and based aircraft forecasted to grow slowly, and commercial operations forecasted to increase at a higher rate, it would be expected that the number of operations per based aircraft will likely increase in the future.

2.4.1.2 General Aviation Operations

Table 2-9 graphically represents the total annual reported GA itinerant and local operations at ORS in 5-year intervals since 1990. As previously mentioned, without the existence of an active control tower, the operations

Table 2-9: ORS estimated annual GA Operations since 1990 (five-year intervals)

ORS General Aviation Aircraft Operations			
Year	Itinerant	Local	Totals
1990	30,000	9,000	39,000
1995	23,952	10,266	34,218
2000	25,000	16,180	41,180
2005	17,588	8,663	26,251
2010	18,521	9,124	27,645
2015	18,000	15,000	33,000

Source: FAA 5010 Master Record / TAF

can only be estimated via a combination of extrapolated data available from various sources, but primarily through FAA 5010 records.

The data reflects large fluctuations in the estimated GA operations over the last three decades, and represents an average annual decrease in GA activity of -0.67% over the period for both itinerant and local GA operations. Some of this fluctuation can be attributed to anomalies and inaccuracies in estimates of activity, which is common for non-towered airports. Interviews with airport representatives and stakeholders seem to confirm, however, that the GA operations data may be representative of GA operations over the period described. GA activity at ORS is heavily dependent upon itinerant operations with ORS having a heavy tourist draw. It is also reflective of some recent and earlier declines in smaller GA aircraft operations in and out of the facility. Local economics, an airport service area with a small, slow growing local resident population and a disproportionately large percentage of residents with second homes are factors that all contribute to the GA operations at ORS. Local stakeholders have expressed that their observations and the data indicate that while GA activity is likely growing, it is growing slowly, and is being far exceeded by the increase of scheduled passenger activity.

The previous ORS master plan forecast, published in 2008, estimated average annual GA operations growth over the forecast period of 1.3%, mirroring based aircraft forecasts in the same study. While this estimated growth rate reflected trends at the time, it is evident that the GA growth rates previously forecasted have not materialized as projected.

The current FAA TAF for ORS provides a basic forecast for GA local and itinerant operations that does show steady and moderate increases of activity over time. FAA forecasts in the TAF for airports of the size and complexity of ORS are usually derived from very generic sources, and the reasoning behind the predictions are very simple. It is expected that these forecasts are to be augmented with more realistic data and trends as part of the master planning process. The current FAA TAF forecasts for GA operations at ORS over five-year intervals is shown in **Table 2-10**.

The current FAA TAF forecast estimates reflect a modest average annual increase of just over 1.37% for both GA itinerant and local operations. This increase seems reasonable at first glance; however, it may be a bit optimistic when factoring in the recent slow growth of GA operations at ORS. Without an additional catalyst to generate more growth in GA activity, it is likely that the growth of the local GA activity on the airport will be heavily tied to existing population growth, local demographics and infrastructure and ease of building new hangars. Although not usually required, it would therefore be prudent to separate the estimated annual percentage growth rates forecasts in this master plan for both GA itinerant and GA local operations.

While military operations have been included in activity estimates at ORS since 2011, based on

Table 2-10: Current FAA TAF GA forecasts (five-year intervals)

ORS General Aviation TAF Forecasts			
Year	**Itinerant**	**Local**	**Totals**
2020*	19,010	15,832	34,842
2025*	20,354	16,944	37,298
2030*	21,780	18,138	39,918
2035*	23,305	19,422	42,727
2040*	24,942	20,794	45,736
2045*	26,693	22,254	48,947

Source: FAA TAF

Table 2-11: FAA TAF historical scheduled passenger operations ORS (five-year intervals)

Year	Air Carrier	Air Taxi/Commuter	Totals
1990	0	9,125	9,125
1995	0	9,125	9,125
2000	0	13,456	13,456
2005	0	6,928	6,928
2010	0	8,076	8,076
2015	6,800	1,900	8,700

Source: FAA 5010 Master Records/TAF Data

the information available and interviews with local representatives, it is unlikely they will have any significant role for the foreseeable future at ORS. These types of operations will be included as part of the forecasts, but should be considered statistically insignificant.

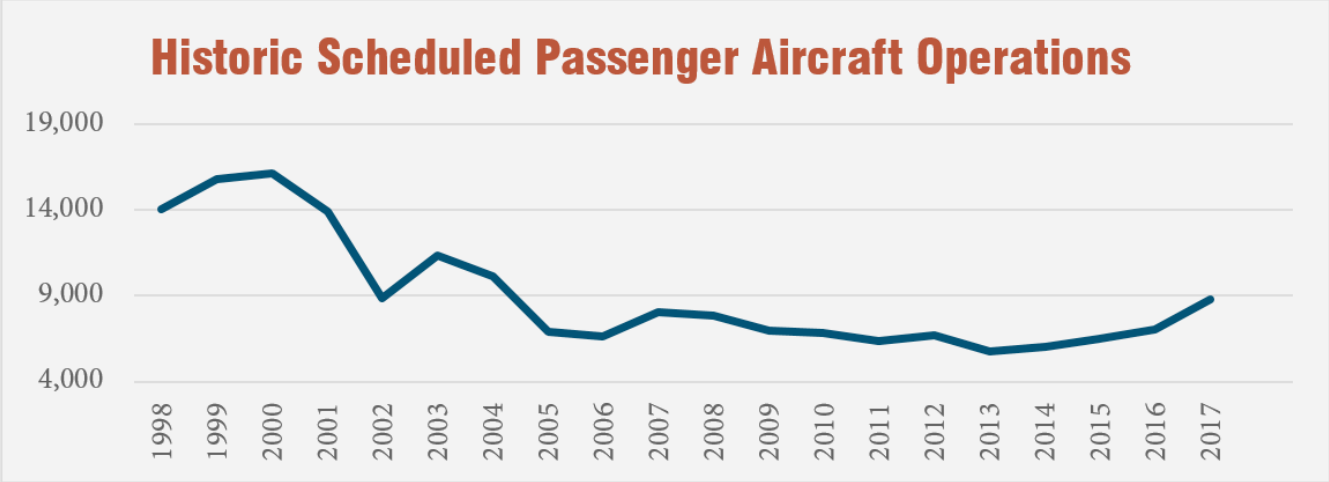
2.4.1.3 Scheduled Passenger Operations

As highlighted in the inventory chapter, ORS has several scheduled air taxi / commuter companies serving ORS. Because all the scheduled passenger aircraft servicing ORS have 19 seats or less, by FAA regulations, these operations are not being conducted under FAR Part 121 operating certificates, and ORS does not need to operate under an FAR Part 139 operating certificate. Part 121 air carriers are generally associated with major airlines, and are not part of the operations at ORS. At non-towered airports, the collection of operational data associated with scheduled air service is generally more reliable than GA operating data. Although discrepancies exist between different sources of scheduled passenger information, total aircraft activity is usually consistent. The FAA mandates certain reports to be filed by commercial operators providing commercial air service. Data utilizing IFR flight information is also useful in validating other available operations data since many scheduled passenger operations in and out of ORS operate routinely under IFR flight plans. **Table 2-11** shows the historic numbers of scheduled passenger services operations at ORS since 1990 in 5-year intervals, as reported by the FAA.

This data is derived once again from operations as reported on the FAA 5010 master record for ORS. The overall trend shows an average annual decrease of -0.19% over the given period. One obvious discrepancy in the data is evident in the way that the numbers were reported. The FAA no longer has a reportable entry space for "commuter" operations. All commuter operations are to now be reported under the "air taxi" code. In addition, "air carrier" operations, as reported by the 5010, are to be reserved for those operations by commercial carriers operating under an FAR Part 121 operating certificate. As described earlier, Part 121 operations are usually only inclusive of larger type jet aircraft flown by major airlines, none of which operate out of ORS. It is very common, however, to see this type of error reported on FAA 5010 records, and it does not diminish the significance of the data. Historical operations as reported by the 5010 records indicate a somewhat variable but robust number of scheduled passenger operations.

The previous ORS master plan forecast published in 2008 predicted scheduled passenger enplanement to grow at an exceptional rate of 3.1% over the forecast period. This rate of growth is higher than normal for most operations in the US, and would indicate substantial growth. This forecast was primarily based upon the FAA predicted growth rates at the time. Actual growth has been much lower than this forecasted rate. However, the 3.1% passenger enplanements growth rate forecasted in the 2008 plan has

Figure 2-3: Total scheduled passenger aircraft operations at ORS since 1998



been fairly accurate in recent years, likely due to a change in the aircraft fleet and increased passenger loads per operation. Kenmore Air sold their Chieftains in 2014 and acquired larger capacity Cessna Caravans. In addition, because Orcas Island is a tourist and second home destination, their economy was more impacted by the recession and has had a stronger recovery.

ORS requires scheduled airlines to file individual operation reports directly to the airport. In examining all the data available concerning scheduled passenger aircraft operations at ORS, the data from airline reports submitted to the airport seems to be the most accurate. **Figure 2-3** graphically shows the total scheduled passenger operations at ORS since 1998 reported in airport records. Although air carrier activity is shown to have decreased by approximately -2.51% over the last 19 years, scheduled passenger operations over the last ten years grew by a modest average annual rate of 0.91%. This rate of growth is similar to the overall growth rate of GA operations reported at the airport. ORS staff unanimously agree that these growth rates may be indicative of the current trends at the airport, but enplanement growth may outpace operations.

As also evidenced by the table, although operations over the years have fluctuated up and down, recent trends are clearly robust, exceeding an 11% average annual growth rate in just the last 4 years. Although percentage increases over the long term of this magnitude are unlikely,

Table 2-12: FAA TAF forecasts for itinerant operations ORS (five-year intervals)

Year	Air Carrier	Air Taxi/Commuter	Totals
2020*	6,800	2,148	8,948
2025*	6,800	2,508	9,308
2030*	6,800	2,919	9,719
2035*	6,800	3,402	10,202
2040*	6,800	3,963	10,763
2045*	6,800	4,618	11,418

Source: FAA TAF Terminal Area Forecast Detail Report

there are no indications that an upward trend will wane in the near future. It is likely that overall scheduled passenger operations will not keep pace with actual enplanement forecasts. This is because aircraft size and passengers per flight will continue to grow.

Table 2-12 depicts the current FAA TAF forecasts for scheduled itinerant operations at ORS in selected 5-year intervals. As previously mentioned, due to a reporting anomaly, only the total operations are of consequence, and the individual distinction between air carrier and air taxi operations should be considered irrelevant. The FAA TAF indicates an average annual increase of 0.98% over the period shown. This growth rate is very consistent with current growth rate reported by ORS over the last 10 years.

2.4.1.4 Passenger Enplanements

Passenger enplanements reflect how many commercial passengers board aircraft at an airport, usually to travel to another airport destination or to connect with another flight. One of the most critical functions that ORS serves is as an aviation connection for the residents of Orcas Island with the greater Seattle area and the broader US mainland. The only other transportation options for local residents are flights from nearby seaplane bases and the intercoastal ferry. Historic trends and evidence of passenger enplanements to and from ORS are one of the most important data elements to measure the activity and importance of the airport. Most reliable enplanement data for ORS comes from historic FAA 5010 Master Record estimates and enplanement reports provided to ORS by the commercial carriers.

Table 2-13 depicts the historic enplanements for ORS provided by the FAA from FAA 5010. Before 2006, FAA 5010 record passenger enplanement data fluctuated quite significantly over the years. Since that time, reporting has been relatively steady and reflective of more accurate passenger enplanement reports derived from airport records. Although these figures represent an average annual decrease of -0.78% over 25 years, some of this data may be unreliable after further analysis. It is worth noting that 2007-2014 were wildly anomalous years due to a significant drop in tourism in the area.

Table 2-13: FAA 5010 records of passenger enplanements at ORS (five-year intervals)

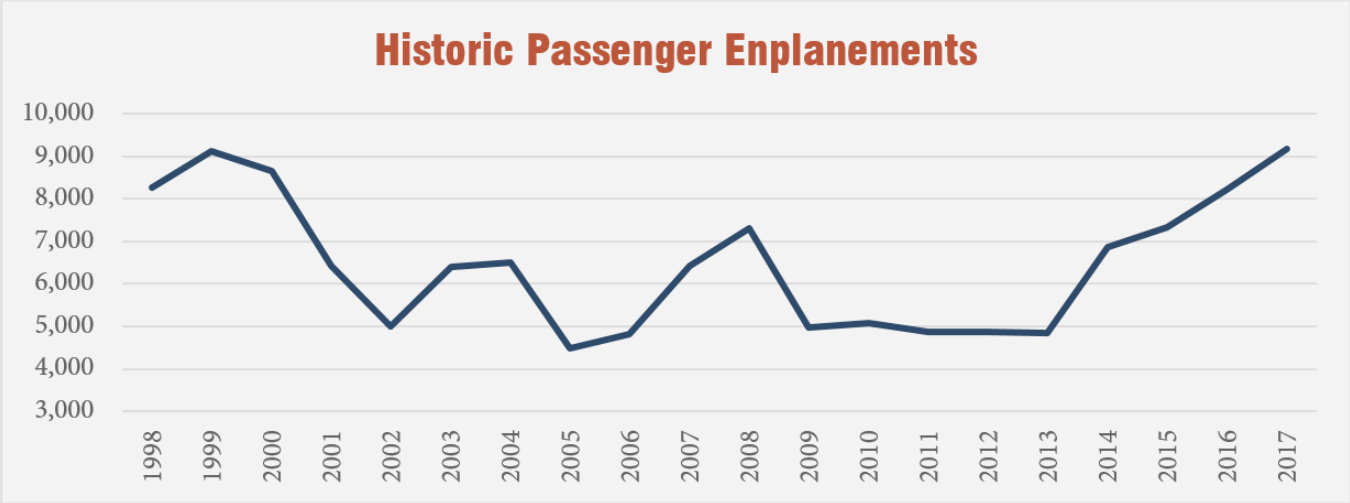
Year	Enplanements
1990	6,156
1995	0
2000	6,167
2005	4,364
2010	3,728
2015	5,068

Source: FAA 5010 / TAF

Due to the inconsistencies of the FAA enplanement data as provided by historic 5010 Master Records, the records from ORS representatives are considered more reliable. These records are collected directly by ORS representatives from reports provided by the commercial carriers. As a result, the enplanement numbers used as a base for this master plan forecast will mirror the enplanement figures provided by ORS, and not the FAA enplanement numbers reflected in the 5010 records and TAF. This will also provide a common starting point for the forecasts with which to measure average annual growth rates, and to allow better comparisons to the FAA TAF forecast growth rates. ORS should continue to encourage all carriers to report enplanements to the FAA.

Figure 2-4 on the following page shows all passenger enplanement records since 1998 provided by ORS. Since 1998, passenger enplanements grew an annual average of 0.54%, however, taking into consideration the large fluctuations over time and estimating growth from 2005, when the enplanements were close to their lowest point, an annual average growth rate of 6.14% is calculated. This tremendous growth rate is very apparent when considering just the last four years of data, which reflect a growth rate of over 17% each year. Once again, growth rates of these magnitudes cannot be accurately extrapolated into predicted growth rates, but can serve

Figure 2-4: Passenger enplanments at ORS since 1998



Source: ORS Airport Manager Records

Table 2-14: Current FAA TAF estimates for ORS passenger enplanments (five-year intervals)

Year	Enplanements
2020*	7,367
2025*	8,576
2030*	9,982
2035*	11,629
2040*	13,548
2045*	15,782

Source: FAA TAF

to augment the longer-term growth rates. Interviews conducted with ORS representatives reflect optimism that current positive trends will continue. Interviews were conducted with most of the air service providers at ORS to determine if any major changes or actions might influence future enplanements at ORS. Those interviews revealed no major changes anticipated by any of the providers in either the type or level of air service or equipment.

The previous master plan forecast published in 2008 predicted enplanements to rise by approximately 3.1% annually. Normally for FAA master plan forecasting standards, this growth rate would seem exceptional; however, actual enplanements in 2017 exceeded the previous 10-year master plan forecasts considerably. Previous estimations in the master plan were primarily driven by FAA forecasts at the time.

Table 2-14 shows the current FAA TAF enplanement forecasts for ORS over selected five-year periods. This FAA TAF forecast continues the previous FAA trend of a 3.1% average annual growth rate. Actual passenger enplanement data provided by ORS already supersedes the actual estimated enplanement numbers by the FAA, however, the specific numbers are not quite as relevant to the future forecasts as is the estimated percentage growth rate.

2.4.1.5 Instrument Operations

Instrument approach capabilities across the nation for nearly all community based airports is increasing at a very fast rate. An acknowledgement of the critical need coupled with rapidly developing technology by the aviation industry and the FAA has led to an ambitious program to upgrade and equip the system and individual airports. ORS is a prime example of an airport that is not only heavily

Table 2-15: TFMSC instrument operations at ORS from 2000-2017

Year	Total IFR Operations
2000	402
2001	542
2002	573
2003	532
2004	819
2005	699
2006	768
2007	597
2008	667
2009	735
2010	1044
2011	1666
2012	1696
2013	1902
2014	2010
2015	2082
2016	2022
2017	2482

Source: FAA TFMSC Data

Table 2-16: FAA histroic data and TAF forecasts for NWMR for enplanements, operations, and based aircraft (selected five-year periods)

Year	Total Enplanements	Total Operations	Based Aircraft
1990	34,369,452	9,605,279	17,411
1995	47,746,048	10,485,644	17,762
2000	57,090,075	11,685,668	20,850
2005	60,896,618	11,590,222	23,970
2010	65,451,243	10,794,569	22,427
2015	73,860,171	10,228,484	22,258
2020*	92,455,565	10,539,669	24,750
2025*	102,862,526	11,029,046	25,970
2030*	114,130,692	11,615,507	27,101
2035*	126,120,592	12,253,645	28,272
2040*	139,086,461	12,953,348	29,515
2045*	153,158,686	13,722,508	30,837
Average Annual Growth	2.04%	1.06%	0.88%

Source: FAA TAF ORS Data
*Data is TAF forefasted data

dependent upon instrument approaches, but has the data to reflect its need over time. The most reliable method of determining trends of instrument operations over time at a facility is by examining the historic TFMSC data available. **Table 2-15** depicts total instrument operations recorded by the FAA TFMSC at ORS since the year 2000. The data clearly shows a strong upward trend of IFR use at the ORS airport. This trend seems to far outpace other measurable activity statistics at the airport. The rates of growth for IFR flights at ORS are 11.16%, 15.06% and 7.44% over the last 17, 10 and 5 years respectively. The increase reflects both the basic demand for IFR operations and FAA's development of new instrument approach procedures over time.

2.4.2 Regional Trends and Forecasts

2.4.2.1 FAA Northwest Mountain Region TAF

As a requirement of the FAA's NPIAS program, FAA TAF statistics for all NPIAS airports in the United States are projected forward, not only at a local airport level, but regionally and nationally as well. The historic data and current FAA TAF forecasts for enplanements, operations and based aircraft within the Northwest Mountain Region for selected 5-year intervals are shown in **Table 2-16**.

The FAA is forecasting an average annual growth rate in the region of 2.04% for enplanements, 1.06% for total aircraft operations and 0.88% for based aircraft over the next 25 years. These statistics will of course vary from airport to

Table 2-17: FAA historic data and TAF forecasts for State of Washington for selected data (selected five-year periods)

Year	Enplanements	Total Operations	Based Aircraft
1990	9,041,107	2,820,613	4,563
1995	13,231,273	3,208,215	4,790
2000	15,996,284	3,610,414	5,872
2005	16,374,531	3,427,252	6,631
2010	17,658,548	3,178,399	5,963
2015	22,178,136	2,935,112	5,554
2020*	28,005,492	3,060,949	6,087
2025*	31,430,084	3,235,020	6,439
2030*	35,210,770	3,427,528	6,771
2035*	39,291,134	3,637,193	7,125
2040*	43,760,924	3,867,483	7,516
2045*	48,718,672	4,122,093	7,963
Average Annual Growth	2.24%	1.2%	1.08%

Source: FAA TAF
*Data is TAF forecasted data

airport given local factors, such as flight schools or charter operations, however, as a gross estimate, it is useful to consider these forecasts in relation to local factors at ORS.

2.4.2.2 FAA Washington State TAF

The FAA TAF presents the same categories of forecast data for each of the individual states. See **Table 2-17** above. The FAA TAF predicts for the State of Washington an average annual growth rate of 2.24% for enplanements, 1.20% for total operations and 1.08% for based aircraft over the next 25 years. As previously mentioned, these statistics are used to help identify trends and augment individual forecasts.

2.4.2.3 Washington State Aviation System Plan

Washington State completed its latest aviation system plan update in 2017 (WASASP). This update is the latest iteration of the continuing 20-year plan to assist the State, FAA and individual airports in understanding the influences affecting aviation within the state and to help individual airports and the State make appropriate plans for the future. The WASASP report is characteristic of other FAA funded state system planning studies and is organized similarly to individual airport system plans. These similarities are because state system plans are also conducted under the same FAA Master Planning guidance as individual airport master plans, found in FAA Advisory Circular 150/5070-6B. The WASASP provides forecasts for each of the airports. As with national forecasts the state forecasts for individual airports are more general than are

Figure 2-5: New Washington State Aviation System Plan Airport Classification System

Classification	Primary Activities	Factors to Classify Airports
Major	• Commercial service • Aircraft or aerospace manufacturing	• ARC C-III or greater • Primary Activity: commercial service and/or aerospace manufacturing/MRO • Population over 40,000
Regional	• Corporate GA and travel business	• ARC B-II or greater • Primary Activity: corporate GA and travel business • Population over 30,000
Community	• GA-personal transportation/business and recreational • Pilot training	• Not metro or regional • Paved primary runway surface • 15 or more based aircraft
Local	• GA-personal transportation/recreational • Pilot training • Agriculture	• Not metro or regional • Paved primary runway surface • Less than 15 based aircraft
General Use	• GA-personal transportation/recreational, including backcountry	• Unpaved primary runway surface (including all seaplane bases)

Source: WASASP (2017)

those developed in specific airport master plans. The WASASP defines the three pillars of the Washington Aviation System as air cargo, commercial uses and general aviation, and ORS embodies each of those three pillars.

As part of the new WASASP, the State of Washington has developed its own airport classification system to better describe the airport's contribution to the state airport system **Figure 2-5** depicts the new WASASP airport classifications.

As part of the new classification system, ORS has been designated as a "Community" Airport. A full description of this new classification is:

"A Community airport provides a facility for larger scale general aviation activities that are important to aviation, such as business and personal transportation, recreation, and pilot training. There may be fewer corporate flights for business activities than a Regional airport, but they will still be active at this type of airport. The typical aircraft serving these activities are ARC A-I (small) to B-II. A Community airport serves a population range of 5,000 to 1.8 million. Community airports have paved runways and should have a minimum of 15 based aircraft to be included in this classification."

ORS meets the definition of the "Community" airport, including its expectation of the type of aircraft served, quite well.

Of particular interest to ORS were the forecasts developed as part of the latest WASASP. The overall average and classified annual growth rates forecast by the WASASP for the 20-year period and relevant to ORS forecasts are summarized as:

- GA aircraft operations statewide: **0.9%**
  - » Community Classified Airports: **1.3%**
- Air Carrier / Air Taxi Commuter aircraft operations statewide: **2.0%**
- Enplanements statewide: **3.1%**
  - » Based Aircraft statewide: **1.1%**
- Community Classified Airports: **1.8%**

These numbers are similar to most of the other FAA TAF based forecasts and provide further credence to the projected activity of the aviation industry in Washington as a whole. Also as part of the WASASP, some individual airport information was also presented in terms of 20-year projection trends. **Table 2-18** shows the historic reported and forecast projections attributed to ORS for scheduled passenger operations from the WASASP.

Table 2-18: Projected Air Carrier / Air Taxi / Commuter aircraft operations as per WASASP (2017)

Year	Scheduled Passenger Operations
2014	3,439
2019	3,566
2024	3,715
2034	4,087

Source: WASASP (2017)

The figures reported in the WASASP do not match current reported analysis or trends at ORS. Reported scheduled passenger aircraft operations are already substantially higher than reported by the WASASP. This anomaly is due to the different databases used and time periods in which the data is presented. It is not uncommon for information of this type in a statewide plan to be collected from consolidated databases rather than being specific to an individual airport. The information is not meant to be entirely conclusive for each individual airport, and is used more to show trends for the entire state.

2.4.2 National Trends and Forecasts

2.4.2.1 FAA Aerospace Forecast

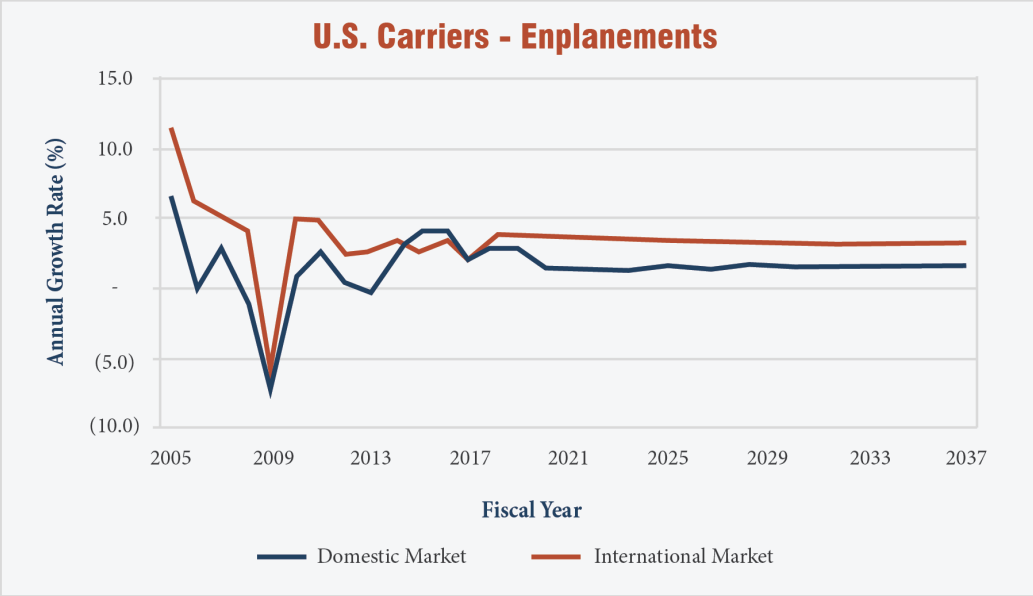
An important part of developing trends for statistical purposes is analyzing relevant issues from a national perspective, and then applying them, as warranted, to the regional and local perspective. One of the most reliable and important tools for this purpose is the information collected and analyzed by the FAA as part of its FAA Aerospace Forecast (2017–2037), and the NPIAS driven FAA TAF reports.

The latest FAA Aerospace Forecast report states that the U.S. is in its seventh year of recovery from a significant recession that affected the industry tremendously. The aviation industry is currently doing well overall and recent events have seemed to heighten airline competition. The boom and bust cycles that characterized much of the aviation business since deregulation 40 years ago have been replaced by an industry that is closely tied to the healthy economy, and for the most part, the report states that the US economy is showing very good signs of long-term strength. The FAA is forecasting US domestic carrier passenger growth to average 1.9% per year over the next 20 years. (See **Figure 2-6**) The sharp decline in oil prices in 2015 and 2016 was a boost for the overall growth of the industry, which is still in effect. The FAA is forecasting oil to be supplied at appx $50 per barrel in 2018 and perhaps exceed $100 per barrel in 2026 and perhaps be over $132 per barrel by 2037.

Although there are some significant changes continuing, the report states that the long-term outlook for GA is stable and has room for optimism. In 2016, deliveries of GA aircraft continued their decline, with a drop of -2.1% in turboprop deliveries, a decline of -7.4%

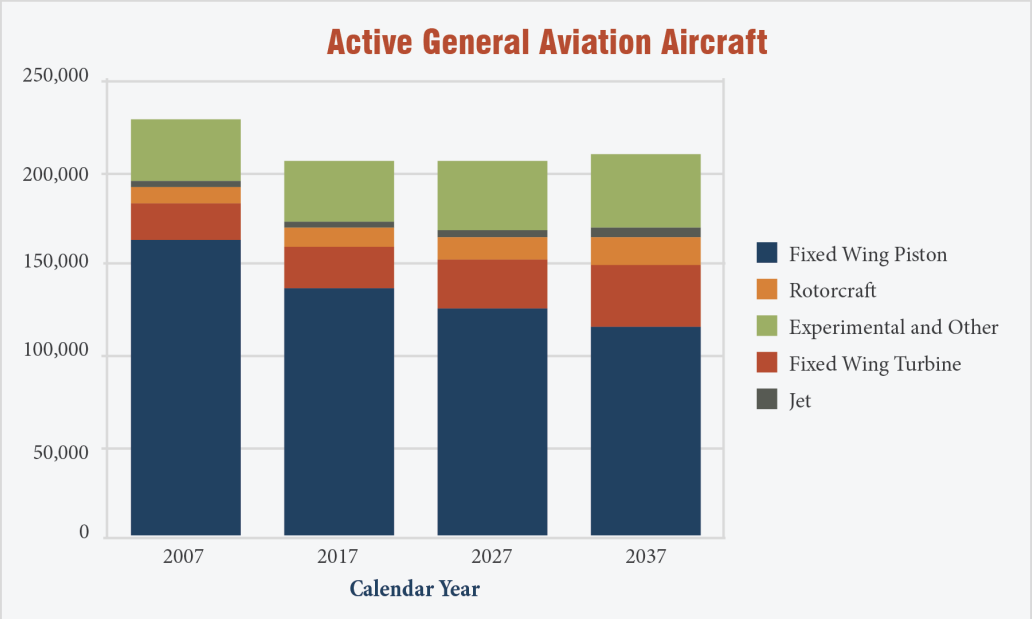
in deliveries of single-engine piston aircraft, and a sharp decline of -23.2% in multi-engine piston aircraft, however, business jet deliveries continued to increase by 1.8%. The FAA predicts an average annual increase in the GA fleet of 0.1% per year for the next 20 years, with the largest gains being made in the rotorcraft sector, and continuing declines in the fixed wing fleet over the same period. See **Figure 2-7.**

Figure 2-6: FAA forecast US enplanements



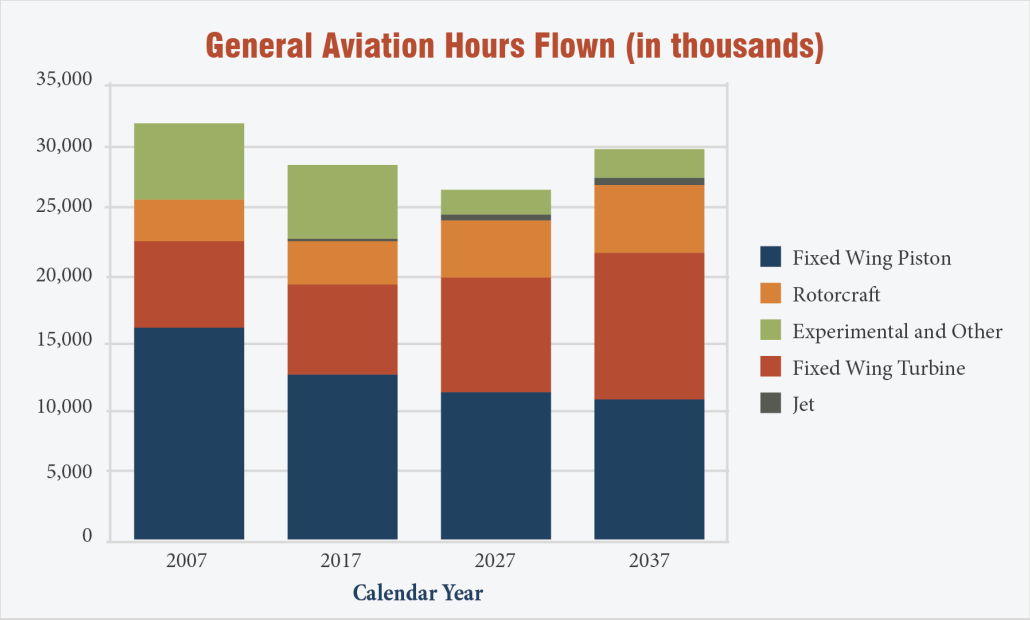
Source: FAA Aerospace Forecast

Figure 2-7: FAA forecasts for general aviation fleet



Source: FAA Aerospace Forecast

Figure 2-8: FAA forecasts for GA hours flown



The number of GA hours flown is expected to increase an average of 0.9% per year over the forecast period, with a 2.3% growth in the turbine hours, a 2.0% increase in rotorcraft hours, and a 3.0% increase in jet hours, but with a 0.8% decline in in fixed wing piston hours. The regional and business jet market continues to be robust, and shows no signs of slowing. See **Figure 2-8**.

2.4.2.2 FAA National Terminal Area Forecast Summary

The FAA's official forecast for ORS, and for all other airports as well, is provided by the annual FAA TAF (Terminal Area Forecast). FAA TAF information has been utilized in several ways in previous sections of this forecast chapter. The FAA TAF is used in conjunction with the FAA's National Plan of Integrated Airport Systems (NPIAS) to determine an airport's forecasted number of aircraft operations, based aircraft, enplanements and other information, especially if no other data is available. The FAA TAF and the associated annual summary report provide forecasts for multiple levels, from nationwide to region and down to the individual airport level. The types of operations that the TAF forecasts for individual airports depends upon the complexity of the airport, with large commercial service airports having more complete data, and smaller GA airports having less. For ORS, the TAF includes forecasts of enplanements, aircraft operations and based aircraft, with each broken down into standard subset categories. The forecasts for individual airports are made from a national rather than a local perspective. The entire current FAA TAF for ORS can be found in **Appendix XX**.

The latest FAA TAF forecasts some interesting data for the US as a whole. For the near term, itinerant GA operations are predicted to increase by 0.2% and local GA operations by 0.3%. Total enplanements at all airports are expected to increase by 4.3%. For the longer term, trends favor a national average annual growth rates for air carriers by 2.6%, a dip in air taxi/commuter traffic by -1.1%, an increase in itinerant GA operations of 0.3% and growth of local GA operations at 0.4%. There is also a 0.78% increase forecasted for based aircraft nationally over the same period. A summary of some selected individual historic and forecast national statistics provided within the latest FAA TAF over selected 5-year periods can be seen in **Table 2-19**.

Table 2-19: FAA TAF Report - National trends and forecasts for selected years

Year	Passenger Enplanements	Itinerant Operations		Local Operations	Based Aircraft
1990	35,267,097	10,899,797	37,856,386	39,597,910	162,130
1995	53,086,501	13,244,148	38,692,933	38,432,590	157,731
2000	75,336,095	14,252,839	43,829,370	43,173,651	179,675
2005	147,094,064	15,537,944	40,248,225	40,842,565	197,155
2010	159,812,158	12,132,948	34,401,873	36,767,751	165,441
2015	154,157,631	10,505,427	32,401,573	35,880,959	163,973
2020*	161,102,944	9,047,757	32,450,259	36,472,297	179,487
2025*	176,944,397	8,055,931	32,997,398	37,130,522	186,859
2030*	192,880,962	8,368,051	33,586,458	37,837,913	194,021
2035*	209,583,076	8,703,656	34,222,076	38,601,331	201,459
2040*	227,402,065	9,060,573	34,911,411	39,429,173	209,386
2045*	246,388,889	9,439,235	35,659,947	40,328,657	217,754

Source: FAA TAF

2.4.3 Other Relevant Influences on Trends & Forecasts

When forecasting future operations, enplanements and based aircraft at GA and small commercial service airports, it is important to examine other potential influences and desires that could affect overall development. Some of the items to consider may have unquantifiable metrics, while others may be quantifiable. It is incumbent upon the forecaster to not only use professional judgement when considering these variables, but to place a great degree of emphasis upon stakeholder opinions about the topics. Forecasting operations at larger, commercial airports can certainly be challenging due to their complexity and the sheer amount of data available, however, smaller GA airport forecasts can be equally as challenging because of the limited amount of reliable published data and because some variables can potentially have a large influence on the whole. This makes forecasting for GA airports much more dependent upon local input and forecaster discretion.

2.4.3.1 Ferry Operations

Washington State Ferries operates ferry service crossing the Puget Sound and its inland waterways. This marine highway carries commercial users, tourists, and daily commuters. Several vessels provide service between Anacortes and the San Juan Islands, with a stop at the Orcas Island Ferry Terminal (**Tables 2-21-2-22 and Figure 2-9**).

Historic ferry ridership between Anacortes and Orcas Island decreased from 2002 to 2009, but has since rebounded with 672,272 riders in 2017.

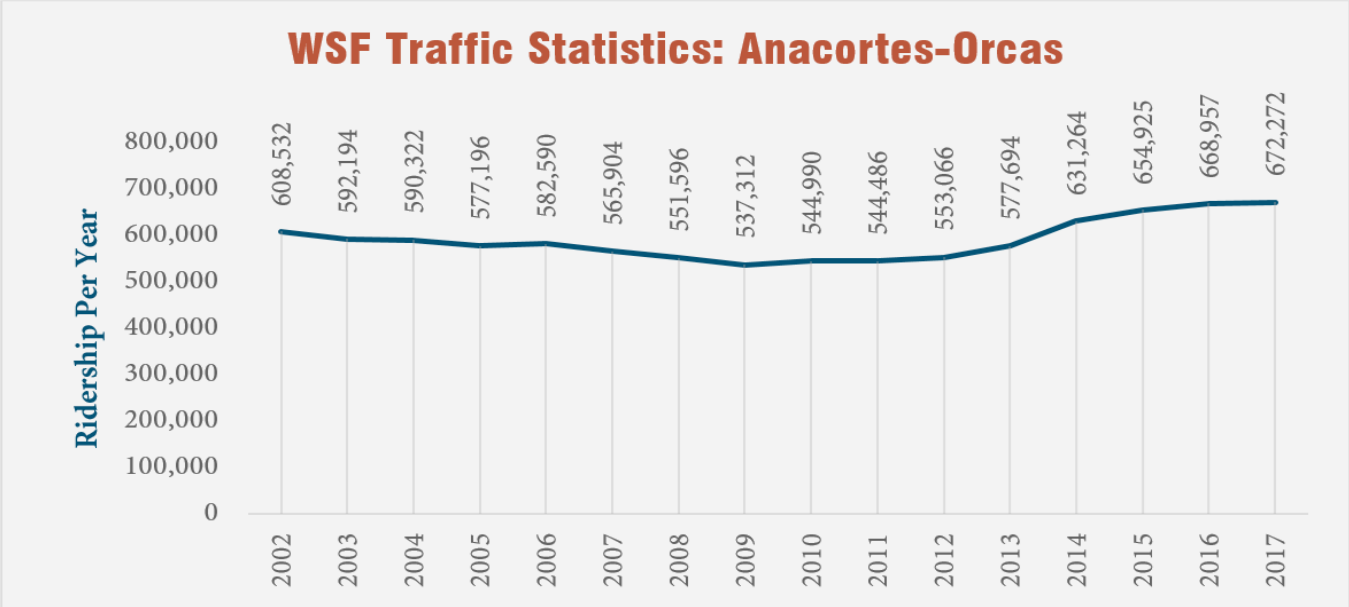
Round-trip fares on the Anacortes-Orcas route are assessed for passengers and vehicles.

Table 2-20: Representative Washington State Ferries Vessels Serving Orcas Island (2017)

Vessel Name	Vessel Class	Maximum Passengers	Maximum Vehicles
Chelan	Issaquah	1200	124
Hyak	Super	2000	144
Kittitas	Issaquah	1200	124
Samish	Olympic	1500	144
Yakima	Super	2000	144

Source: http://www.wsdot.com/ferries/vesselwatch, accessed April 2018. Vessels serving Orcas Island may vary.

Figure 2-9: WSF Traffic Statistics



Source: WSF Traffic Statistics Rider Segment Reports

Table 2-21: Washington State Ferries Traffic Statistics: Anacortes-Orcas

Year	Vehicles	Passengers			Total Riders	% Change from Previous Year (Total Riders)
		Total	Vehicle	Foot		
2002	288,558	319,974	250,840	69,134	608,532	0.0%
2003	276,728	315,466	243,356	72,110	592,194	-2.7%
2004	278,222	312,100	244,884	67,216	590,322	-0.3%
2005	276,274	300,922	238,362	62,560	577,196	-2.2%
2006	279,872	302,718	238,446	64,272	582,590	0.9%*
2007	274,224	291,680	210,500	81,180	565,904	-2.9%*
2008	265,236	286,360	224,090	62,270	551,596	-2.5%*
2009	260,254	277,058	214,306	62,752	537,312	-2.6%
2010	263,232	281,758	222,928	58,830	544,990	1.4%
2011	260,616	283,970	225,560	58,310	544,486	-0.1%
2012	264,174	288,892	230,244	58,648	553,066	1.6%
2013	275,104	302,590	238,730	63,860	577,694	4.5%
2014	289,400	341,864	262,310	79,554	631,264	9.3%*
2015	297,986	356,939	280,767	76,172	654,925	3.7%
2016	307,276	361,681	285,333	76,348	668,957	2.1%
2017	310,377	361,895	288,989	72,906	672,272	0.5%*

Source: WSF Traffic Statistics Rider Segment Reports January 1, 2002 through December 31, 2017.
*Calculated values. All other percentages drawn from WSF reports.

Table 2-22: Washinton State Ferries Passenger and Vehicle Fares: Anacortes-Orcas

Fare Type		Anacortes/Orcas *(Round-Trip)*
Passenger (in vehicle or walk on)	Regular Fare (Peak Season)	13.50
	Senior / Disability / Medicare (Peak Season)	6.70
	Youth (Peak Season)	6.70
	Wave2Go Multi-Ride Card (Peak Season)	88.65
Bicycle Surcharge	Passenger Fare Plus	2.00 (4.00)
Small Vehicle & Driver (under 14')	Regular Fare (Peak Season)	32.75 (44.15)
	Senior / Disability / Medicare (Peak Season)	25.95 (37.35)
	Wave2Go Multi-Ride Card (Peak Season)	123.15
Standard Vehicle & Driver (14' to under 22')	Regular Fare (Peak Season)	40.95 (55.20)
	Senior / Disability / Medicare (Peak Season)	34.15 (48.40)
	Wave2Go Multi-Ride Card (Peak Season)	153.90
Motorcycle & Driver, Stowage Fee	Regular Fare (Peak Season)	19.10 (25.70)
	Senior / Disability / Medicare (Peak Season)	12.30 (18.90)
	Wave2Go Multi-Ride Card (Peak Season)	143.90
Vehicle Length-Based Fares	22' to under 30', Under 7'2" High (Peak Season)	62.80 (84.65)
	22' to under 30', Over 7'2" High (Peak Season)	125.30 (169.00)
	30' to under 40' (Peak Season)	166.95 (225.25)
	40' to under 50' (Peak Season)	208.65 (281.50)
	50' to under 60' (Peak Season)	250.30 (337.75)
	60' to under 70' (Peak Season)	292.00 (394.05)
	70' to under 80' (Peak Season)	333.65 (450.30)
	80'+ (per additional foot) (Peak Season)	4.15 (4.65)

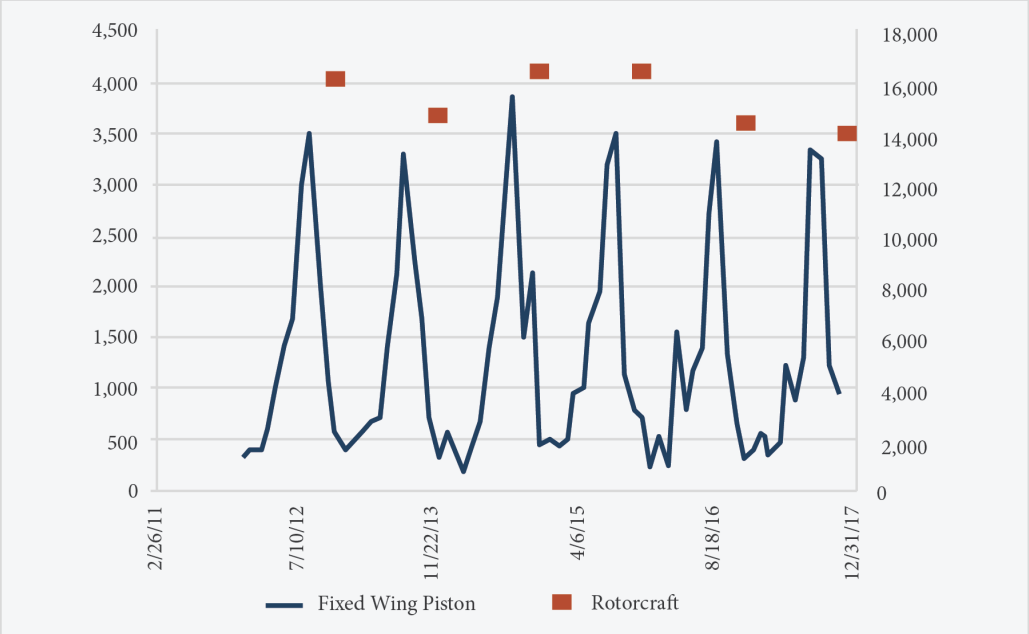
Source: WSF Passenger and Vehicle Fares, Effective October 1, 2017.

Regular passenger fares were $13.50 as of October 1, 2017, with discounts available for youth, senior, and disabled individuals. Vehicle fares are based on vehicle length, height, and width and range from $32.75 for a small vehicle and driver during the off season to $450.30 for a vehicle 70-80 feet in length during peak season.

2.4.3.2 Fuel Sales

Fuel sales are another metric that can help to determine historical trends in activity at an airport. Although sales can fluctuate over time, consumption of fuel can be an indicator of activity at an airport, especially for GA. Interpreting fuel sales information at ORS was only possible coupled with explanations from airport representatives. It is rare that commercial scheduled passenger aircraft purchase fuel at ORS. Most fuel sales at ORS are from transient and local GA aircraft. The fact that the aviation fuel must be transported to Orcas Island prior to final sale obviously increases the cost as compared to sales on the mainland. Fuel sales records over the time period available corroborate the observations by local users of somewhat static GA

Figure 2-10: Fuel sales records for ORS



Source: ORS Airport Management Records

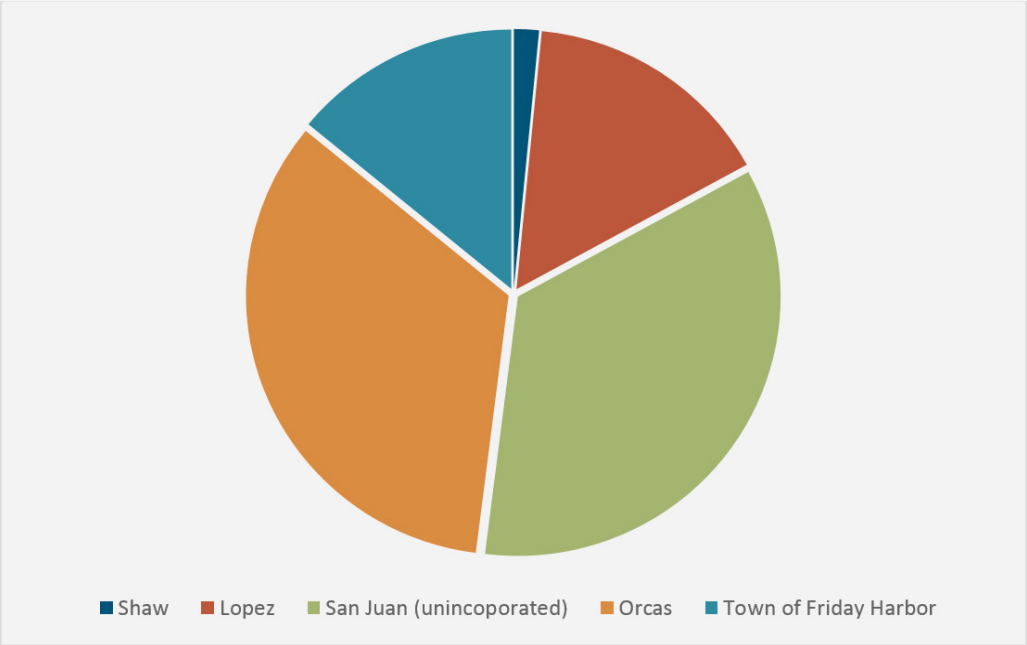
activity levels. **Figure 2-10** depicts the recorded fuel sales at ORS over several years. The obvious decline and rise of fuel sales over a year is clearly evident and highlights just how much activity and traffic there is during the tourist season. The consensus of stakeholders is that additional fuel sales to commercial carriers would be very beneficial, but not likely in the foreseeable future. Fuel sales data do not contribute to the activity forecasts but will be used in determining required fuel storage.

2.4.3.3 US Census and Demographic Information

The US census information relative to Eastsound and Orcas Island has been refined and augmented greatly by the State of Washington and San Juan County. The 2017 20-year comprehensive population projections developed by the Department of Community Development provide some valuable information regarding the population trends on Orcas Island. Orcas Island constitutes about 1/3 of the total County population (**Figure 2-11**). The island has been and is currently home to a disproportionately large number of second home owners and part-time residents, and this trend is continuing. This situation is well known to ORS airport representatives and stakeholders, and is evident in the types and numbers of local GA operations and scheduled passenger traffic.

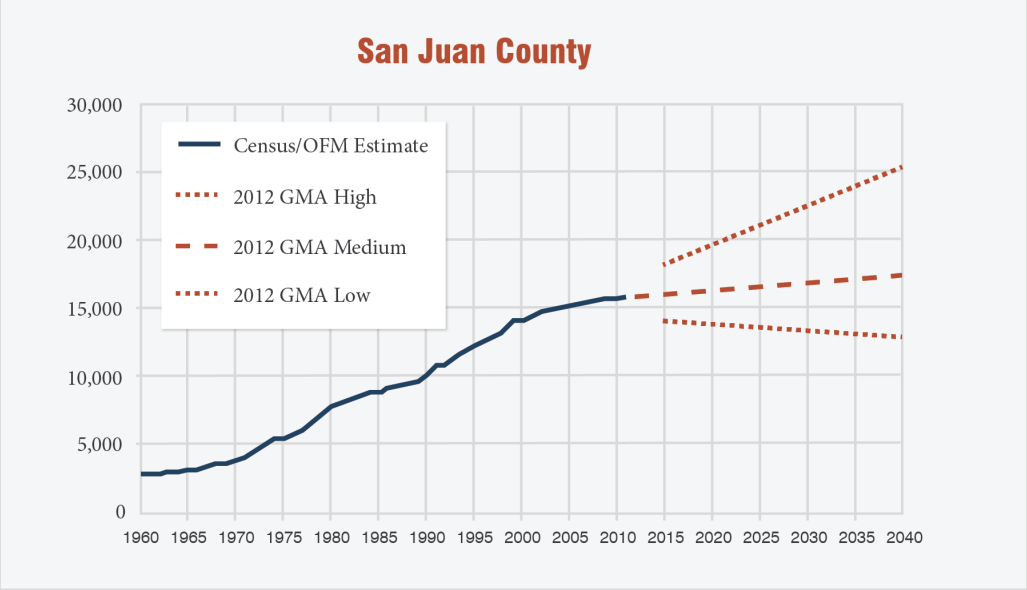
From 1990 to 2016, Orcas Island grew at a compound annual growth rate of nearly 2.04%. However, the rate of population growth has been declining and was approximately 0.55% from 2010 to 2016. This growth rate is based primarily on immigration as deaths continue to outpace birth rates in the County and on Orcas Island. The most reliable low-end estimates for population growth for Orcas Island show a decrease in population over time, however, more likely medium projections estimate modest growth for both Orcas Island and San Juan County through 2040. (See **Figure 2-12**). The total estimated Orcas Island population as of April 2016 was 5,395. Under medium prediction estimates, this number is expected to rise to approximately 5,768 by 2040.

Figure 2-11: San Juan County population distribution



Source: OFM GMA County Population Projection, Courtesy of San Juan County

Figure 2-12: San Juan County 20-year population estimates



Source: OFM GMA County Population Projection, Courtesy of San Juan County

2.5 ORS FORECASTS

2.5.1 Forecasting Methodology

FAA AC 150/5070-6B gives wide latitude in both the types and application of the methods that can be used when forecasting data in an airport master plan. The reason for this flexibility is to account for the large variances in the types and complexities of airports and the large number of variables that can influence the forecasts. Professional judgement must be employed in determining the best methodology for the application of forecasts. There are several types of methodologies that the FAA recognizes, including:

1) Regression analysis. This is a statistical technique that ties aviation demand (dependent variables), such as enplanements, to economic measures (independent variables), such as population and income. This type of analysis should be restricted to relatively simple models with independent variables for which reliable forecasts are available.

2) Trend analysis and extrapolation. This type of method relies on projecting historic trends into the future. In trend analysis, a simple equation can be used with time as the independent variable. It is one of the fundamental techniques used to analyze and forecast aviation activity. While it is frequently used as a back-up or expedient technique, it is highly valuable because it is relatively simple to apply. Sometimes trend analysis can be used as a reasonable method of projecting variables that would be very complicated (and costly) to project by other means. This is especially true for smaller, GA airports.

3) Market share analysis or ratio analysis. This technique assumes a top-down relationship between national, regional, and local forecasts. Local forecasts are a market share (percentage) of regional forecasts, which are a market share (percentage) of national forecasts. Historical market shares are calculated and used as a basis for projecting future market shares. This type of forecast is useful when the activity to be forecast has a constant share of a larger aggregate forecast.

4)Smoothing. A statistical technique applied to historical data, giving greater weight to the latest trend and conditions at the airport; it can be effective in generating short-term forecasts.

For ORS forecasts, a combination of Trend Analysis with Applied Smoothing augmented with Market Share Ratio and other demographic and stakeholder input data will be utilized. Current and historic data coupled with existing forecast data from external sources is used to create a trending average that is adjusted by recent trends (smoothing) to create a forecasted annual average growth rate. This methodology takes advantage of the known historical trends of the airport, the current operational and based aircraft data and other data influencing the region including national trends and data.

In determining the slope of a linear graph over time, several average and trend-adjusted average annual growth rates that were previously discussed in this chapter were considered as well as other national and specific information. Some of the specific annualized rates and the other relevant information used is summarized in **Table 2-23**. Individual rates that were predicted by the FAA TAF and compared to the developed forecasts are highlighted as well.

2.5.1.1 TAF Reconciliation

To further refine the FAA TAF forecasts, the FAA relies upon the airport master planning process. To ensure reasonableness and to create a baseline for master planning forecasts, the guidance provided for airport master planning in the FAA AC 150/5070-6B states that all airport master plan forecasts must be compared against the FAA's existing TAF for the airport. After comparisons are made, the forecasts are considered compatible and consistent with the FAA TAF for all classes of airports if the forecasts for total enplanements, based aircraft, and total operations meet the following criteria:

- Forecasts differ by less than 10 percent in the five-year forecast period
- Forecasts differ by less than 15 percent in the ten-year forecast period

If comparisons are not consistent with the FAA TAF, the reasons for the differences must be explained. It is not uncommon for there to be differences between the FAA TAF and airport master plan forecasts, especially for smaller uncontrolled commercial service and GA airports with limited current and historic data.

Table 2-23: Some specific Indicators considered for ORS forecasts, adjusted and augmented as described within the chapter

Level of Indicator	Specific Indicator	Source	Average Annual Rates
Based Aircraft Information			
Local	FAA Based Aircraft Stats (1984-2017)	FAA 5010 / TAF	3.91%
Local	FAA Based Aircraft Stats (2006-2016)	FAA 5010 / TAF	0.00%
Local	2008 Master Plan Based Aircraft Forecast	ORS MP 2008	1.30%
Local	FAA ORS Based Aircraft Forecasts (2017-2045)	FAA TAF	3.76%
Regional	FAA NWMR Forecasts (2017-2045)	FAA TAF	0.88%
Regional	FAA Washington State Forecasts (2017-2045)	FAA TAF	1.08%
Regional	WASASP Forecasts (all classes)	WASASP	1.10%
Regional	WASASP Forecasts (community class)	WASASP	1.80%
National	FAA National Forecasts (2017-2045)	FAA TAF	0.78%
General Aviation Aircraft Operations			
Local	FAA GA Operations Stats (1990-2015, local and itinerant)	FAA 5010/TAF	-0.67%
Local	2008 Master Plan GA Operations Forecast	ORS MP 2008	1.30%
Local	FAA ORS GA Operations Forecasts (2017-2045, local and itinerant)	FAA TAF	1.37%
Regional	FAA NWMR Forecasts (2017-2045 all operations)	FAA TAF	1.06%
Regional	FAA Washington State Forecasts (2017-2045 all operations)	FAA TAF	1.20%
Regional	WASASP Forecasts (all classes)	WASASP	0.90%
Regional	WASASP Forecasts (community class)	WASASP	1.30%
National	FAA National Forecasts (near term itinerant operations)	FAA TAF	0.20%
National	FAA National Forecasts (near term local GA operations)	FAA TAF	0.30%
National	FAA National Forecasts (long term itinerant operations)	FAA TAF	0.30%
National	FAA National Forecasts (long term local GA operations)	FAA TAF	0.40%
Scheduled Passenger Service Operations			
Local	FAA Air Carrier Operations Stats (1990-2015)	FAA 5010/TAF	-0.19%
Local	2008 Master Plan Air Carrier Operations Forecast	ORS MP 2008	3.10%
Local	ORS Reported Air Carrier Activity (1998-2017)	Port of Orcas	-2.51%
Local	ORS Reported Air Carrier Activity (1998-2017)	Port of Orcas	0.91%

Level of Indicator	Specific Indicator	Source	Average Annual Rates
Local	ORS Reported Air Carrier Activity (2013-2017)	Port of Orcas	11.21%
Local	FAA ORS Air Carrier Forecasts (2017-2045)	FAA TAF	0.98%
Regional	FAA NWMR Forecasts (2017-2045 all operations)	FAA TAF	1.06%
Regional	FAA Washington State Forecasts (2017-2045 all operations)	FAA TAF	1.20%
Regional	WASASP Forecasts (all classes)	WASASP	2.00%
National	FAA Aerospace Forecast All Passengers	FAA	1.9%
National	FAA National Commuter Traffic (2017-2045)	FAA TAF	-1.10%
Passenger Enplanements			
Local	FAA Passenger Enplanement Stats (1990-2015)	FAA 5010/TAF	-0.78%
Local	2008 Master Plan Passenger Enplanements Forecast	ORS MP 2008	3.10%
Local	ORS Reported Passenger Enplanements (1998-2017)	Port of Orcas	0.54%
Local	ORS Reported Passenger Enplanements (2005-2017)	Port of Orcas	6.14%
Local	ORS Reported Passenger Enplanements (2013-2017)	Port of Orcas	17.30%
Local	FAA ORS Pax Enplanements Forecasts (2017-2045)	FAA TAF	3.10%
Regional	FAA NWMR Forecasts (2017-2045)	FAA TAF	2.04%
Regional	FAA Washington State Forecasts (2017-2045 all operations)	FAA TAF	2.24%
Regional	WASASP Forecasts (community class)	WASASP	3.10%
National	FAA Aerospace Forecasts	FAA	1.90%
National	FAA National Forecasts (2017-2045)	FAA TAF	4.3%
Instrument Operations			
Local	FAA Instrument Operations Stats (2000-2017)	FAA TFMSC	11.16%
Local	FAA Instrument Operations Stats (2007-2017)	FAA TFMSC	15.06%
Local	FAA Instrument Operations Stats (2012-2017)	FAA TFMSC	7.44%

2.5.2 Forecast Tables

The following tables represent the forecasts as developed for the ORS airport master plan, with associated data and FAA TAF forecasts for reference. The tables depict the current baseline levels as well as the required forecasts for the short term (+5-years), mid-term (+10-years), and long term (+20-years) as required by the FAA. The complete year by year forecasts for all data elements can be found in **Appendix XX**.

Based Aircraft

Table 2-24: ORS Based Aircraft Forecasts

	Base Year 2017	Short Term Forecast 2022	Intermediate Term Forecast 2017	Long Term Forecast 2037
Single	60	63	66	73
Twin	1	1	1	1
Jet	0	0	0	0
Helicopter	0	0	0	0
Total Based Aircraft Forecast (+1.00%)	61	64	67	74
FAA TAF Based Aircraft forecast (+3.76%)	76	94	108	155
% Difference Between Forecast and TAF	20%	32%	38%	52%

Explanation of Forecast and TAF Differences

The current FAA TAF for ORS has a very robust average annual growth rate of based aircraft of 3.76% over the forecast period. A deeper analysis of the data, as previously explained in the relevant section of this chapter, shows the past numbers recorded for ORS to be quite unreliable for many of the years records were kept, especially in relation to the FAA Airport Master Records. More recent trends and available data suggest that based aircraft numbers have been relatively static at the facility, and a decrease over the last ten years. Further consideration of input from ORS representatives and interested stakeholders coupled with analysis of the available information such as GA activity, census data, and WASASP forecasts have influenced the forecast.

General Aviation and Schedued Commuter Operations

Table 2-25: ORS Aircraft Operations Forecasts

	Base Year 2017	Short Term Forecast 2022	Intermediate Term Forecast 2027	Long Term Forecast 2037
Interant Operations				
Air Carrier	0	0	0	0
Air Taxi/Commuter (+2.10%)	8,790	9,753	10,820	13,320
GA (+1.50%)	18,247	19,657	21,176	24,576
Military	100	100	100	100
Local Operations				
GA (+0.85%)	15,203	15,860	16,546	18,007
Military	0	0	0	0
Total Aircraft Operations Forecast	42,340	45,370	48,642	56,003
FAA TAF Forecast	42,309	44,991	47,892	54,425
% Difference Between Forecast and TAF	0.07%	0.84%	1.54%	2.82%

Explanation of Forecast and TAF Differences

There are no major discrepancies between the current FAA TAF for ORS and the forecast predictions.

Instrument Approach Procedures

Table 2-26: ORS Instrument Operations Forecasts

	Base Year 2017	Short Term Forecast 2022	Intermediate Term Forecast 2027	Long Term Forecast 2037
Instrument Operations (+7.50%)	2,482	3,563	5,115	10,543

Explanation of Forecast and TAF Differences

The current FAA TAF for ORS does not include any predictive analysis regarding total instrument operations at ORS.

Passenger Enplanements

Table 2-27: ORS Enplanement Forecasts

	Base Year 2017	Short Term Forecast 2022	Intermediate Term Forecast 2027	Long Term Forecast 2037
Air Carrier	0	0	0	0
Commuter (+2.80%)	9,180	10,642	12,337	16,580
Total Enplanements Forecast	9,180	10,642	12,337	15,580
FAA TAF Forecast	6,723	7,832	9,110	12,360
% Difference Between Forecast and TAF	36.5%	35.9%	35.4%	34.1%

Explanation of Forecast and TAF Differences

As described in more detail in the relevant section of this chapter, there have been some stark differences in the enplanements reported by the FAA and those reported by ORS using data provided by the carriers. Actual enplanements for 2017 are reported as 9,180. The TAF uses as its base (current year) forecast, 6,723 enplaned passengers. When the correct current year enplanements are applied to the TAF forecast growth rate, the forecasts are within the mandated maximum difference.

Very little of the difference between the actual and TAF base year counts can be ascribed to on-demand/unscheduled carriers or calendar/fiscal differences. Looking at the ACAIS record for 2017, on-demand/unscheduled carriers account for only about 2.5% of total enplanements. Also, if there is a growth trend, as there is at ORS, it wouldn't be surprising that calendar year data would be higher than fiscal year data, but probably nothing close to the 26% difference shown in the table except in extreme circumstances.

Capacity

Capacity of the facility to handle the onloading and offloading of scheduled service is currently adequate, but could certainly be enhanced. The forecasts predict moderate growth reflecting an increasing use of the existing passenger facilities. No changes in current service are forecast that would not be able to be met by future planning and development of additional or remodeled onloading and offloading facilities under normal FAA AIP development. In contrast to scheduled passenger facilities, cargo facilities currently utilized for onloading and offloading are very strained and have exceeded facility capacity for some time. Although cargo forecasts are not part of the required forecasts for this chapter, additional needs are evident, and are further discussed in the facility needs section. Capacity, or lack of it, does not impact the forecasts.

Image of Cessna 208B Grand Caravan

2.5.3 Critical Aircraft

ORS does not have an active control tower, or a method for recording all types and numbers of flights at the facility. Because of this, other reliable sources of information and methods of collecting relevant data are necessary to help in ascertaining critical aircraft information. In addition to gathering IFR flight records for the facility and examining fuel sales, interviews with airport representatives and stakeholders, government representatives and the master plan advisory committee were also utilized. Most importantly, the manager of the airport provided detailed information about the nature of flights in and out of the airport. Since there are many IFR flight operations in and out of ORS, the aircraft type reported with IFR flight information is very helpful in assisting with the critical aircraft determination.

The "Critical Aircraft" or "Design Aircraft" determination is an important aspect of an airport master plan as it potentially sets ultimate dimensional design requirements for an airport. This impacts items such as the distance between runways and taxiways and the size of certain other areas protecting the safety of aircraft operations and passengers. To facilitate application of design standards across the universe of aircraft types, the FAA groups aircraft into performance- and dimension-based categories. These different categories are primarily defined based on wingspan, tail heights, landing gear configuration and approach speeds. The process of examining the using and forecasted aircraft leads to the selection of a "Design Aircraft" and a "Runway Design Code" (RDG). That selection leads to the consideration

of the facility requirements discussed in future chapters of the master plan.

- Aircraft Classification - The Design Aircraft classification is a composite of three parameters: The Aircraft Approach Category, the Airplane Design Group, and the Taxiway Design Group.
- Aircraft Approach Category – The Aircraft Approach Category (AAC) is based on the landing aircraft's approach speed. Most of the aircraft using ORS are in AAC Category A – approach speed less than 91 knots or AAC B – approach speed 91+ to 121 knots
- Airplane Design Group - Most of the aircraft using ORS are in either ADG I – Tail Height <20' and wingspan < 49', or ADG II – tail height 20' to <30' and wingspan 49' to <79'.
- Taxiway Design Group – TDG relates to the undercarriage dimensions of the using aircraft and sometimes determines taxiway width and/or runway-taxiway separation. Most of the aircraft using ORS are in the TDG-1A category.
- Runway Design Code (RDC) is a combination of the above factors plus a number representing the approach visibilities at the airport. For ORS the visibility minimums are "not less than 1 mile" and receive a code category 5000.

The Cessna Grand Caravan, an A-II category aircraft with an approach speed of less than 91 knots, by itself accounts for more than 500 operations at ORS. However, the Grand Caravan's minimum operating speed during icing conditions is 95 knots, and icing conditions are frequent at ORS. In addition, aircraft with approach speeds in the B category, such as the Beechcraft King Air 200, collectively conduct more than 500 operations at ORS annually, so the B category becomes critical.

Most of the aircraft operating at ORS are TDG-1A or lower, and aircraft higher than TDG-1A do not collectively exceed 500 annual operations. Thus, the airport Runway Design Category (RDC) for ORS is B-II-1A-5000. This RDC will be used in the facilities requirements chapter later in this master plan.

FORECAST SUMMARY

Table 2-28 summarizes the ORS forecast for total operations, total enplanements and total based aircraft over the next 20 years.

Table 2-28: ORS Summary

	Base Year 2017	Short Term Forecast 2022	Intermediate Term Forecast 2027	Long Term Forecast 2037	Forecasted Growth Percentage
Total Operations	42,340	45,370	48,642	56,003	1.4%
Total Enplanements	9,180	10,642	12,337	16,580	3.0%
Total Based Aircraft	61	64	67	74	1.00%