Regional Aviation Baseline Study

Technical Workshop #2

October 10, 2019

Agenda

- Welcome and introductions
- Study overview
- Results of key metrics
  - *Commercial service*
  - *Air cargo*
  - *General aviation*
  - *Multimodal access*
- Aviation needs
  - *Methodology*
  - *Capacity vs demand by sector*
  - *Challenges by sector*
  - *Opportunities by sector*
- Discussion
- Regional airspace analysis
- Discussion
- Next steps

Welcome and introductions

Source: Kenmore Air

Study overview

Background

— Aviation plays a pivotal role in the central Puget Sound

— Recent rapid airline passenger and air cargo growth raises questions about the region's ability to meet the future aviation needs while sustaining high-quality service

Study purpose and outcomes

Provide a clear picture of the different roles and aviation activities at each of the region's airports, describe how these activities interact, and set the stage for future planning.

Outcomes:

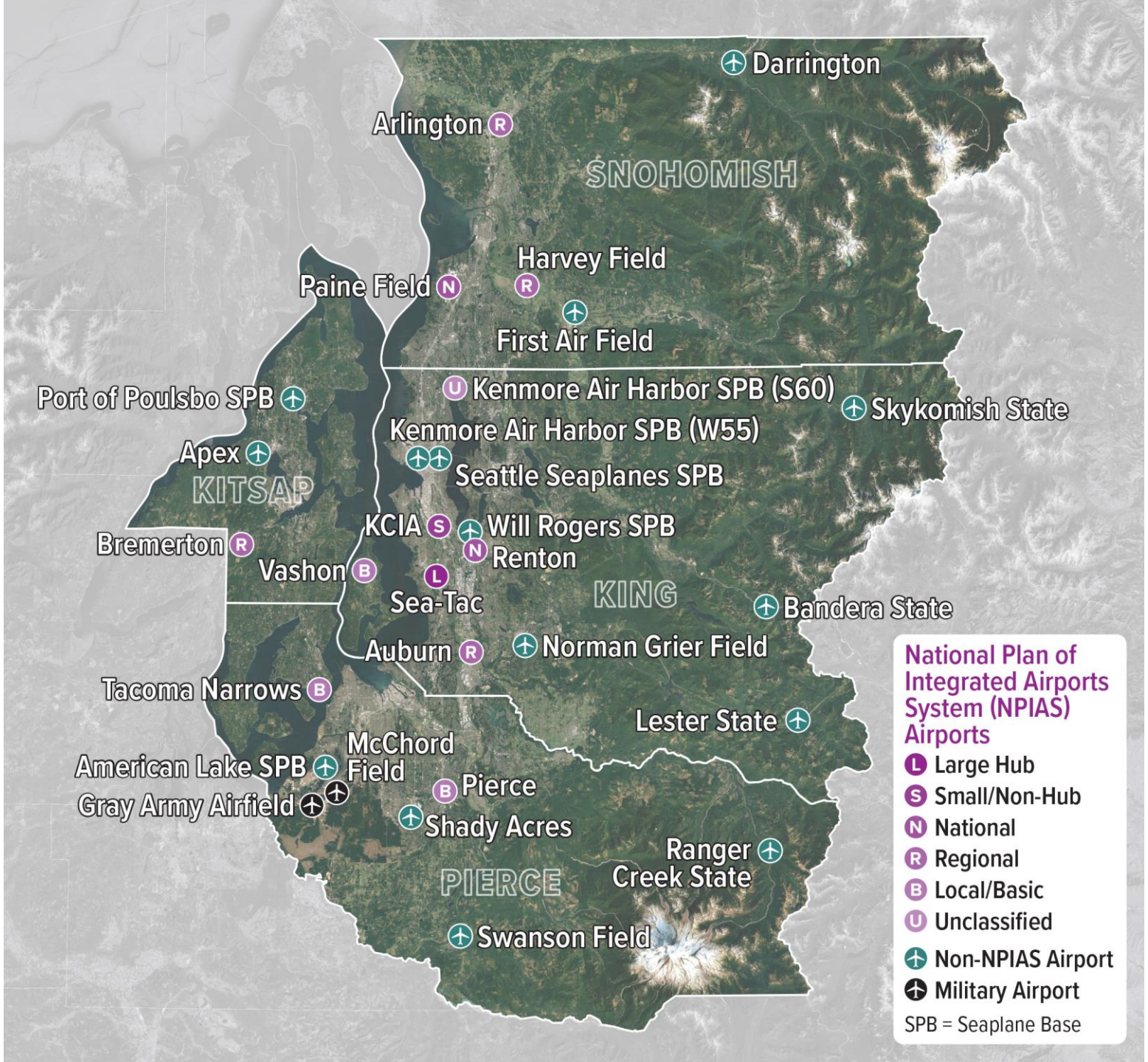
— Identify the roles of each airport and the aviation activities within the region.

— Provide a regional perspective on how aviation activities interact with each other, the community, and the broader community.

— Obtain input from stakeholders about their needs and build a common understanding about aviation and airspace constraints.

— Identify future aviation needs within central Puget Sound region and set the stage for future planning.

Study area and airports



Study phases

Airport & Aviation Activity Analysis (Summer 2019)	Future Aviation Issues Analysis (Fall/Winter 2019/2020)	Scenarios Definition & Evaluation (Spring /Summer 2020)
• Existing conditions & constraints • Market trends • Regional forecasts • *Airspace flow analysis (later in summer 2019)*	• Future regional landside & airside capacity needs • Future needs by activity and by airport • Major challenges • Economic analysis	• Identify and analyze scenarios • Identify potential next steps • Publish final report

WE ARE HERE

Source: Geekwire/Kevin Lisota

Results of key metrics

Commercial Service Benchmark

- Region's commercial service airports: Sea-Tac, KCIA and Paine Field
- KCIA was not analyzed because it does not provide regularly scheduled airline service (Part 121 carriers)

Benchmark: 80% of a region's population and 90% of its jobs are within a 60-minute drive of a commercial service airport

Commercial Service

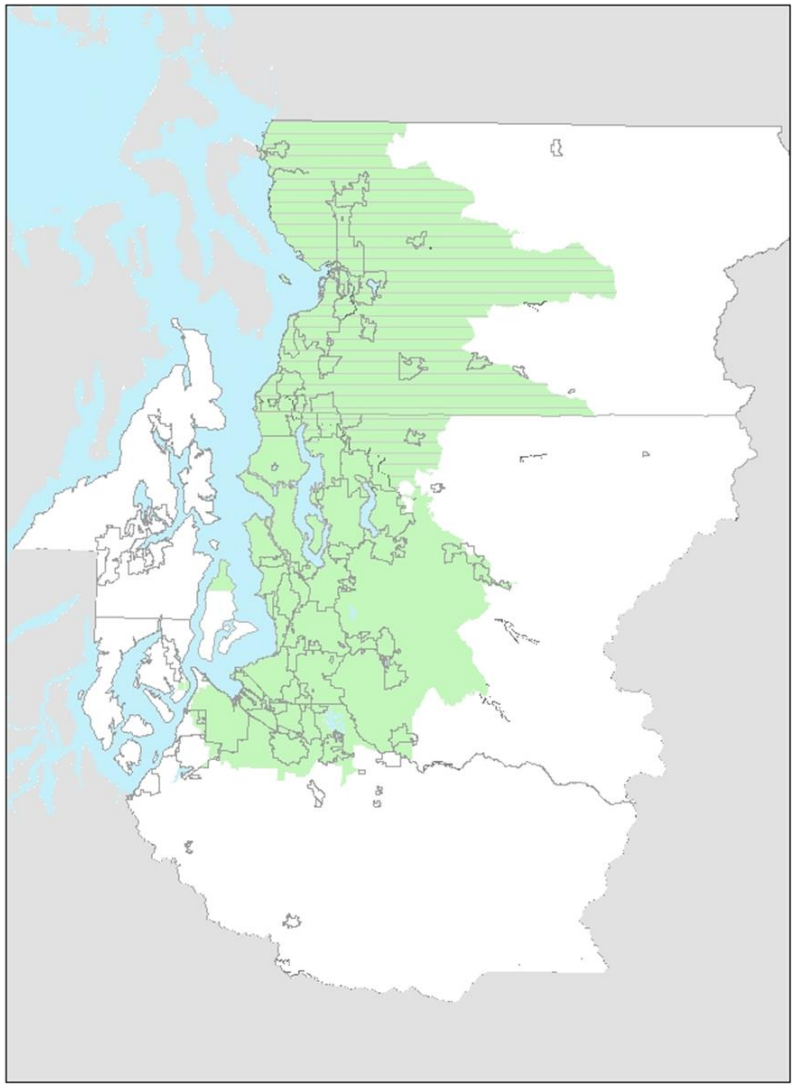
Benchmarks for Commercial Service Airport Coverage and Access

	BENCHMARK	SEA-TAC		SEA-TAC AND PAINE FIELD	
		2017	2050	2017	2050
Percentage Population within 60 minutes	80%[1]	62%[2]	42%[2]	83%[2]	70%[2]
Percentage Employment within 60 minutes	90%[1]	74[3]	57%[3]	90%[3]	80%[3]
Interstate Highway or Major Expressway within 5 miles	100%[4]	100%[5]	100%[5]	100%[5]	100%[6]
Highway or State Route within 2 miles	100%[4]	100%[5]	100%[5]	100%[5]	100%[6]
Direct Access to 4-lane Arterial Road	100%[4]	100%[5]	100%[5]	100%[5]	100%[6]
High-Capacity Transit Access[8]	100%[4]	100%[5]	100%[5]	50%[5]	100%[7]

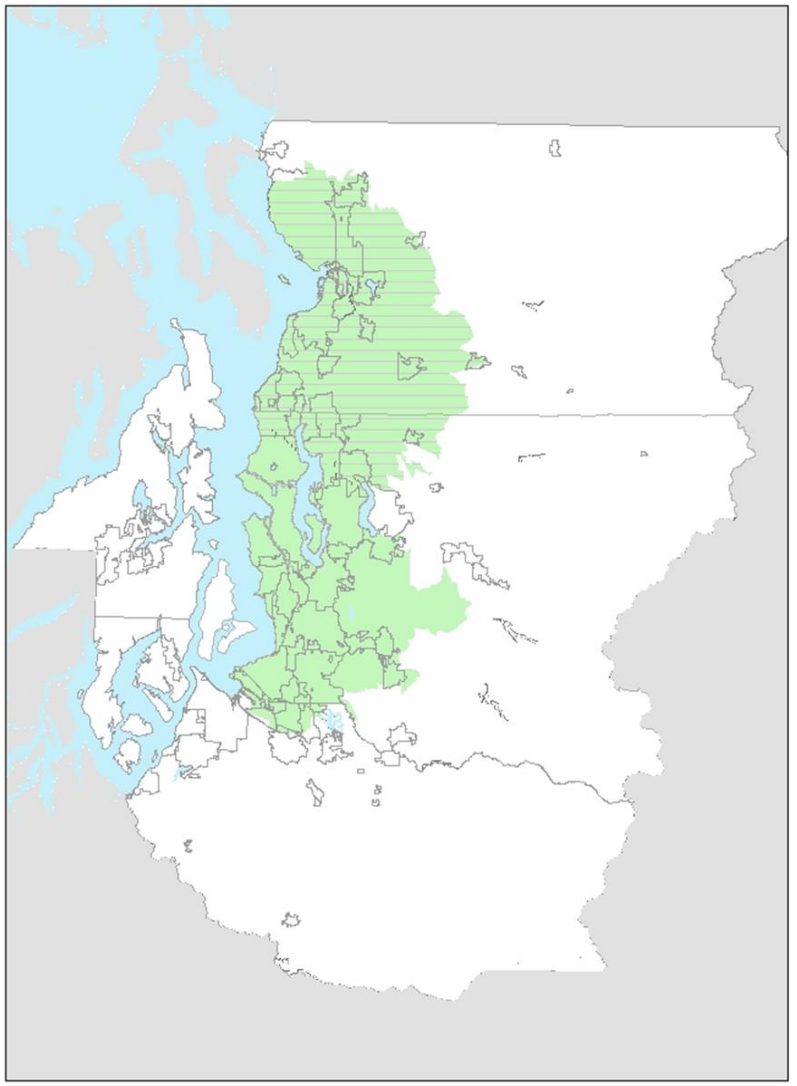
[1]Based on analysis of relevant statewide aviation system plans
[2]Drive sheds from PSRC travel model for 2014 and 2050 and population for 2017 and 2050
[3]Drive sheds from PSRC travel model for 2014 and 2050 and employment for 2017 and 2050
[4]Desirable for commercial service airports based on subject matter expert knowledge
[5] Determined from Google Earth analysis and Sound Transit website
[6]Assumes no changes in roadway access from the current conditions
[7]As of 2017, Paine Field did not yet have HCT. Service started in 2019.

60-Minute Drive Time Access to CS Airports

Sea-Tac and Paine Field in 2017

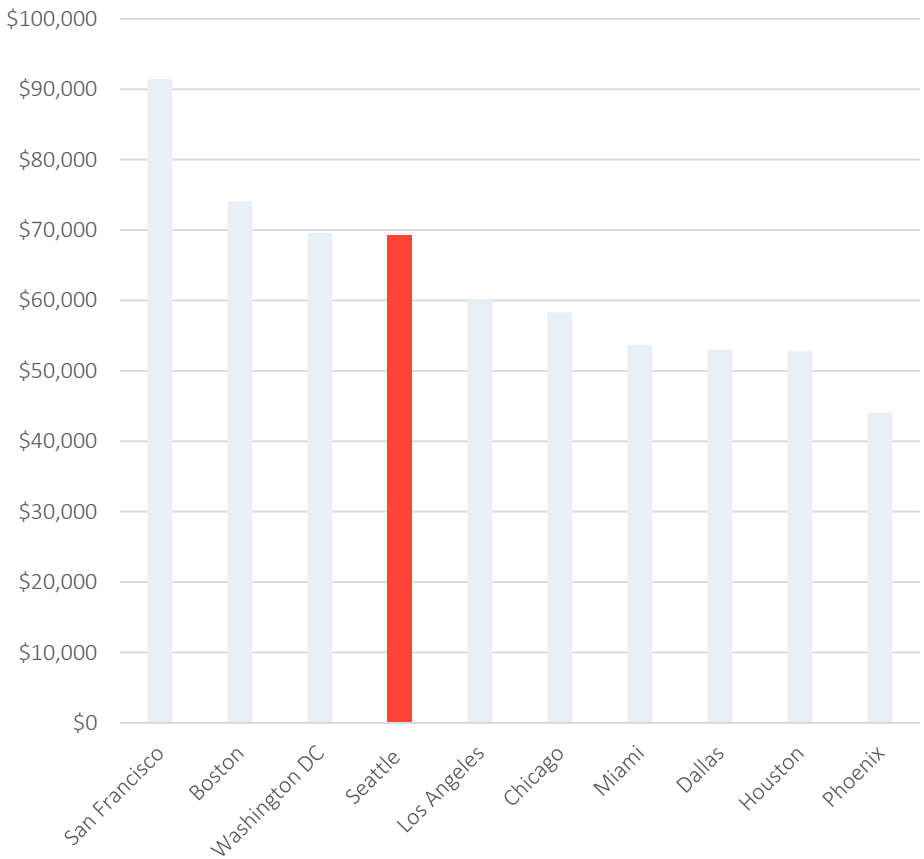


Sea-Tac and Paine Field in 2050

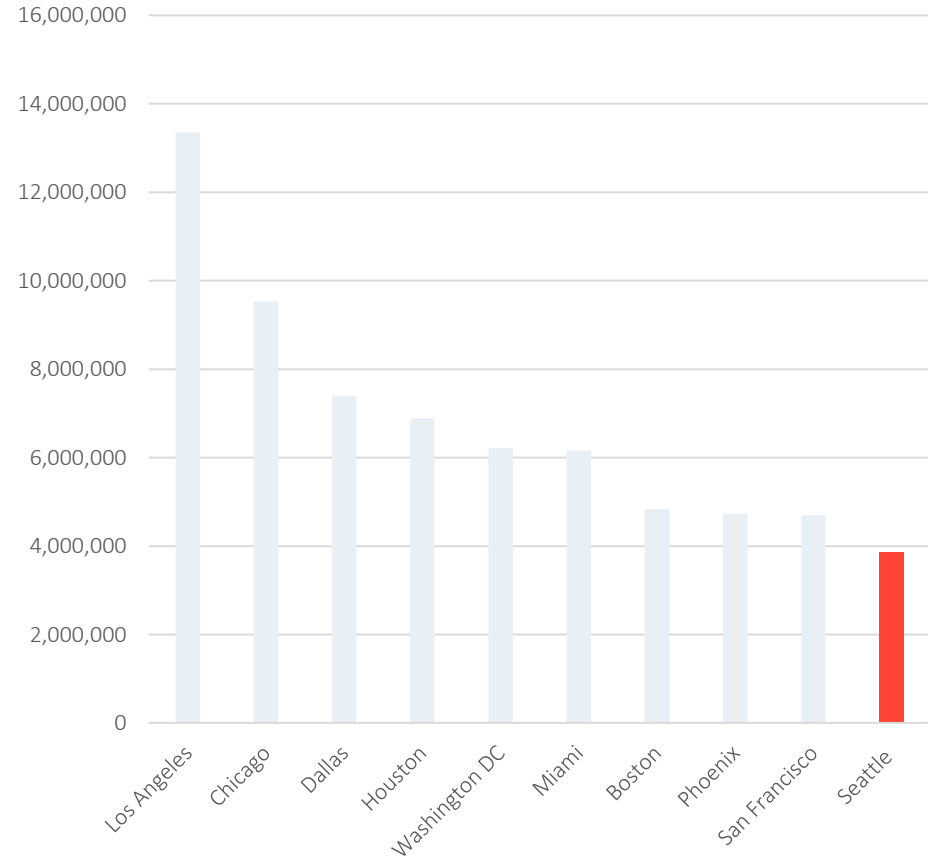


Multi-airport cities analysis
Commercial service

MSA per-capita income (2017)



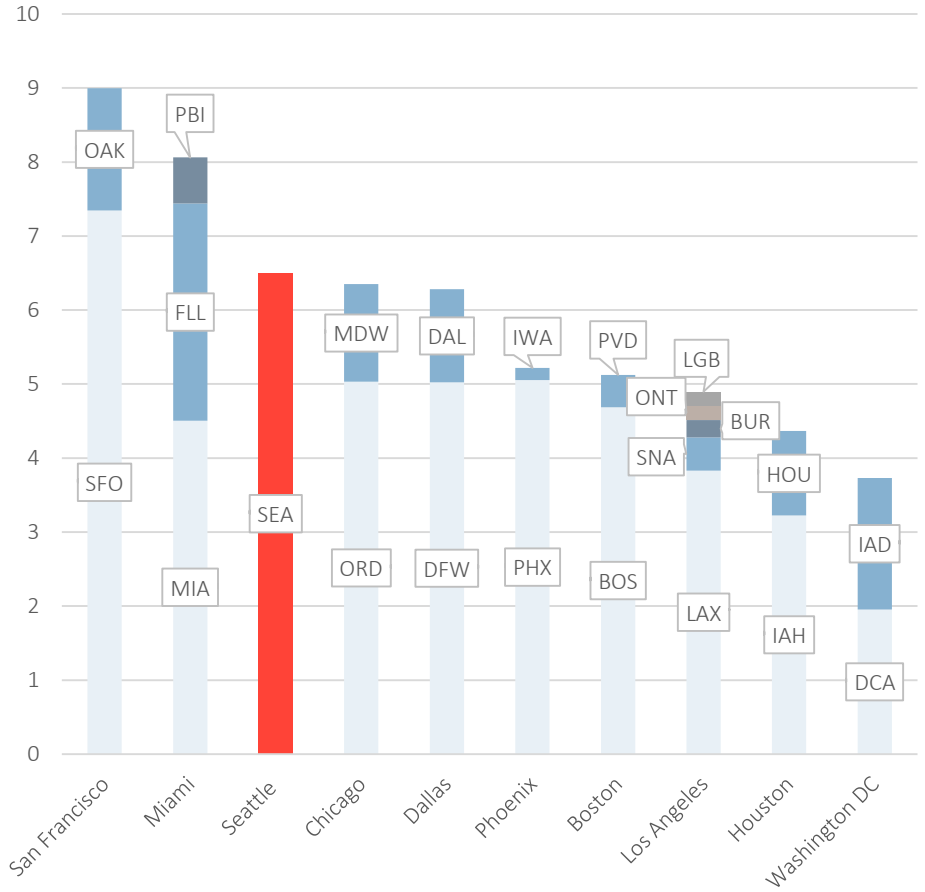
MSA population for multi-airport cities (2017)



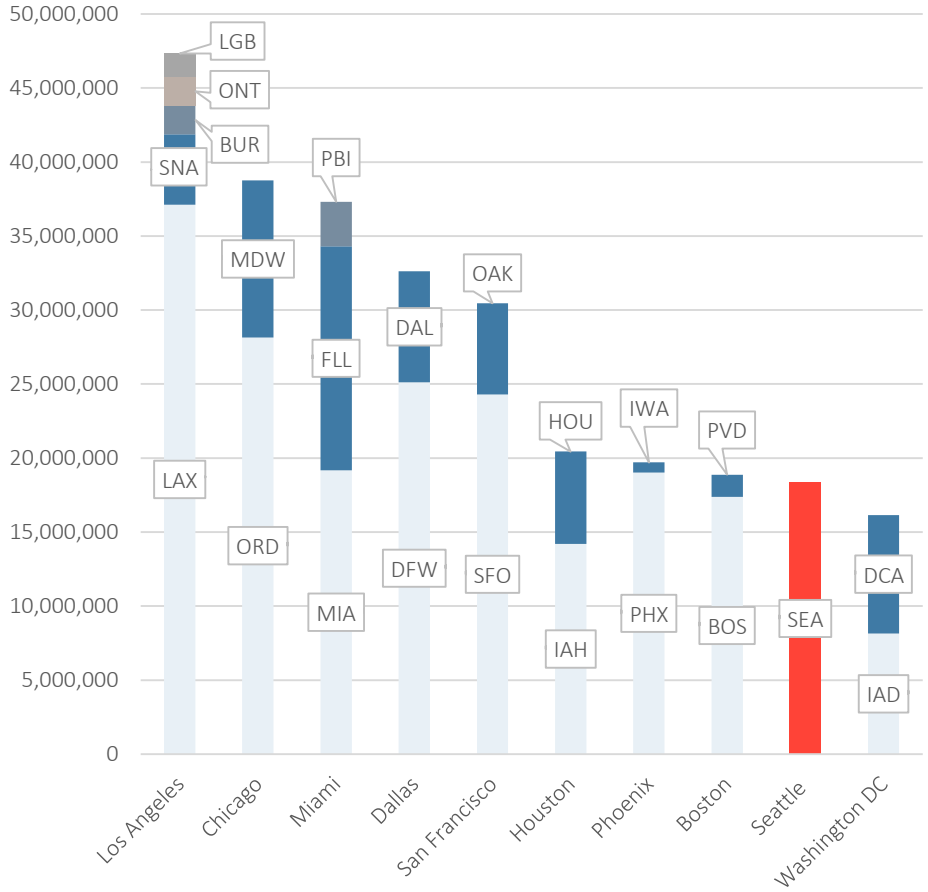
Metropolitan Statistical Area (MSA)

Multi-airport cities analysis
Commercial service

Airline seats per capita by airport (2017)



Enplanements by airport (2017)



Air cargo benchmark

- Analyzed Sea-Tac, KCIA, and Paine Field
- Benchmark for large freighter service and wide-body belly cargo

Benchmark: Percentage of the population within a 60 minute drive time of air cargo facility

Air cargo

Benchmark and performance measures for commercial air cargo service

PERFORMANCE MEASURE (WITH 60-MINUTE DRIVE-TIME ACCESS)	BENCHMARK	2017	2050
Percentage Population of Airport with Large Freighter Service	65%	67%	52%
Percentage Population of Airport with Wide-Body Belly Cargo	65%	62%	42%

General aviation

Benchmarks and Performance Measures for General Aviation Airports (2017 and 2050)

PERFORMANCE MEASURE (WITH 30-MINUTE DRIVE-TIME ACCESS)	BENCHMARK[1]	2017[3]	2050[4]
Percentage Population of Airport with Jet Fuel	85%	86%	87%
Percentage Population of Airport with Facilities for Handling Business Aircraft[2]	80%	71%	74%
Percentage Population of Airport with Precision Instrument Approach	65%	66%	69%
Percentage Employment of Airport with De-Icing Capabilities	70%	64%	64%
Percentage Employment of Airport with Jet Fuel	90%	95%	95%
Percentage Employment of Airport with Facilities for Handling Business Aircraft[2]	85%	83%	85%

[1]Based on analysis of relevant statewide aviation system plans
[2]Facilities for handling business aircraft are a runway at least 5,000 feet in length, automated weather reporting, and an instrument approach with vertical guidance.
[3]Utilizes current (2019) roadway congestion
[4]Assumes current (2019) roadway congestion remains the same into 2050

Multimodal Access

Multimodal benchmarks for Puget Sound commercial service and general aviation airports

CATEGORY	CITY	INTERSTATE (WITHIN 5 MILES)	STATE ROUTE (WITHIN 2 MILES)	DIRECT 4 LANE ARTERIAL ACCESS	HIGH-CAPACITY TRANSIT (WITHIN 1/2 MILE)
Commercial Service Airports					
Paine Field	Everett	✓	✓	✓	✓
Seattle-Tacoma International	Seattle	✓	✓	✓	✓
General Aviation Airports					
Arlington Municipal	Arlington	✓	✓		
Auburn Municipal	Auburn	✓	✓		♦
Bandera State	Bandera	✓	✓#		
Bremerton National	Bremerton		✓		
Darrington Municipal	Darrington		✓		
Swanson Field	Eatonville		✓		
Ranger Creek State	Greenwater		✓		
Kenmore Air Harbor Sea Plane Base (SPB) S60	Kenmore	✓	✓		♦
Norman Grier Field	Kent		✓		
First Air Field	Monroe		✓		
Port of Poulsbo SPB	Poulsbo		✓		
Pierce County	Puyallup		✓	✓	
Renton Municipal	Renton	✓	✓	✓	✓
Will Rogers-Wiley Post Memorial SPB	Renton	✓	✓		✓
Kenmore Air Harbor SPB W55	Seattle	✓	✓	✓	✓
King County International	Seattle	✓	✓	✓	♦
Seattle Seaplanes SPB	Seattle	✓	✓	✓	♦
Apex Airpark	Silverdale		✓		
Skykomish State	Skykomish		✓		
Harvey Field	Snohomish		✓		
Shady Acres	Spanaway				
American Lake SPB	Tacoma	✓	✓#		
Tacoma Narrows	Tacoma		✓		
Vashon Municipal	Vashon				

Note: Military airports were excluded from this analysis.
# Indicates the airport does not have U.S. or state route access but meets the interstate access metric.
♦ Indicates planned high-capacity transit in the future.

Source: Gulfstream

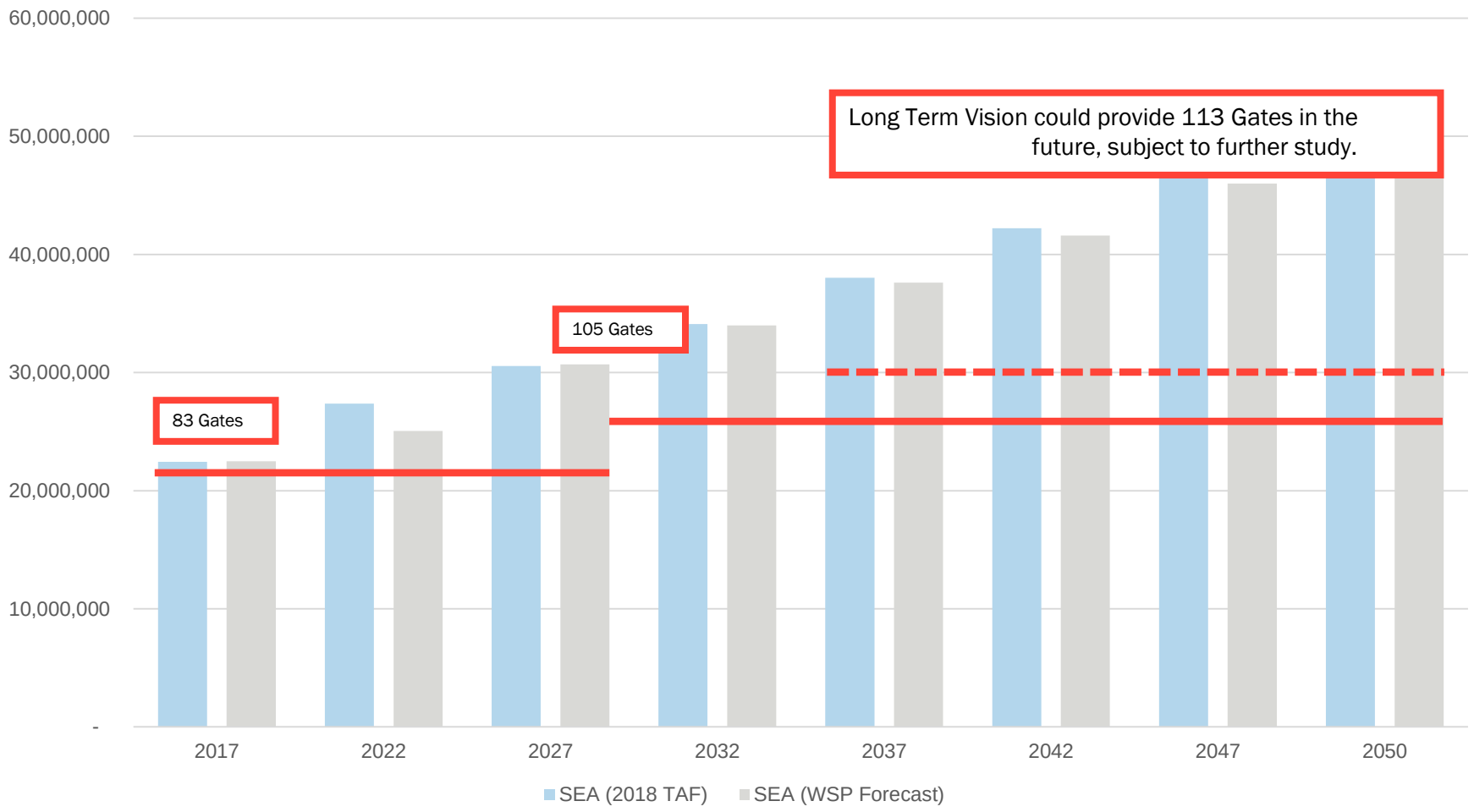
Aviation Needs

Methodology

- Airside
  - *Annual service volume*
  - *Unconstrained annual demand*
  - *Annual aircraft activity*
- Landside
  - *Aircraft parking capacity/demand*
  - *Passenger terminal facility capacity/demand*
  - *Vehicle parking capacity (on site)*
- Ground access (commercial service airports only)
- Airport-specific supply/demand (air cargo only)
- General aviation airports grouped by category

Capacity vs demand: Commercial service
Airside performance

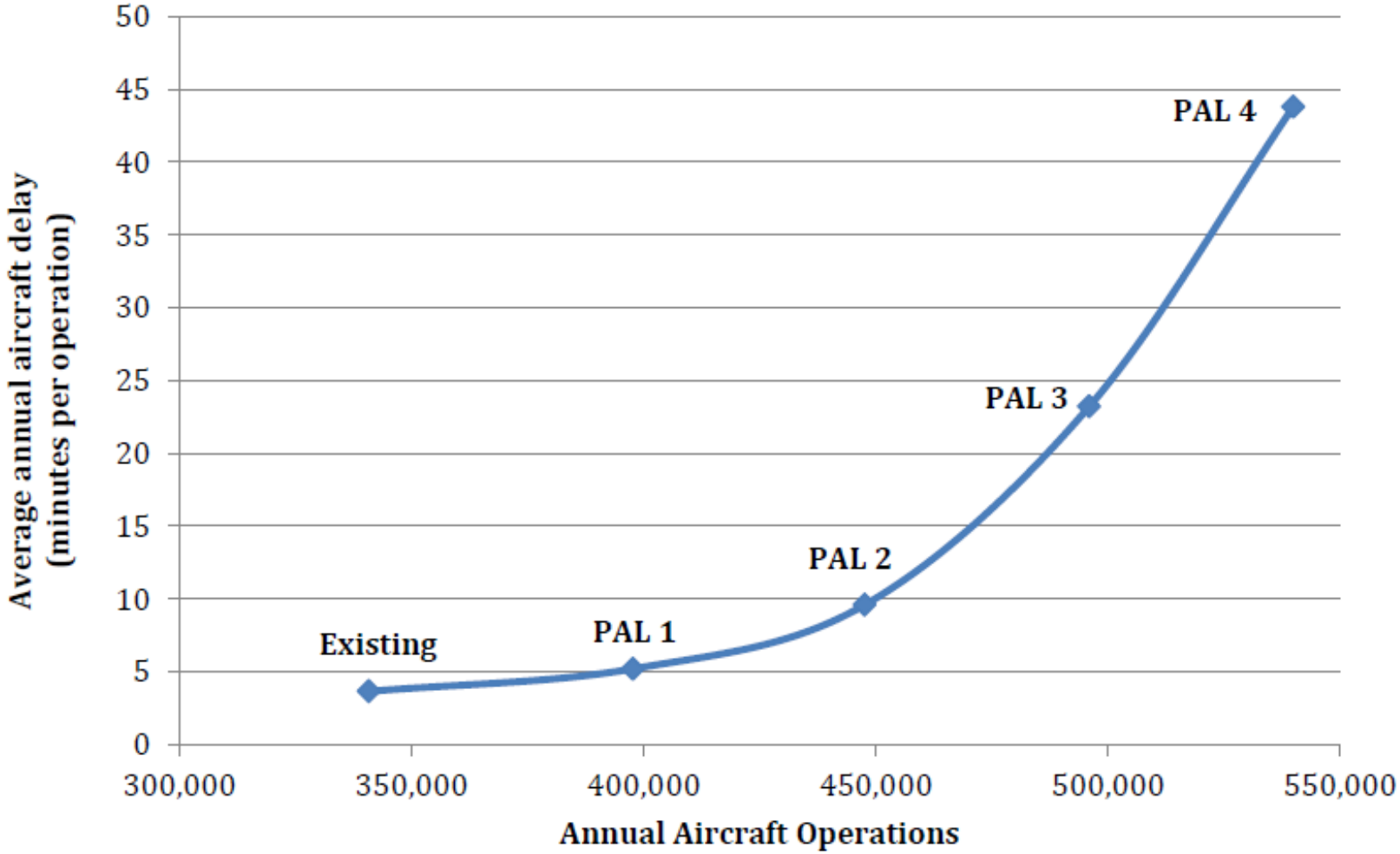
Sea-Tac passenger enplanement demand and terminal gate comparison



Capacity vs demand: Commercial service

Airside performance

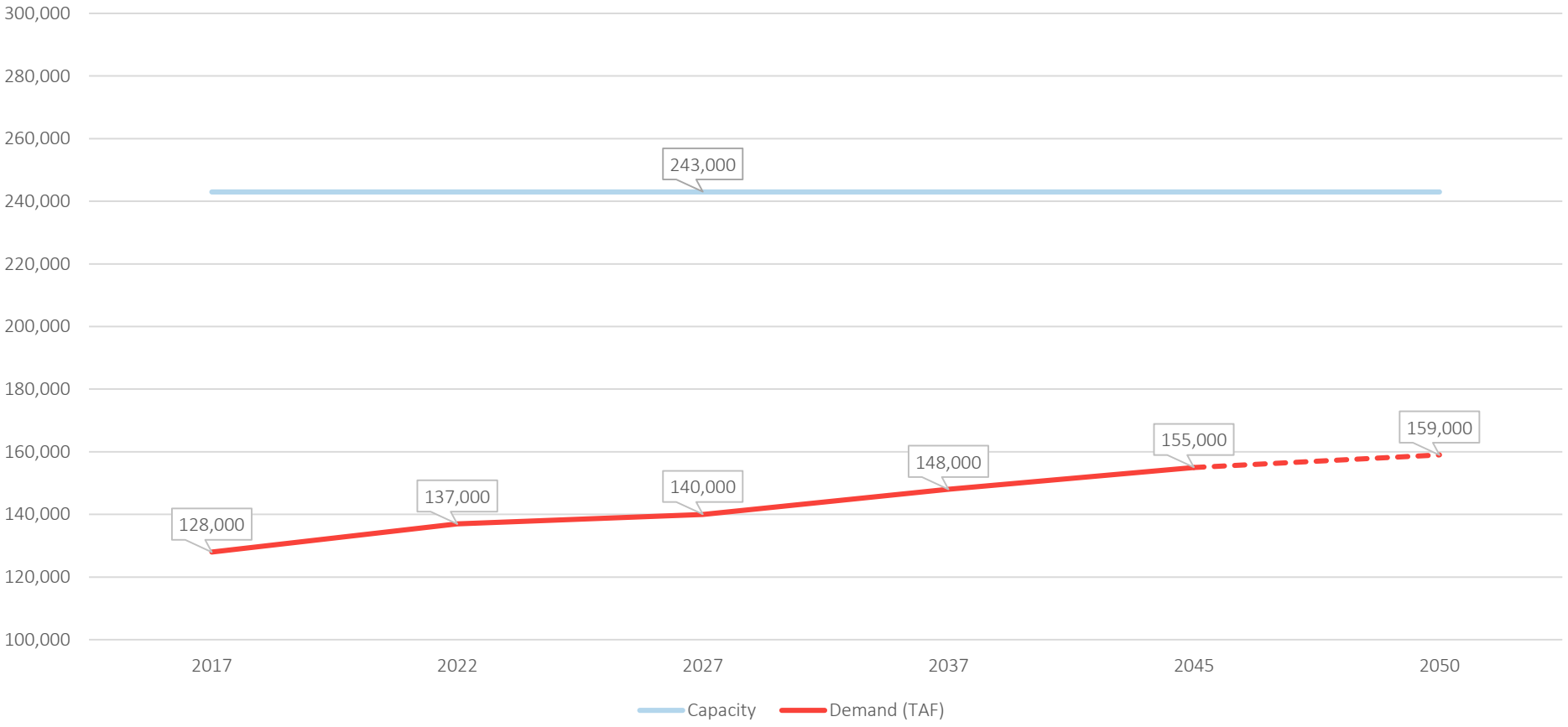
Annual demand/delay comparison (Sea-Tac)



438, 391 total aircraft operations in 2018

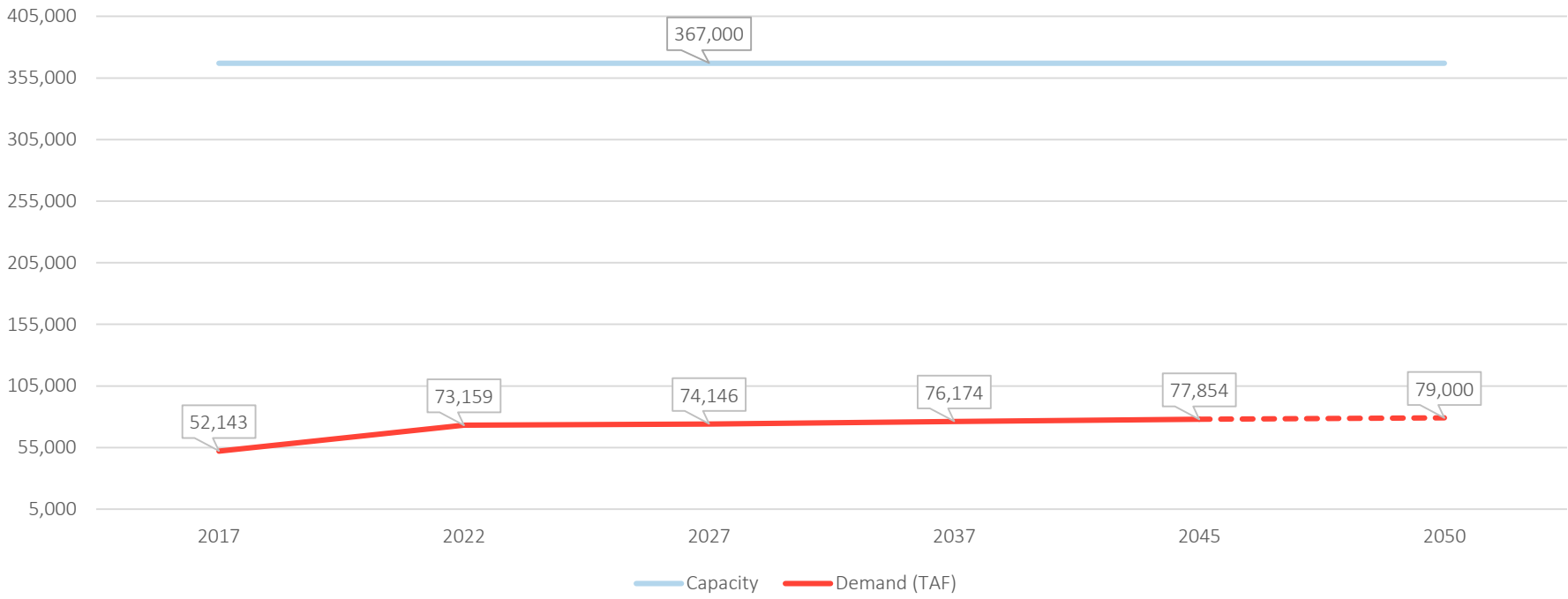
Capacity vs demand: Commercial service
Airside performance

Annual service volume runway demand and capacity (KCIA)



Capacity vs demand: Commercial service
Airside performance

Annual service volume demand and capacity (Paine Field)



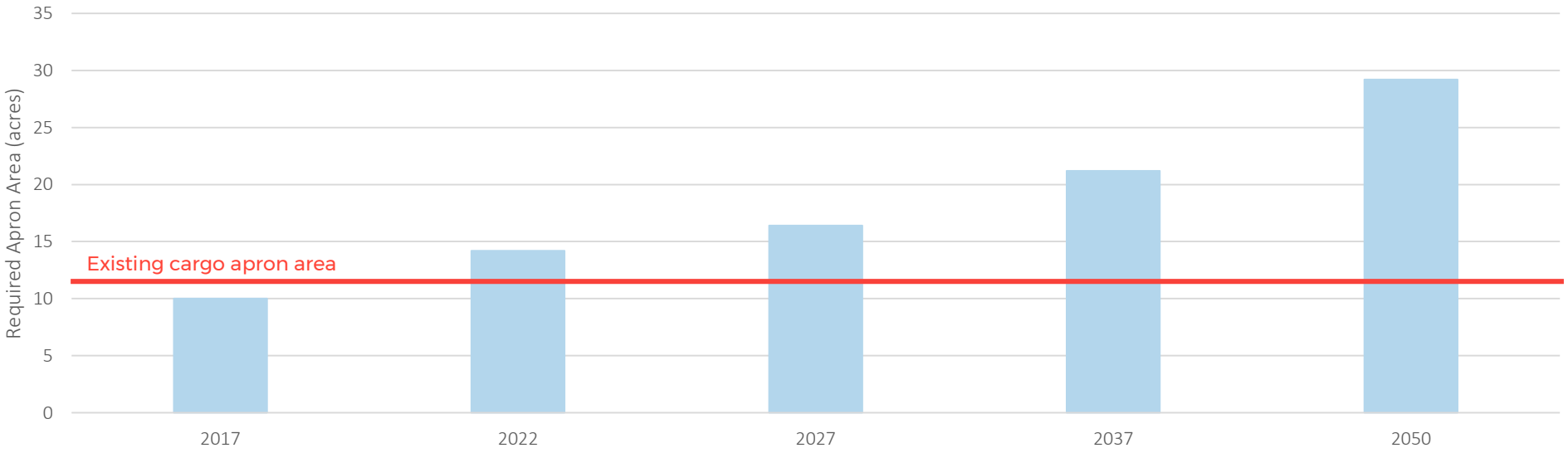
Capacity vs demand: Air cargo
Airside performance

Airside cargo needs analysis (KCIA)

	EXISTING CAPACITY	DEMAND				
		2017	2022	2027	2037	2050
Required Apron Area* (acres)	11.5**	10.0	14.2	16.4	21.2	29.2

* The required apron area was derived from the preferred air cargo activity forecasts presented in Chapter 6. The required apron (in acres) was obtained by applying ratios developed for the 2019 *Washington State Air Cargo Movement Study* of the Joint Transportation Committee of the Washington State Legislature based on the methodology of Airport Cooperative Research Program Report 143, Guidebook for Air Cargo Facility Planning and Development.
** Assessment based on Google Earth imagery.

Airside cargo capacity and demand (KCIA)



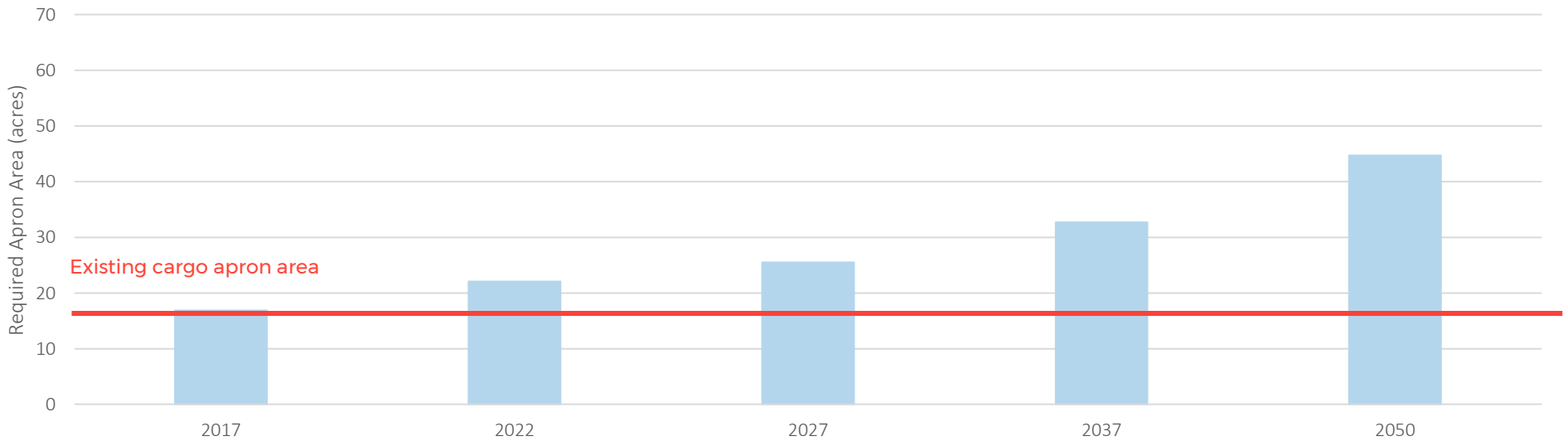
Capacity vs demand: Air cargo
Airside performance

Airside cargo needs analysis (Sea-Tac)

	EXISTING CAPACITY	DEMAND				
		2017	2022	2027	2037	2050
Required Apron Area* (acres)	17	16.9	22.1	25.5	32.7	44.7
Required Hardstands (per the SAMP)**	15	15	16	18	19	–

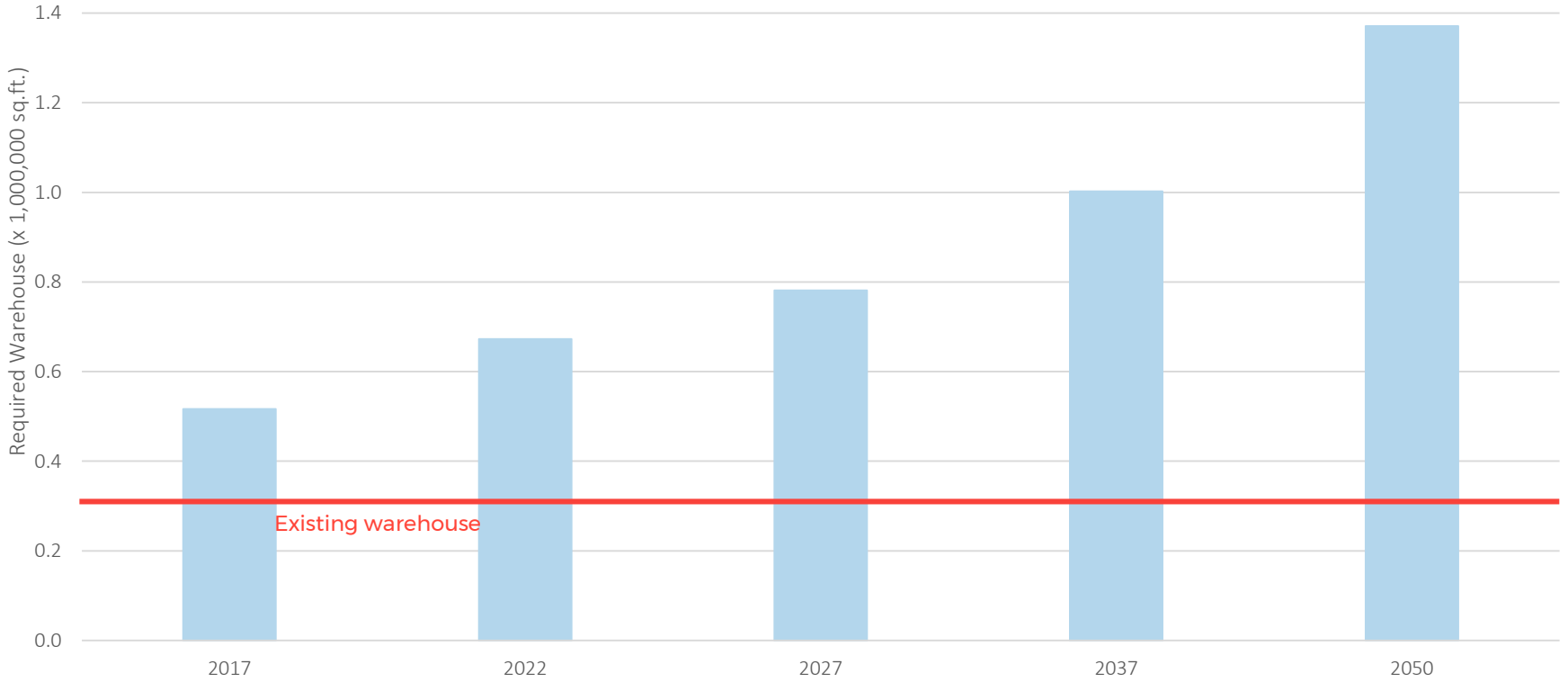
* The required apron area was derived from the preferred air cargo activity forecasts presented in Chapter 6. The required apron (in acres) was obtained by applying ratios developed for the 2019 *Washington State Air Cargo Movement Study* of the Joint Transportation Committee of the Washington State Legislature based on the methodology of Airport Cooperative Research Program Report 143, Guidebook for Air Cargo Facility Planning and Development.
** The required hardstands were extracted from the Sea-Tac Airport Master Plan (SAMP). It was verified that these numbers of stands were consistent with the required apron area.

Airside cargo capacity and demand (Sea-Tac)



Capacity vs demand: Air cargo
Landside performance

Landside cargo capacity and demand (Sea-Tac)

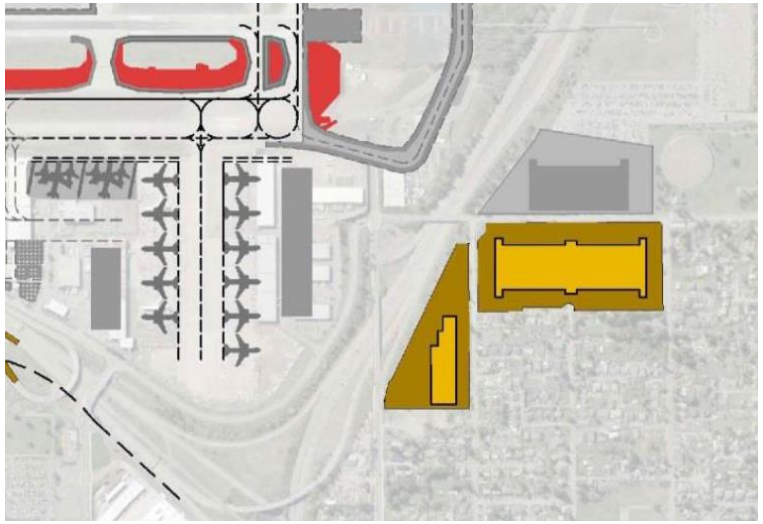


Challenges
Commercial service

- Lack of long-term coverage for western Snohomish and central Kitsap counties
- Sea-Tac does not have capacity to meet unconstrained 20-year forecast (SAMP's Near-Term Projects could accommodate about 28 million enplanements)
- KCIA has limited ability to expand
- Paine Field is currently limited to 600,000 annual enplanements

Challenges
Air cargo

- Limited on-airport cargo facilities at Sea-Tac (Near-Term Projects would add 420,000 SF of off-airport cargo warehousing)
- UPS serves KCIA, with limited ramp and landside space



Sea-Tac Near-Term Cargo Projects

KCIA Air Cargo Facilities and Pass. Terminal

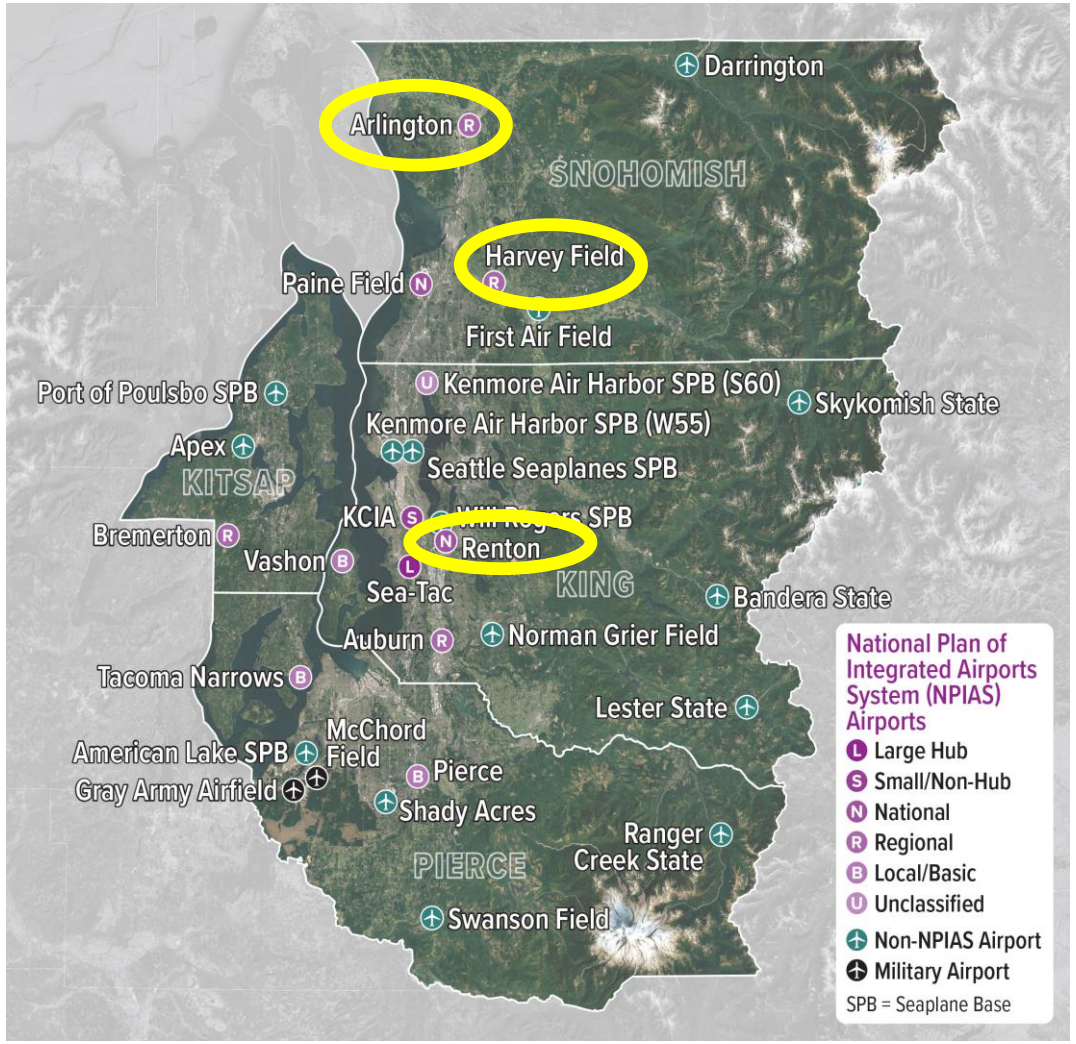
Challenges
General aviation

Airports approaching 80% airfield capacity by 2050:

— Arlington Municipal

— Harvey Field

— Renton Municipal



Opportunities
Commercial

- FAA's NextGen program will improve airspace and provide some additional airfield capacity
- Improved multimodal access at Sea-Tac and Paine Field

FAA Greener Skies Over Seattle

Required Navigation Performance (RNP) approaches

Sound Transit 3

Commercial Service Gap Analysis Summary

ASSESSMENT OF COMMERCIAL SERVICE PASSENGER NEEDS THROUGH 2050				
PS Central Region	Forecast of Passenger Enplanements			
	2017	2022	2027	2050
Passenge Enplanements (high forecast)	22,450,500	25,400,000	31,100,000	55,600,000
Source: WP#1, WSP				
Note: Low forecast for 2050 is 49,300,000 enplanements				
Based on unconstrained forecast				
PAE+Sea-Tac	Potential Passengers Accommodated			
	2017	2022	2027	2050
1-Constrained 2027 SAMP Near Term Projects Scenario[1,2]	23,050,000	25,655,000	28,600,000	28,600,000
2-Constrained SAMP Long Term Vision Scenario[1,3]	23,050,000	25,655,000	28,600,000	33,600,000
Source: SAMP 2016, PAE Supplemental EA, 2018				
PS Central Region	Gap (Demand-Supply)			
	2017	2022	2027	2050
1-Constrained 2027 SAMP Near Term Projects Scenario[1,2]	599,500	255,000	-2,500,000	-27,000,000
2-Constrained SAMP Long Term Vision Scenario[1,3]	599,500	255,000	-2,500,000	-22,000,000
Note: [1] Assumes PAE accommodates 600,000 annual enplanements, per Supplemental EA.				
[2] Based on Sea-Tac SAMP Near-Term Projects, accommodating up to 28 million annual enplaned passengers.				
[3] Based on Sea-Tac SAMP Long-Term Vision, possibly accommodating up to 33 million annual enplaned passengers.				

Opportunities

Air cargo

- Ability to make better use of space and facilities at Sea-Tac
- Develop air cargo facilities at Paine Field
- Use Grant County Moses Lake International Airport during cherry season
- Shift peak season traffic to Spokane International Airport
- Develop non-urban airports as ground-based logistics/distribution centers
- Build multi-story logistics facilities
- Create a regional cargo community system
- Autonomous aircraft won't need long runways

Opportunities
Air cargo

Regional cargo community system

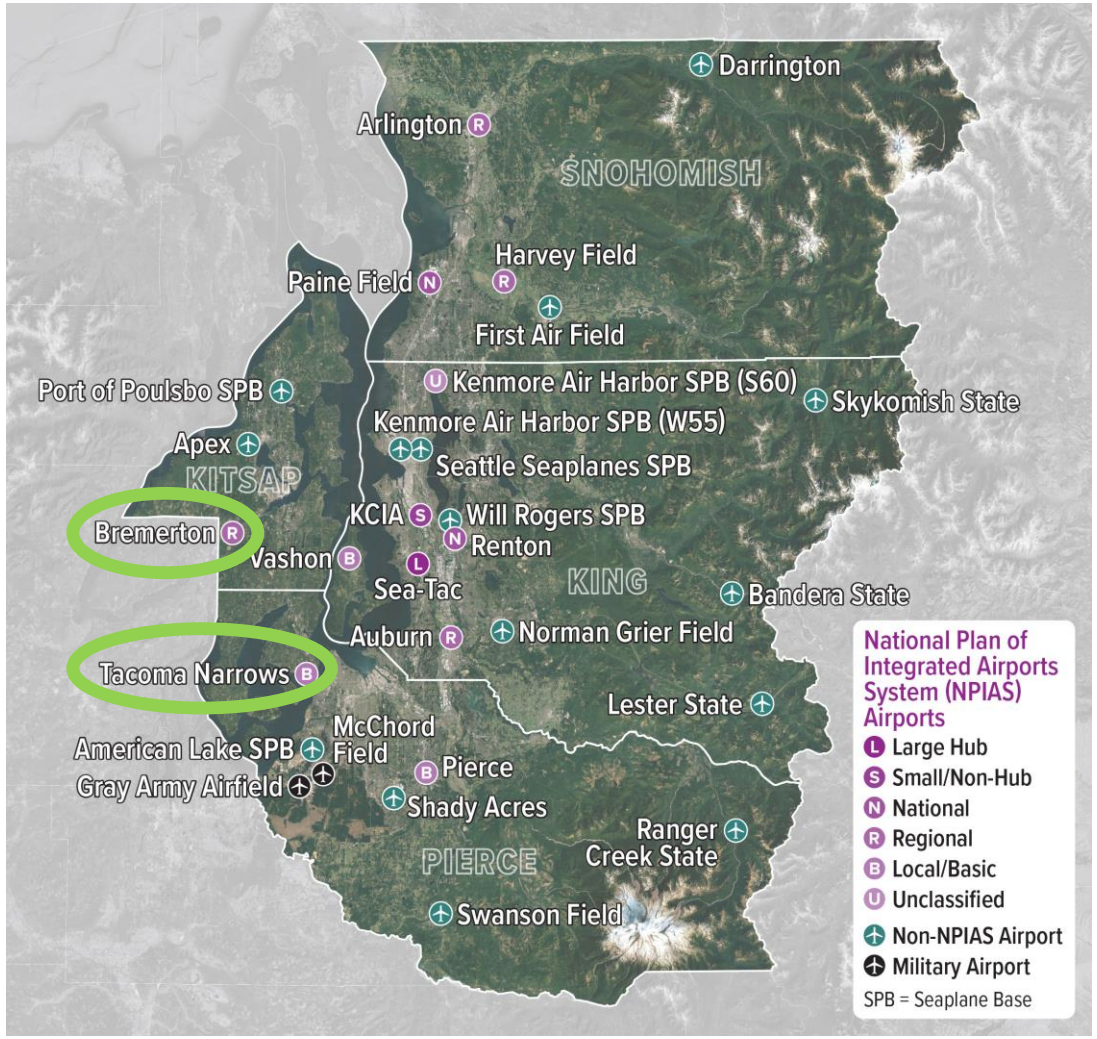
— Neutral and open electronic platform

— Enables intelligent and secure information exchange between public (Port of Seattle) and private stakeholders (airlines, forwarders, warehouse operators, trucking companies)

— Improves the competitive position of the central Puget Sound region as a global logistics hub

Opportunities
General aviation

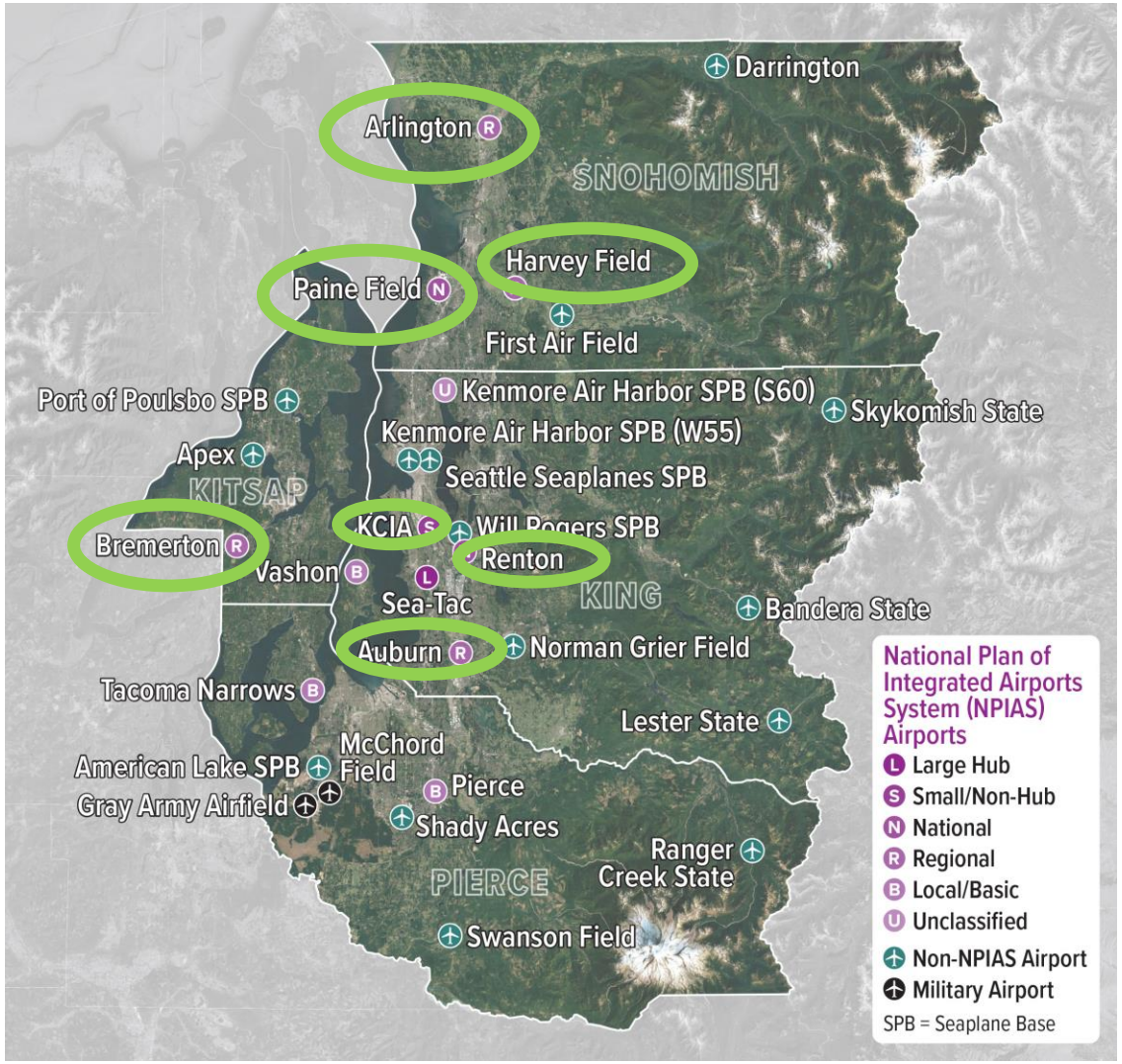
- Airports with potential to provide additional capacity:
  - *Bremerton National*
  - *Tacoma Narrows*



Opportunities
General aviation

Airports with existing runway length, adequate access to highways, and some available space:

- Arlington
- KCIA
- Paine Field
- Bremerton
- Renton
- Harvey Field
- Auburn



Discussion

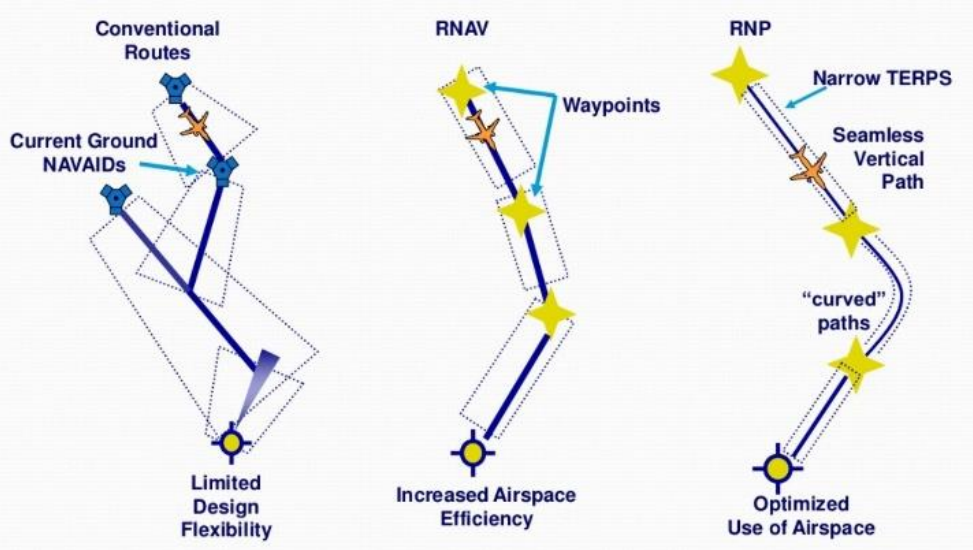
- Does the study accurately represent needs?
- Are there any additional opportunities we should study?
- Are there any additional challenges we should study?

Regional airspace analysis

- Introduction
- Background on the National Airspace and NextGen
- Airports within the PSRC airspace study area
- Existing conditions
  - *Airspaces*
  - *Flight procedures*
  - *Military*
- Constraints
  - *Constraining factors*
  - *Current constraints*

Background on the National Airspace and NextGen

The FAA continuously modernizes the National Airspace System (NAS)



- NAS is the airspace, navigation facilities and airports of the US along with their associated information, services, rules, regulations, policies, procedures, personnel and equipment
- This study focuses on airspaces, flight procedures and surveillance within the Puget Sound Region

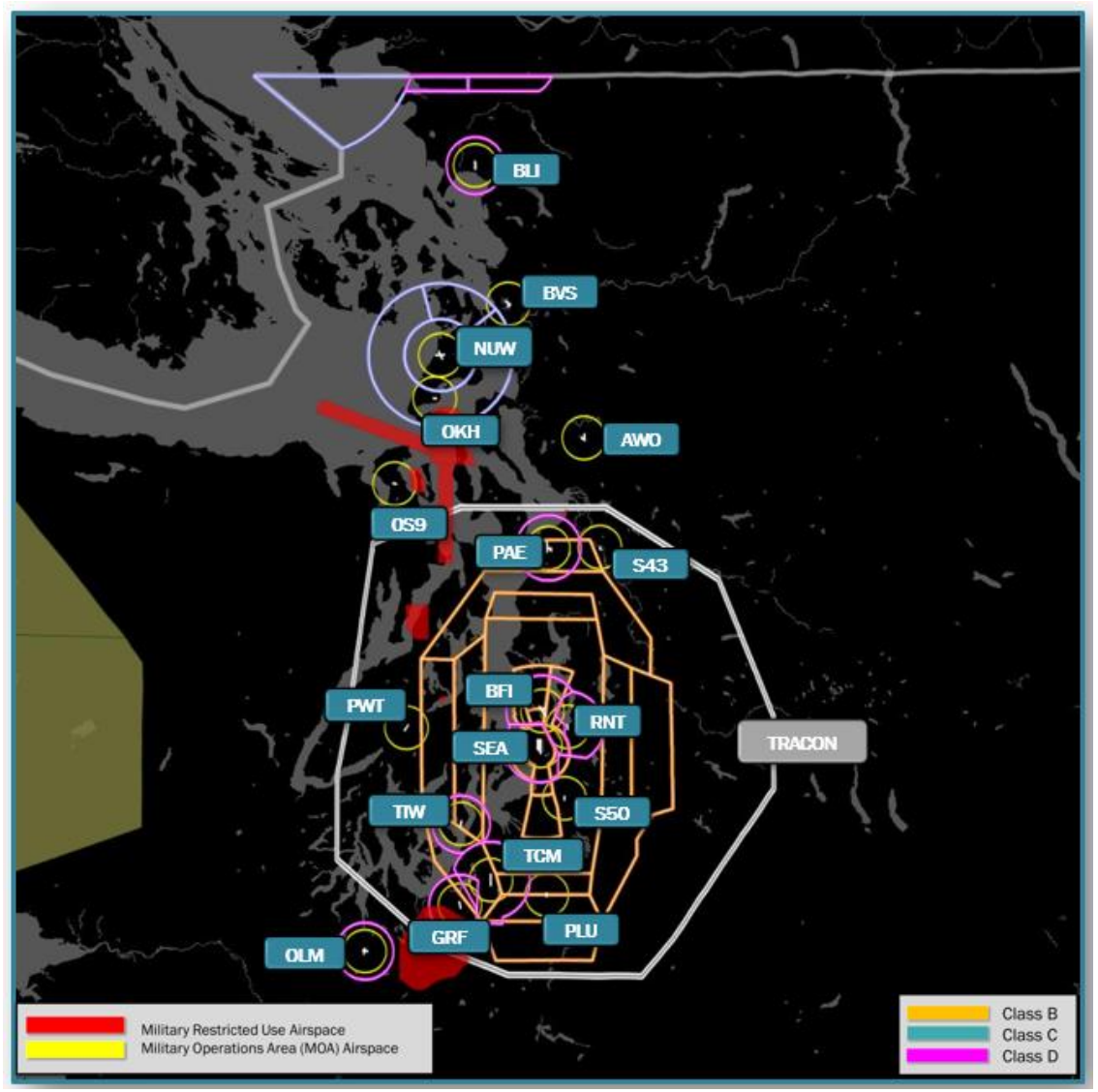
NAS modernization is called NextGen

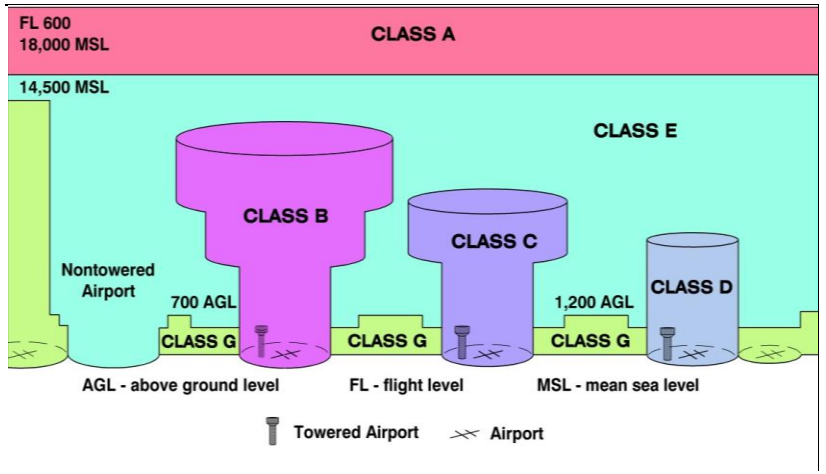
- NextGen makes flying safer, more efficient and more predictable
- It includes planning and implementation of new technologies and procedures

Airports within airspace study

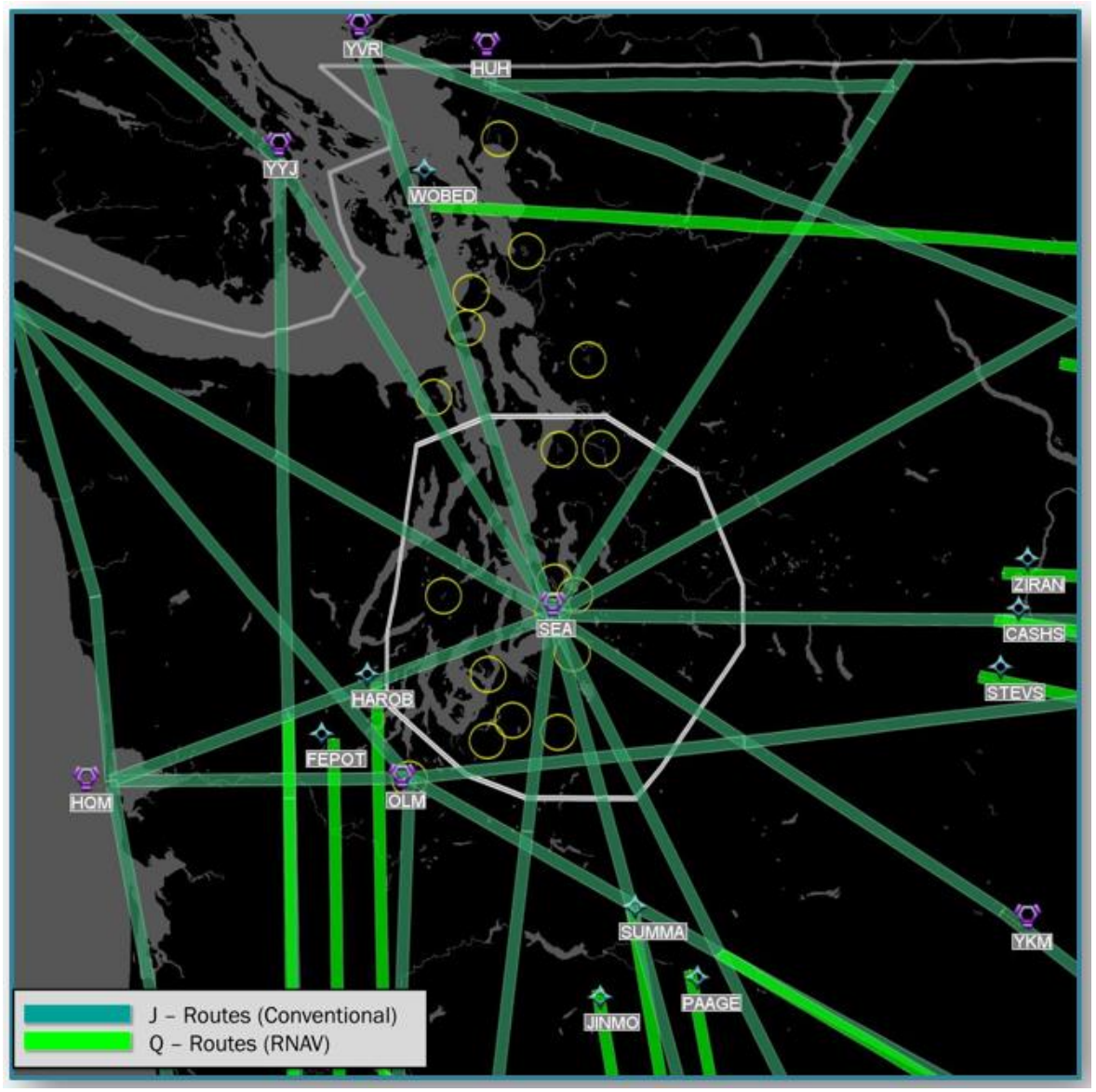
AWO = Arlington Municipal Airport
BFI = King County International/Boeing Field
BLI = Bellingham International Airport
BVS = Skagit Regional Airport
GRF = Gray Army Airfield (Joint Base Lewis-McChord)
NUW = Whidbey Island Naval Air Station (Ault Field)
OKH = AJ Eisenberg Airport
OLM = Olympia Regional Airport
PAE = Paine Field/Snohomish County International
PLU = Pierce County Airport
PWT = Bremerton National Airport
RNT = Renton Municipal Airport
S43 = Harvey Field Airport
S50 = Auburn Municipal Airport
SEA = Seattle-Tacoma International
TCM = McChord Field Airport (Joint Base Lewis-McChord)
TIW = Tacoma Narrows Airport
0S9 = Jefferson County Airport

Airspaces within project study

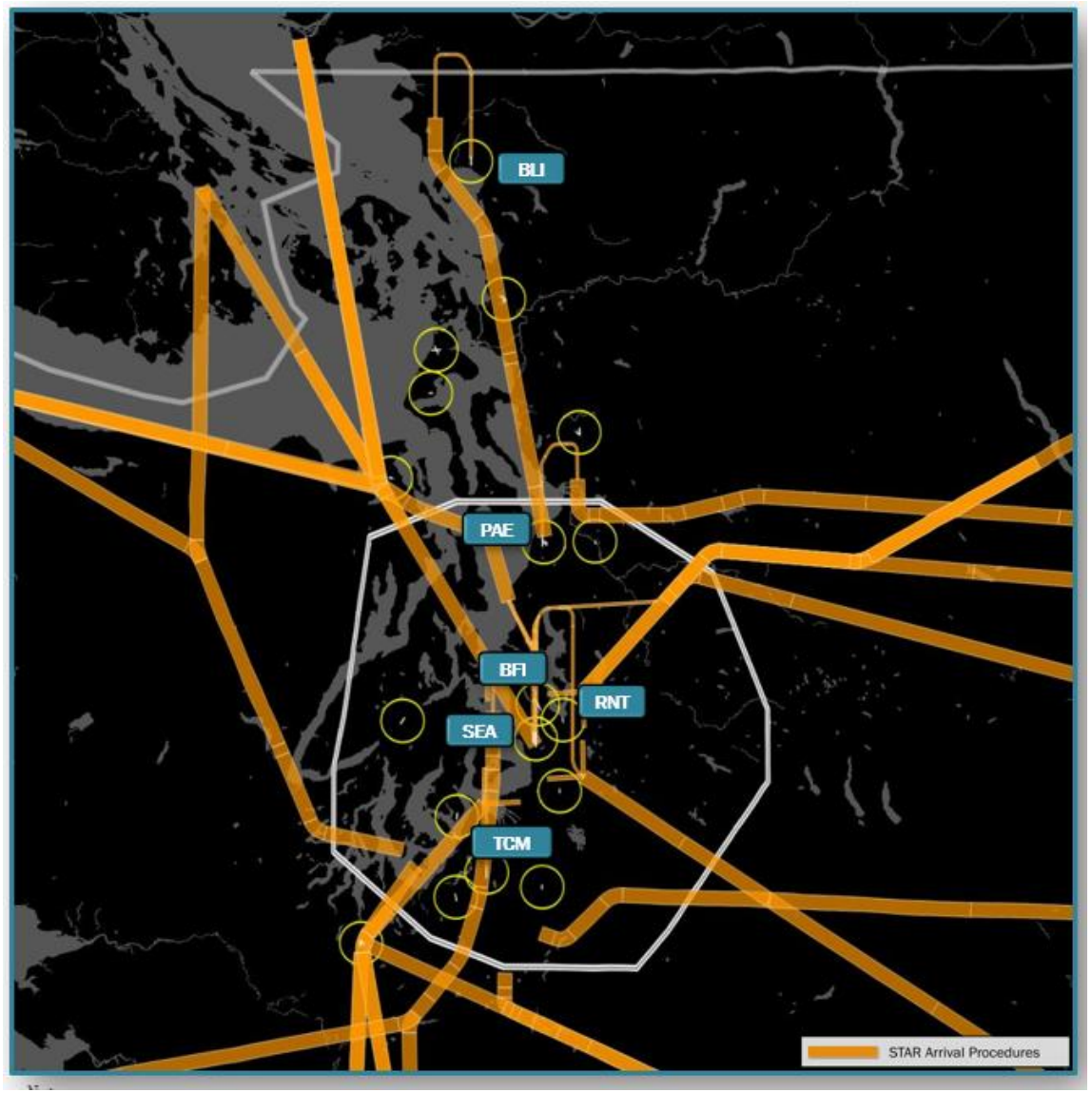




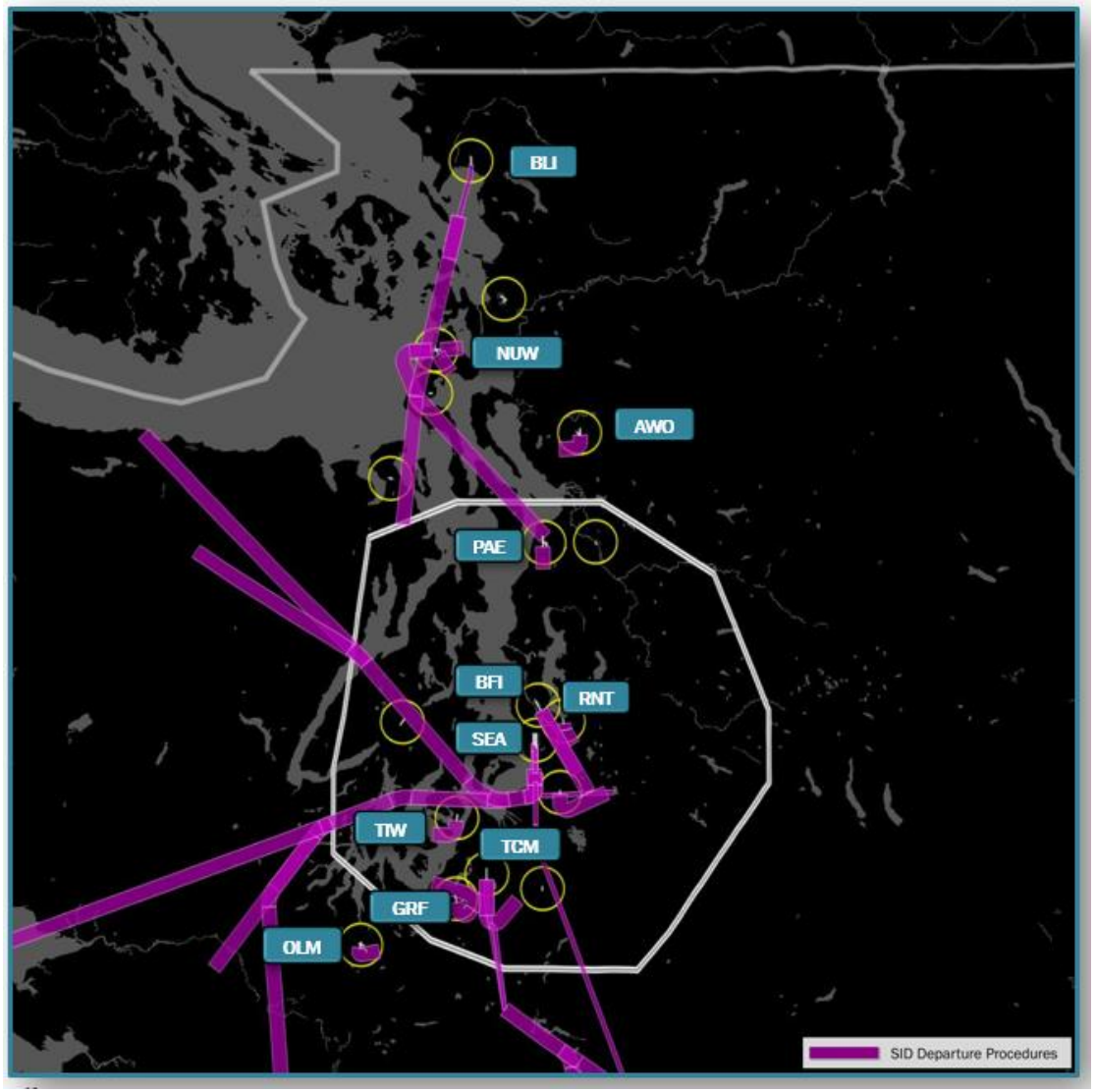
Enroute procedures



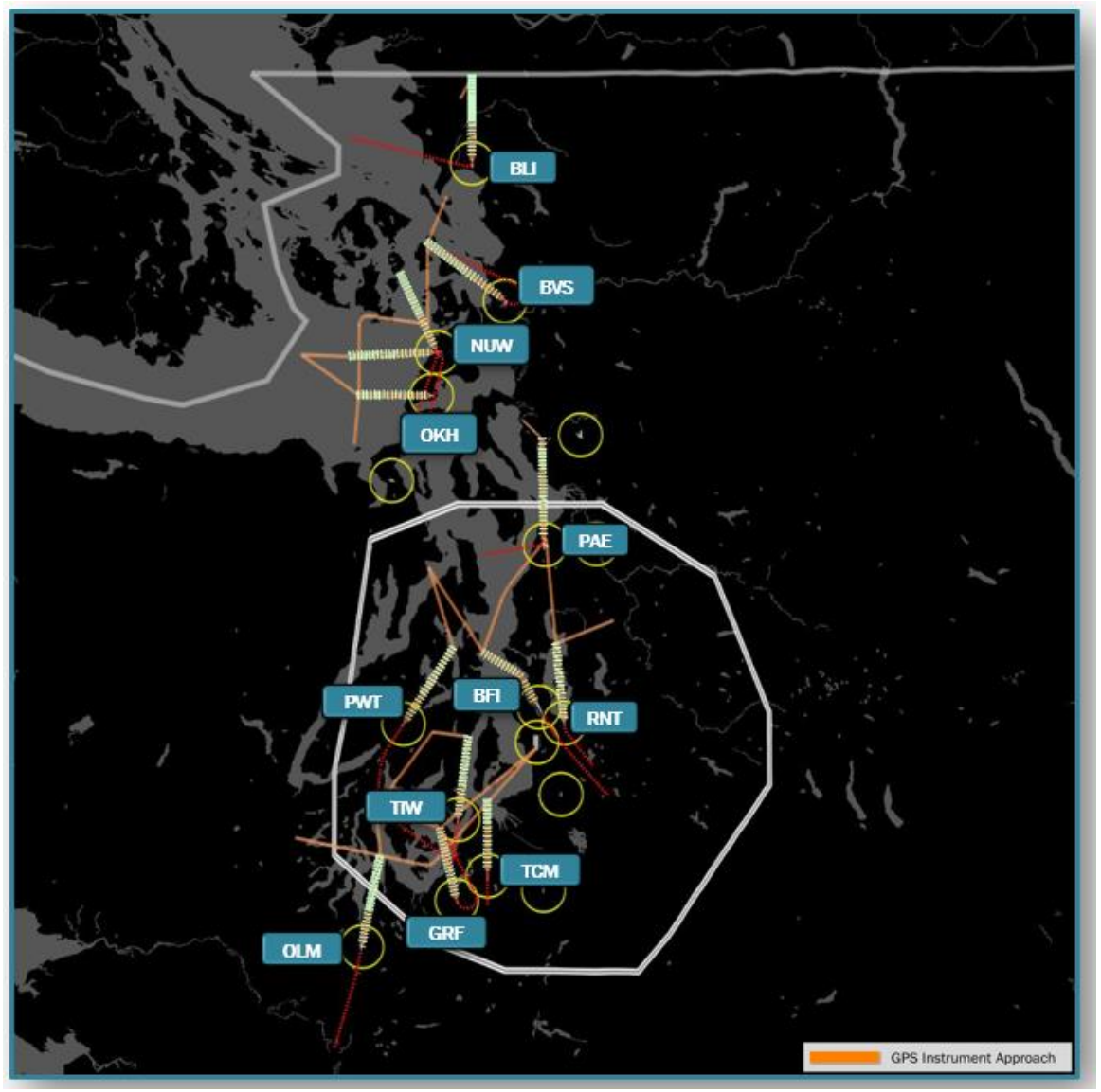
Existing STARs for airports within airspace study



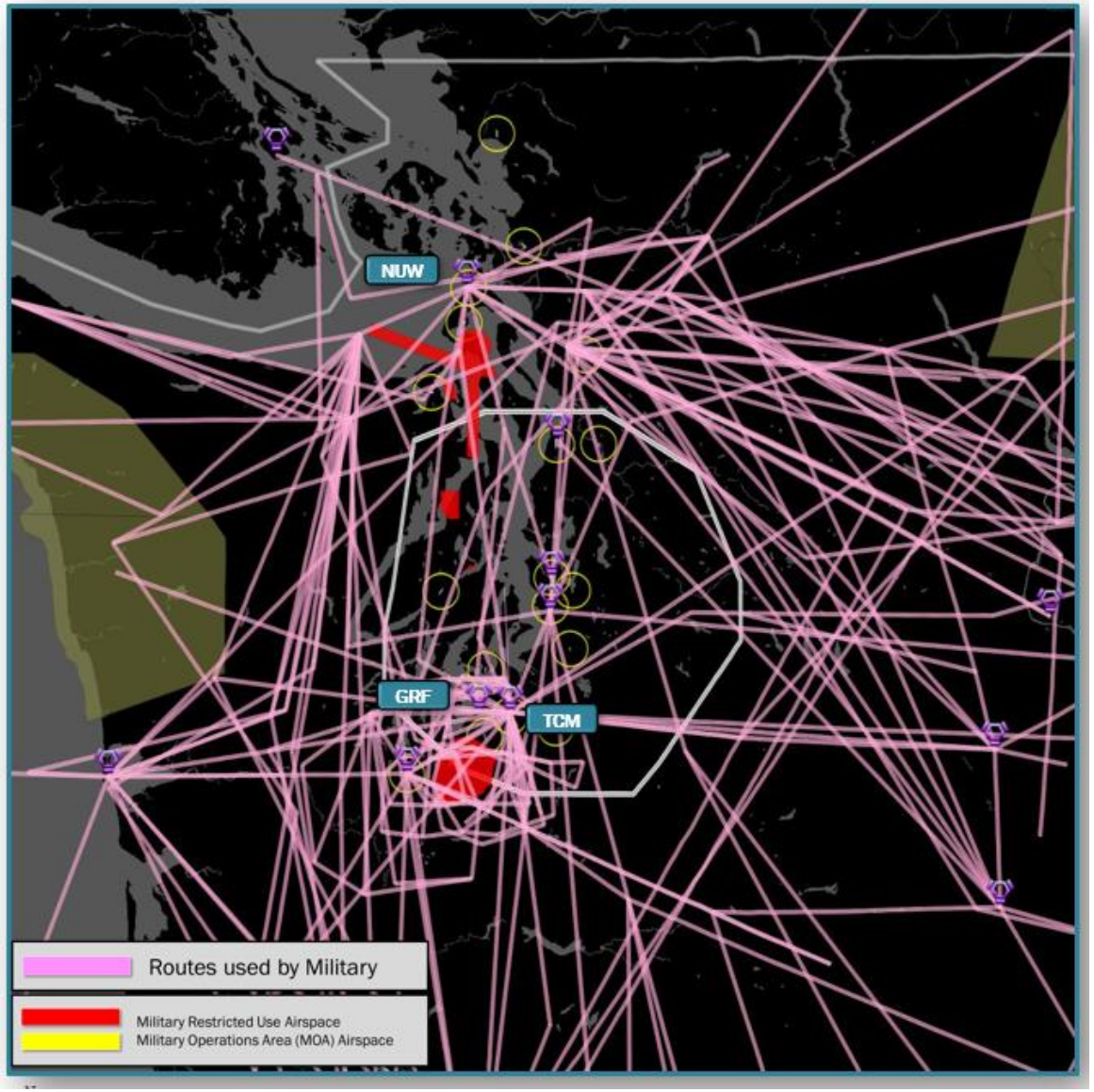
Existing SIDs for airports within airspace study



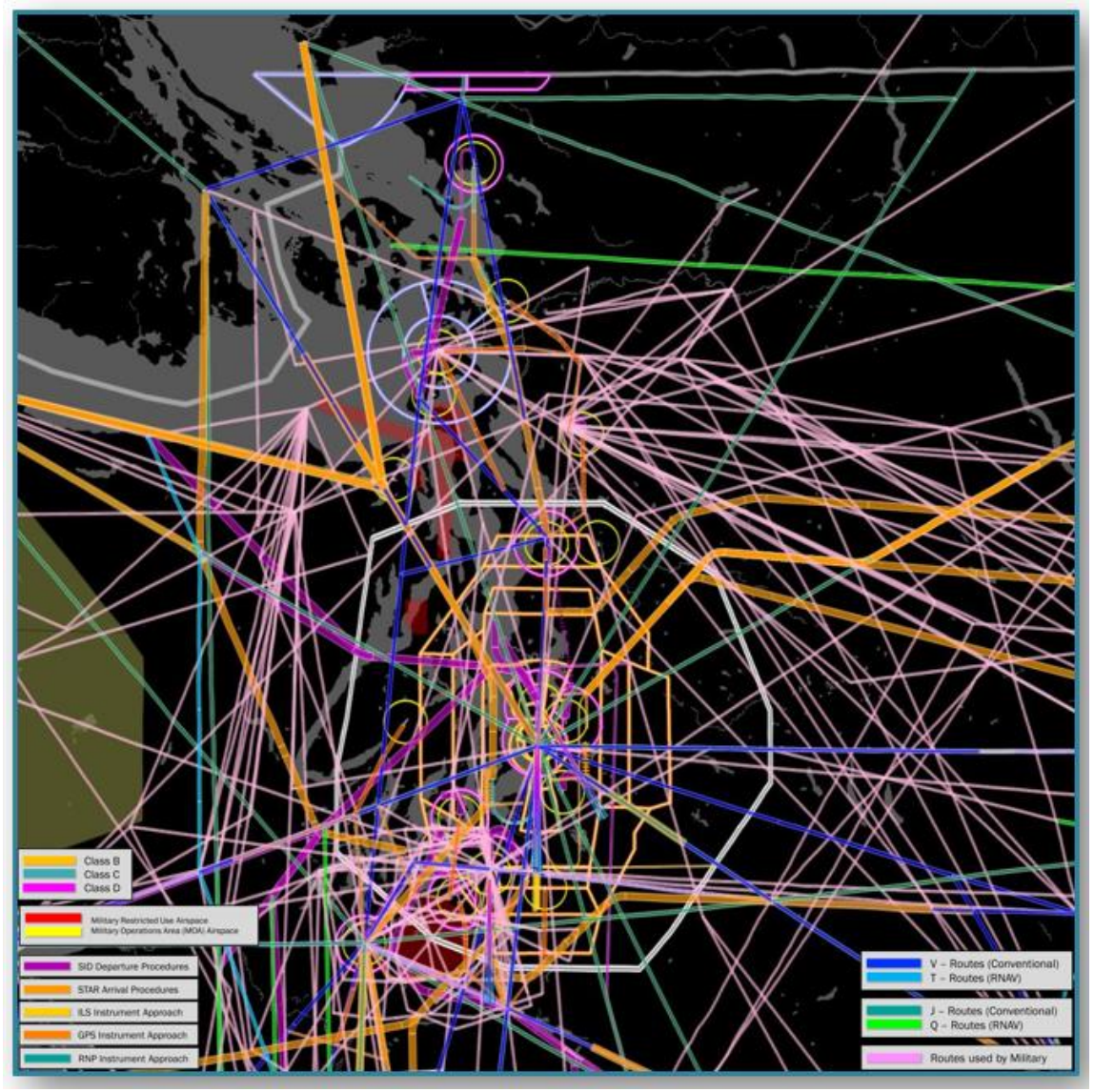
Existing IAPs for airports within study area



Military

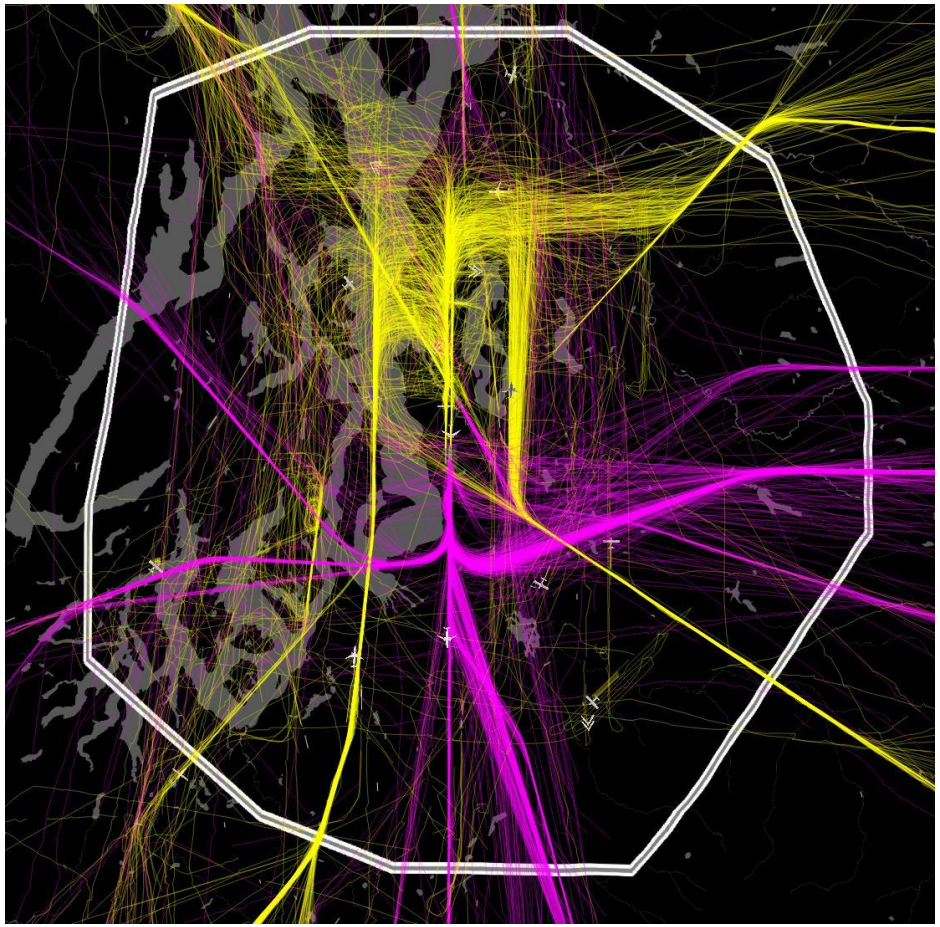

NUW
GRF
TCM
Routes used by Military
Military Restricted Use Airspace
Military Operations Area (MOA) Airspace

Combined airspace and flight procedures

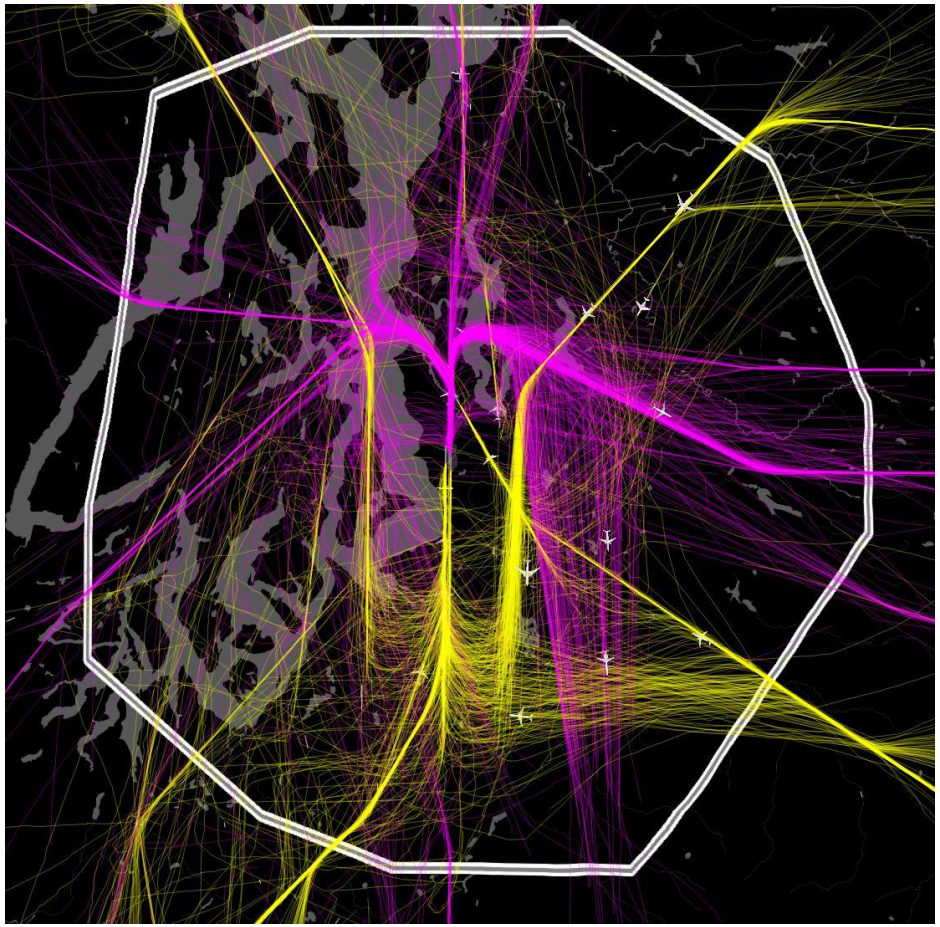


Regional airspace analysis

South flow

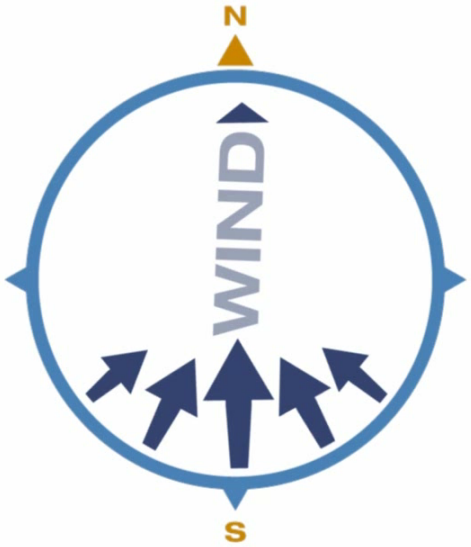


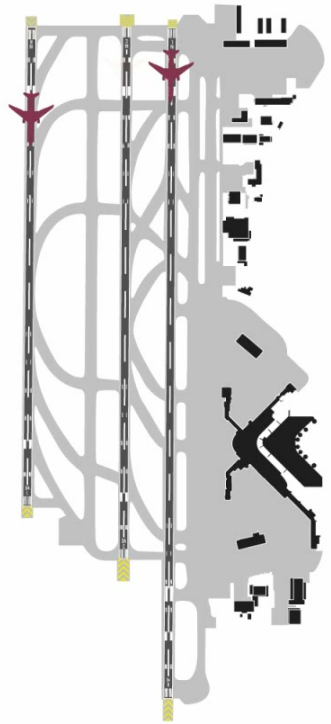
North flow



South flow operations

SEA

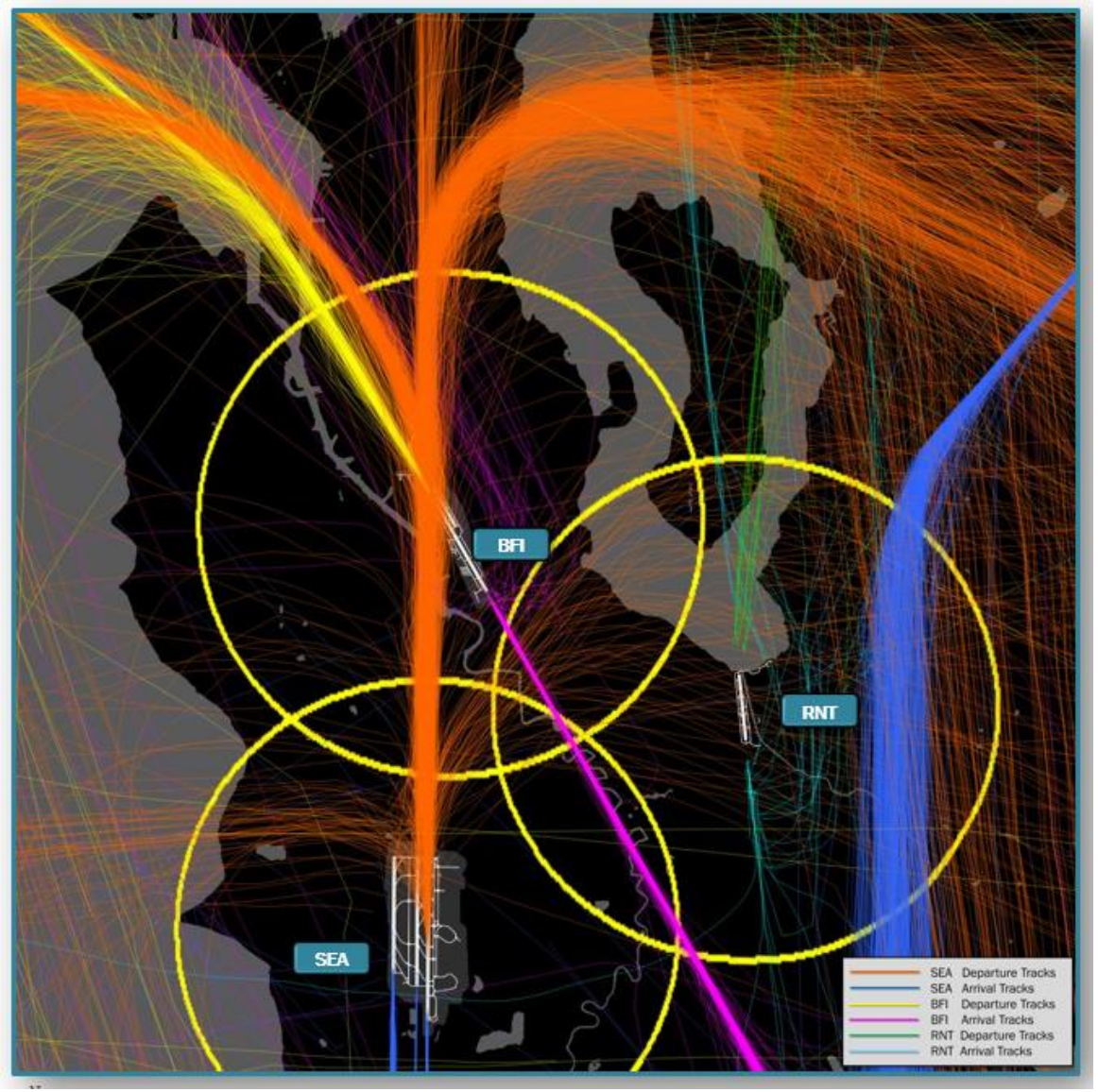




Airspace constraints

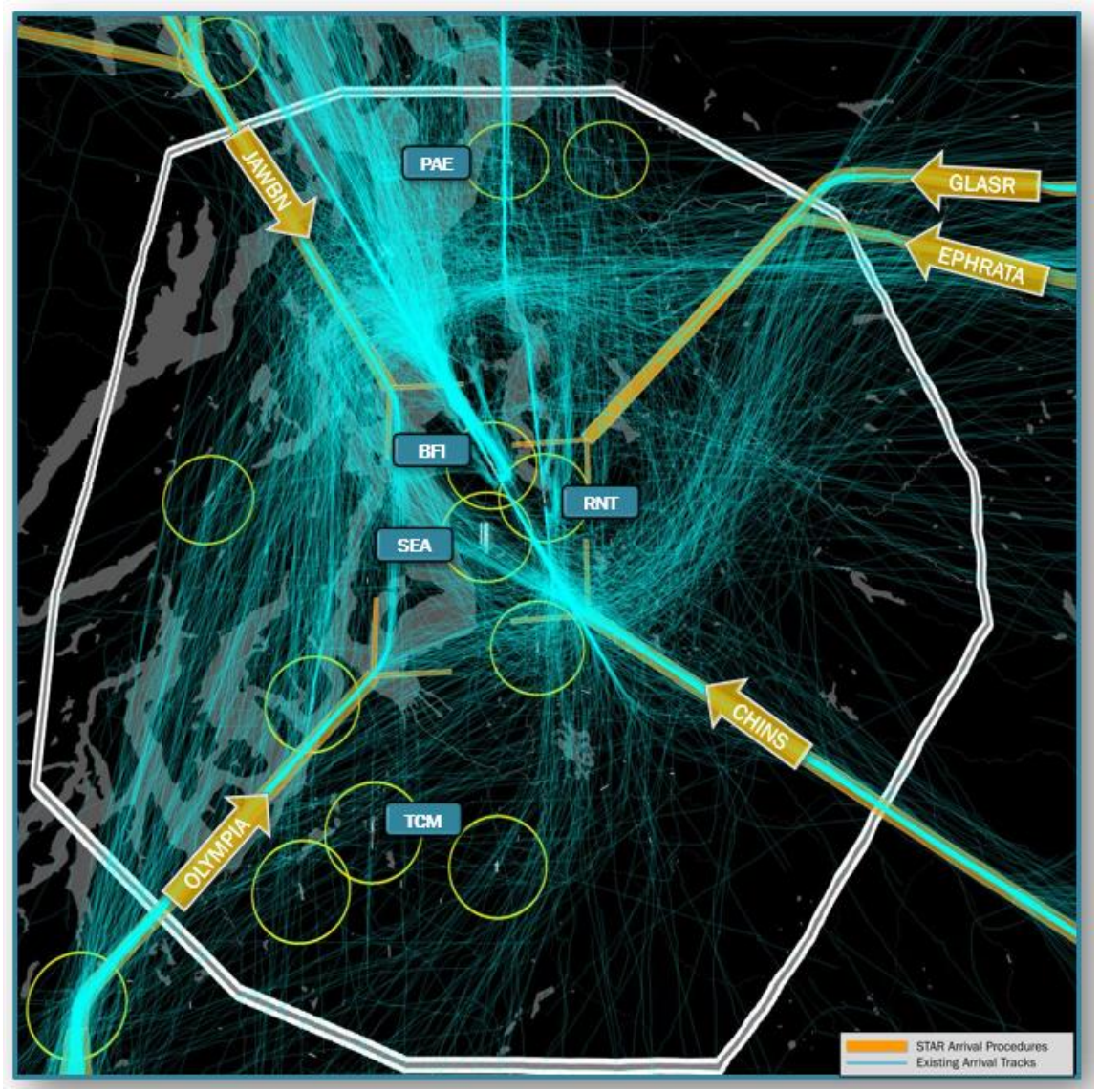
- Terrain
- Proximity to other airports
- Historic noise abatement
- Poor weather access
- Mixed weather
- Airfield limitations
- Existing traffic flow patterns
- Restricted use areas
- Traffic origin/destinations
- Sea-Tac
- Air traffic procedures and complexities

Examples of existing constraints



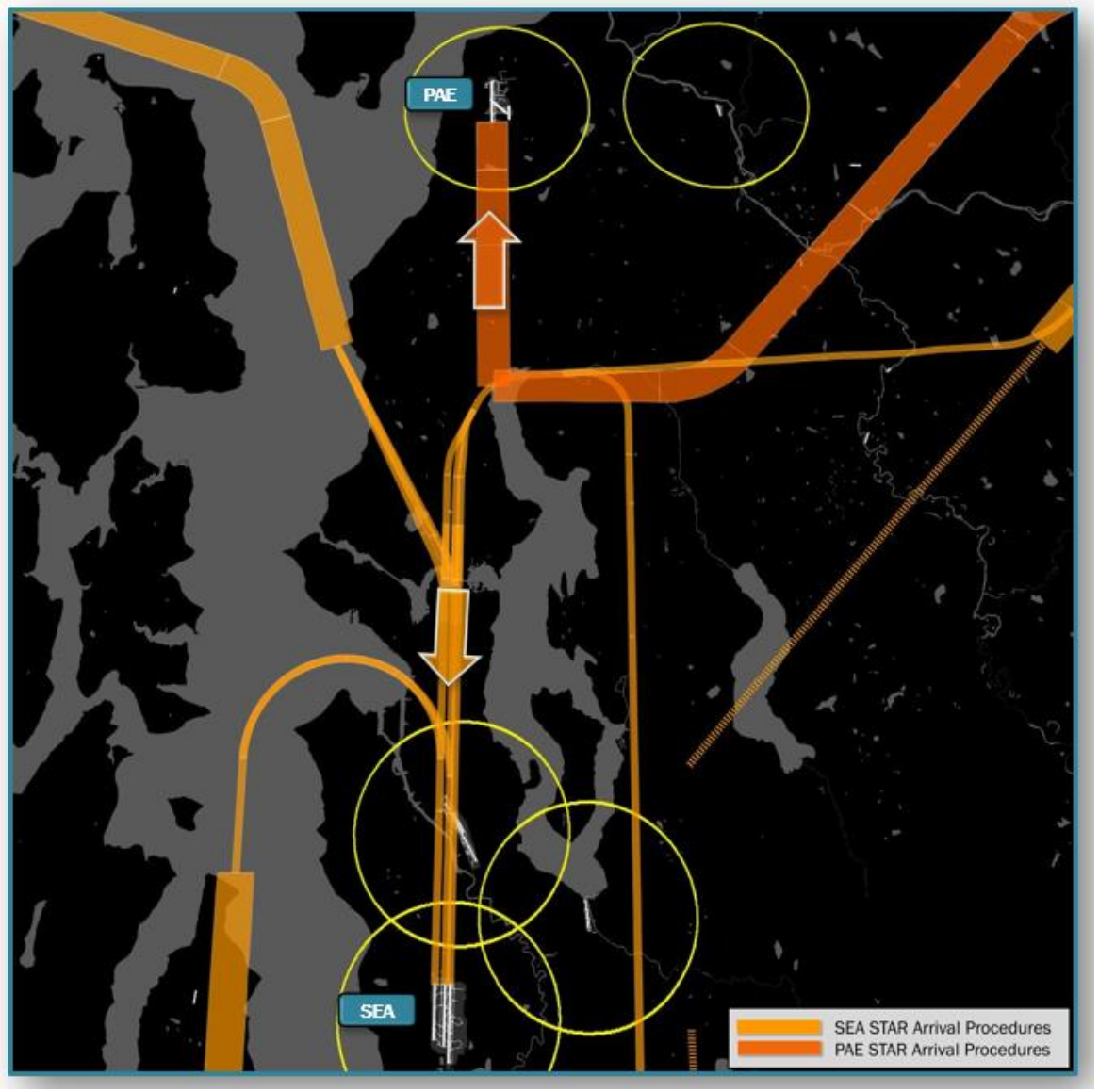
Airports in close proximity

Examples of existing constraints



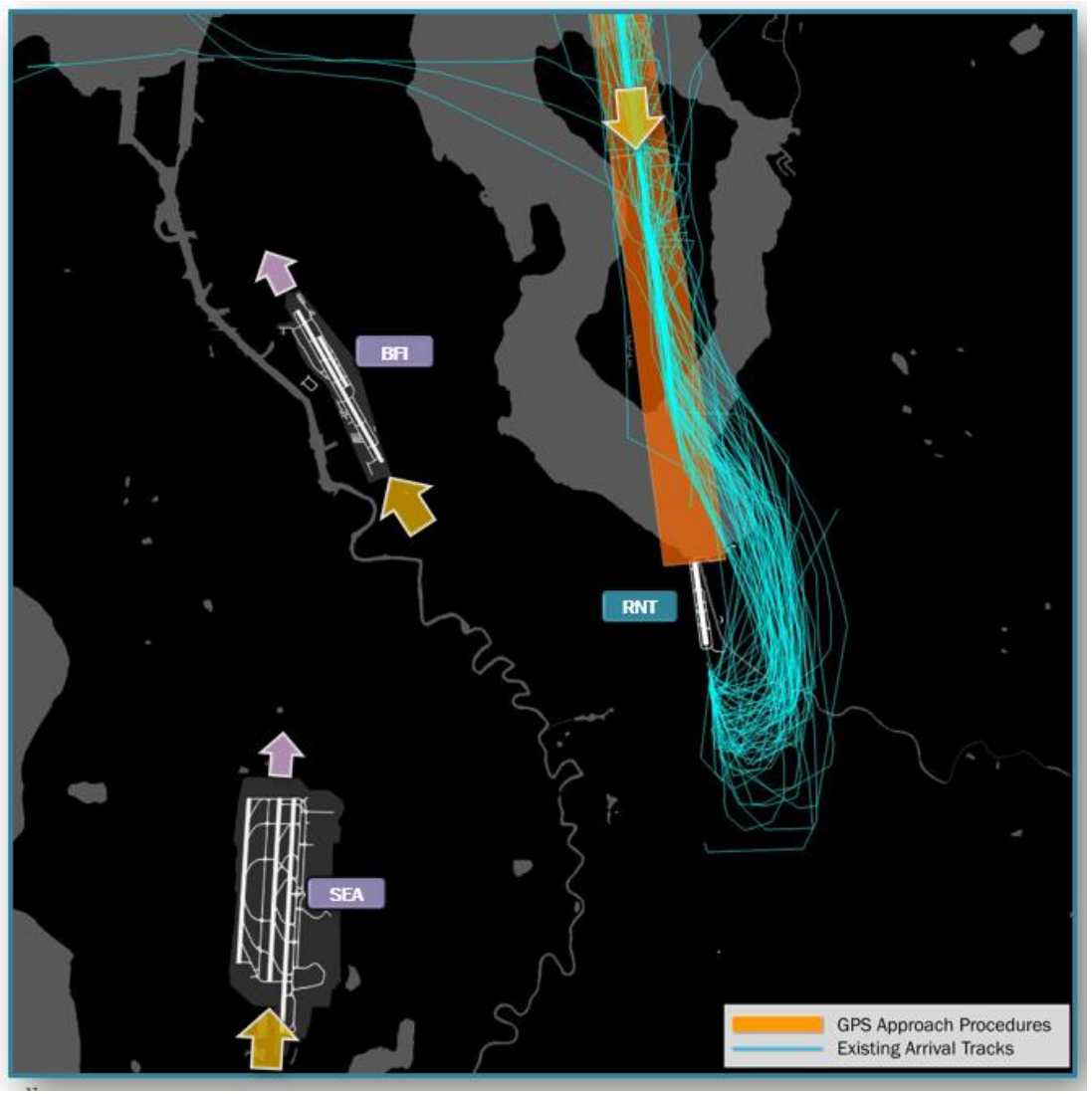
Shared use of STAR procedures

Examples of existing constraints



Mixed flow airspace

Examples of existing constraints



Access in north flow during poor weather conditions

Discussion

- AIRSPACE ANALYSIS DISCUSSION

Next Steps

— WP#1 comments due by October 17

— Define scenarios (Fall 2019/Winter 2020)

— Survey and focus groups (Fall 2019 – Spring 2020)

— Present Working Paper #3 (March 2020)

— Regional public meetings and online open house (Spring 2020)

Wrap up

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