Forecast Best Practices and Data Tools

Presented to: National Consultant Workshop

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Federal Aviation Administration

Current State of Forecast Guidance

- Spread over multiple documents.
- Outdated.
- It has led to “bad habits” in preparation of forecasts.
- Tells sponsors how to prepare a forecast, but not instruct FAA staff how to **review** the forecast.

Quiz #1

- **What is our Forecast Objective?**
  a) Hope as a strategy
  b) Objective evaluation of realistic aeronautical needs – This is the right answer
  c) Air service development goals
  d) Decide on outcome, then plot the data
  e) Build it and they will come

Quiz #1 - Answer

- **What is our Forecast Objective?**

  b) **Objective evaluation of realistic aeronautical needs – This is the right answer**

Is the Forecast Reasonable or is the Forecast Realistic?

… Looking for *realistic*

Issuance of Forecast Review and Approval Instructions

- **Replaces and cancels the Review and Approval of Aviation Forecasts (June 2008) and the Forecast Review and Approval During the COVID 19 Public Health Emergency (October 2020);**
- **Applicable to forecasts used for:**
  - Planning Studies;
  - Part 150 noise compatibility planning;
  - Project justification.
  - NEPA reviews;
  - Benefit-cost analyses (BCA);
- **Will be incorporated into Master Plan AC Change 3.**
- **If a forecast is to be used in FAA decision making, it must be approved.**

What the Instruction's Cover?

- Clarifies scenario development expectations.
  - Baseline vs Conceptual Scenarios, and Constrained Scenarios
- Criteria for review and approval
  - Two swim lanes: towered, non-towered airports.
  - Headquarters review of forecasts.
  - Forecast approval letters.
- Streamlining for non-towered/low activity airports.
- When acceptable to use the TAF Instead of Sponsor-prepared Forecast
- Validation of previously approved forecasts.

Forecast Scenarios

Baseline Scenario

- Operative scenario and outcome most likely to occur at the airport through 10 years
- **Normally** Unconstrained
- Aligns with the determination of the future critical aircraft that is “highly likely” or “expected” to regularly use the airport.
- Uses typical forecasting methodologies (e.g., regression, trend, and share analysis)

FAA Approval

Forecast Scenarios (Continued 1)

Conceptual Scenario

- Aspirational
- Air Service Development
- New Route(s)
- New Industry

*Not Approved, but OK for '**what if' planning***

Forecast Scenarios (Continued 2)

Constrained Scenario

- Hard constraints:
  - Turns per gate
  - Hourly runway capacity (not ASV)

FAA Approval

Forecasts at Non-Towered/Low Activity Airports

- **At many smaller GA airports with less than 90,000 annual operations, the development of a traditional planning forecast is not necessary.**
- **Option: streamline to focus on analysis of the existing critical aircraft by runway and then the likely future critical aircraft by runway.**
- **The airport sponsor may simply state:**

  "Current operations at the airport are less than 90,000 operations annually, and not expected to exceed 90,000 operations in the foreseeable future. Therefore, preparation of a detailed forecast is not warranted. Instead, the analysis will identify the existing critical aircraft, by runway, and if there is any expected change to the future critical aircraft in the foreseeable future."

- **Such forecasts no longer need a TAF comparison.**

Criteria for Forecast Review and Approval

- Near and mid-term forecasts for towered airports differ from the current TAF by less than 10 percent in the 5-year period and 15 percent in the 10-year period.
- Near and mid-term forecasts for non-towered airports differ from the current FAA Aerospace Forecast growth rates by less than 10 percent in the 5-year period and 15 percent in the 10-year period.

Criteria for Forecast Review and Approval (Continued)

- Forecasts are:
  - Realistic
  - Based on the latest available data; supported by information in the study
  - Reflect the current conditions at the airport
  - Sufficient to assess if there is adequate justification for development?

Criteria for Forecast Review and Approval (Continued 1)

- Current data and realistic fleet projections are used to identify the **existing and future critical aircraft**, by runway, per AC 150/5000-17.
- The forecast includes specific calculations related to uncertainty, as well as conceptual scenarios if warranted, and applies lessons learned from the prior forecast.

Criteria for Forecast Review and Approval (Continued 2)

- Inclusion of new entrant aircraft operators or aircraft types, including new routes, in the baseline scenario are **supported by credible letters of firm interest** by the aircraft operator(s).
- ADO may "**accept for planning purposes**" the long-term forecast covering years 11-20 years as is useful to assess and preserve options for future facility needs, if predicted annual growth rates are within 0.5% of the TAF's long-term growth rates for that airport.

Headquarters Review of Forecast

- **Prior to approval, ADOs must send forecasts to APP-400 for HQ review when/if:**
  - Large and medium hub airports;
  - New or replacement airports;
  - Incorporate constrained operations;
  - To be used in an EIS and/or BCA;
  - To be used in an EA for a new airport, for a new runway to accommodate air carrier aircraft at a commercial service airport in an MSA and for a major runway extension.
  - Forecasts not consistent with the TAF

Headquarters Review of Forecast (Continued)

- **Then: APP-400 will review the forecast and coordinate with APO-110 if required**

Can the ADO approve a forecast that exceeds the TAF, without HQ concurrence?

No

Validation of Previously Approved Forecasts

- Decisions to proceed with environmental review, AIP funding, or PFC approval are based on actual activity as the primary reference at the time proposed development is ripe for those decisions, rather than broad reliance on the forecast.
- The forecast may still be used to inform project justification if actual activity levels and critical aircraft are consistent with forecast trends. So, if previously approved forecasts are to be used to support proposed development, validation is essential to ensure they remain realistic.

Validation of Previously Approved Forecasts
(Continued)

- The purpose of the forecast reviews is to validate if it continues to be realistic for FAA decision making?
  - Critical Aircraft still the same?
  - Or did the predicted change in Critical Aircraft actually happen?
  - Scale and timing of project still justified?
  - Consistent with the current published TAF?
  - When applicable -- what has recovery been following past shock events?

Quiz #2 – True or False

a) We can predict the future
b) Except we can predict the future of airport demand
c) Sponsor forecasts are more accurate than the TAF
d) Long-term performance of airport forecasts is solid
e) Once approved, don't look back, forecast is good for at least 5 years
f) Forecasting is my favorite part of planning

Quiz #2 – Answers

a) We can predict the future. **False**

b) Except we can predict the future of airport demand. **False**

c) Sponsor forecasts are more accurate than the TAF. **False**

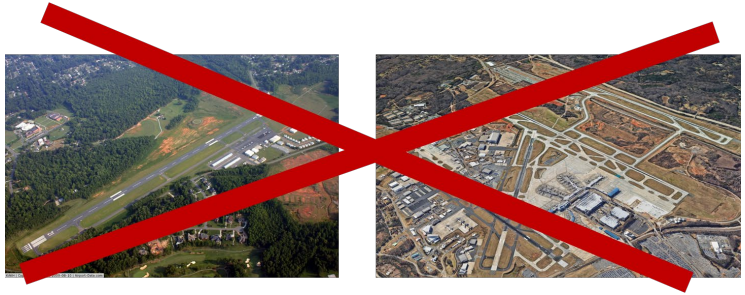
d) Long-term performance of airport forecasts is solid. **False**

e) Once approved, don't look back, forecast is good for at least 5 years. **False**

f) Forecasting is my favorite part of planning. **False**

Data Tools

Airport Centric:
Towered vs. Non-Towered Airports



- **Non-towered airport**
- Mostly VFR operations
- Itinerant jet and turboprop operations are ADS-B equipped but piston equipage can vary

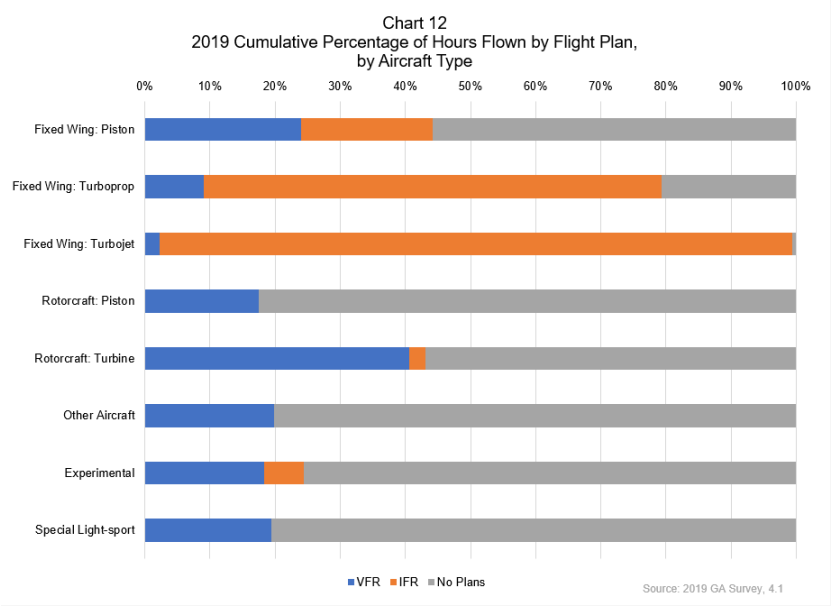
- **Towered airport**
- Mostly IFR operations/flight plans
- Nearly all operations in TFMSC
- ADS-B required by aircraft operating in “rule airspace” incl. Class B and C and above 18,000 feet

Start with Fleet Segments!

Best Practices for Data Tools

- Consider by Fleet Segment:
  - Flight plan use?
  - ADS-B equipage?
  - Rather than by airport such as GA vs Hub, or Towered vs Non-towered
- Understand how counting systems work

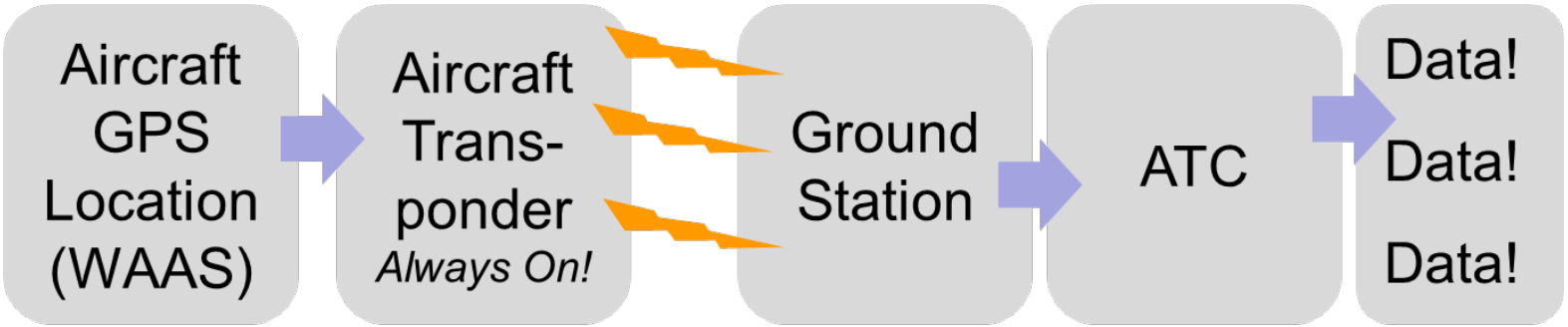
GA IFR or VFR Flight Plan Use by Fleet



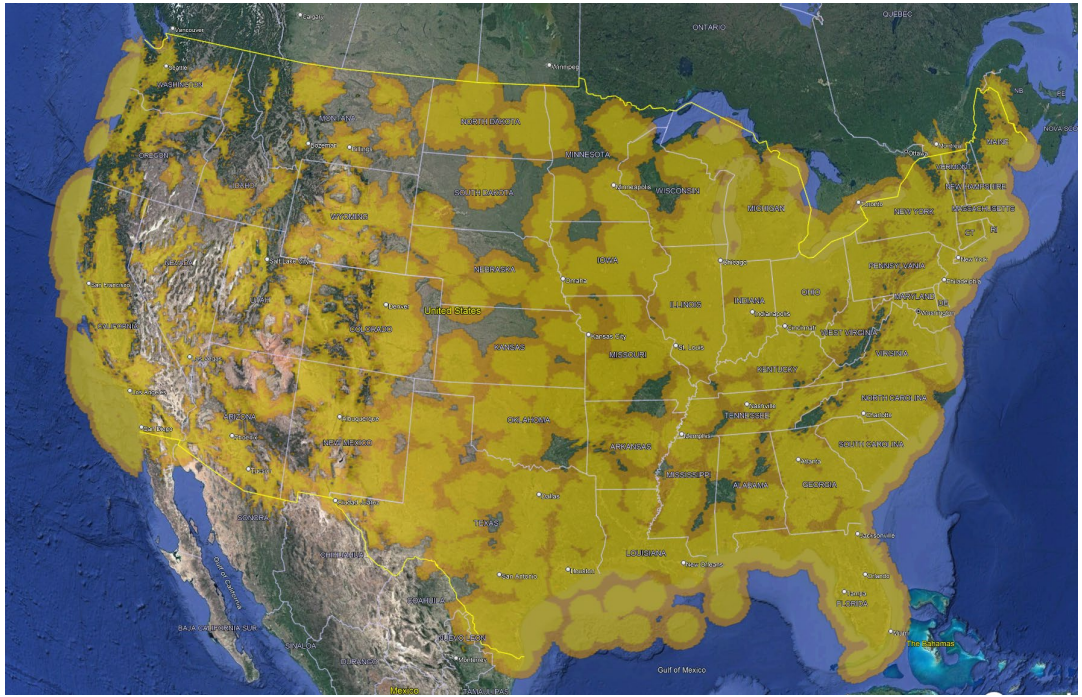
- **Turbojets and Turboprops** conduct most operations under **IFR Flight Plans**, which are captured by TFMSC
- VFR with flight plans captured also, but there many more IFR ops
- *Main gap in TFMSC is with piston aircraft with no flight plan*

What is ADS-B Out?

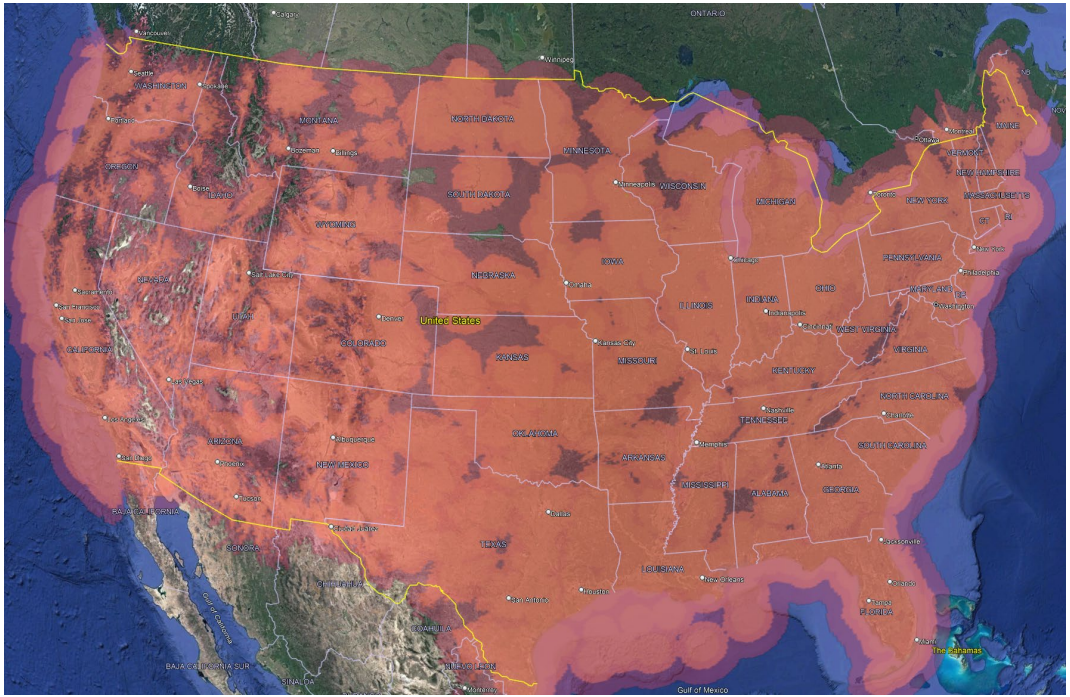
- **Automatic Dependent Surveillance-Broadcast**
- **Required for airspace access 1/1/2020**



ADS-B Ground Coverage at 1500 feet above ground level



ADS-B Ground Coverage at 5000 feet Above Ground Level



ADS-B Equipage of the GA Fleet

- **GA Fleet #Aircraft:**
  - Jets: 15,730
  - Turboprop: 10,415
  - Helo: 10,175
  - Pistons: 137,465
- **Jets: equipped**
- **Turboprops: equipped**
- **Pistons: ~55%**
  - Varies by location and airspace access needs
  - Many operate less than 5 times a year
- **Rule of thumb: 20% of aircraft generate 80% of operations**

Segment, ADS-B, Flight Plan, and Critical Aircraft Determination

Segment	ADS-B Counts equipped aircraft, captures both IFR and VFR ops regardless of flight plan	Flight Plan IFR or VFR	TFMSC Counts ops with flight plan	How essential to Critical Aircraft determination, typically?
Airlines, including Cargo				
GA Jet				
GA Turboprop				
GA Piston				

ADOs have ADS-B ops data

Do we need Total Operations...Why?

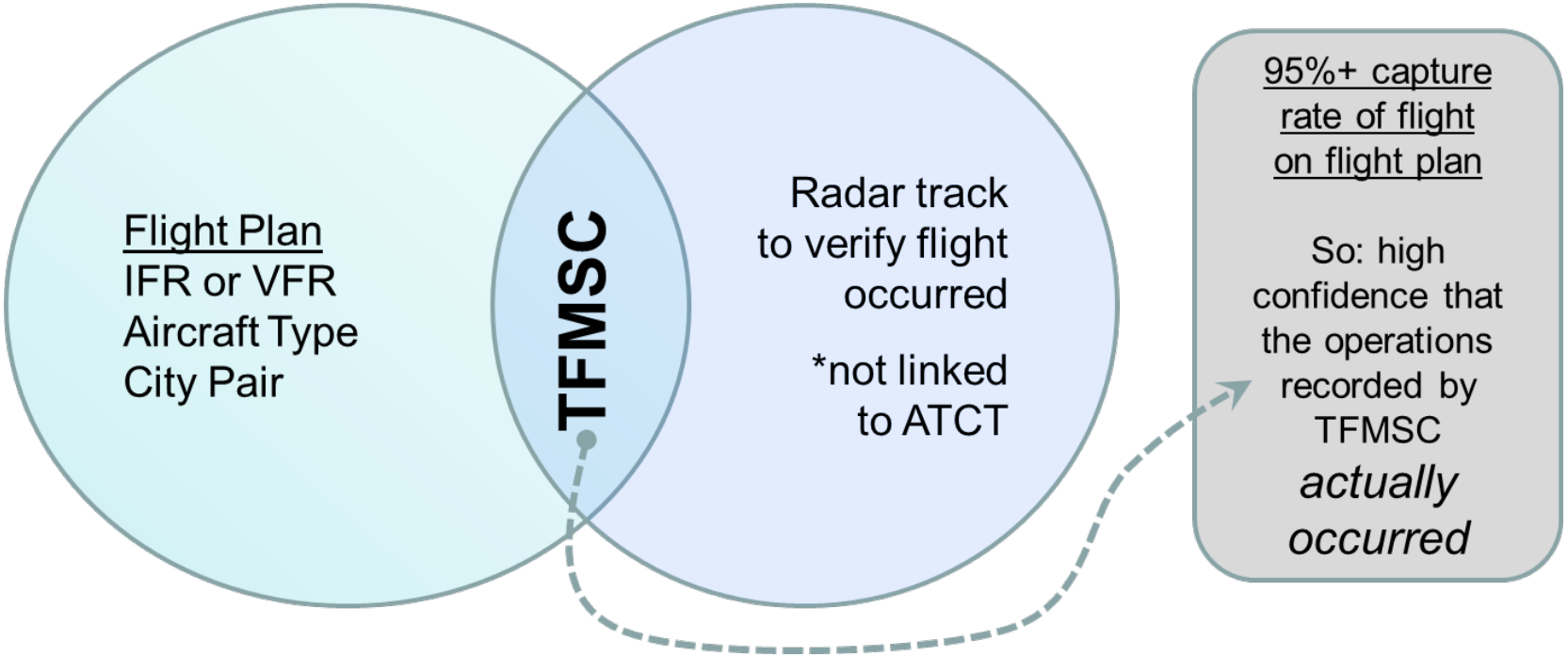
- **Total Ops Needed:**
  - Capacity runway
  - New Contract Tower
  - NEPA (noise and AQ)
  - Legacy Forecast Guidance
- **Most Project Justifications are about Critical Aircraft by Runway**
  - TFMSC or ADS-B
  - **Not** Total Ops

Airport/Consultant Access to ADS-B

- **SWIM Flight Tracking includes ADS-B tracks**
  - No cost, access via VPN
  - But, no historical query available so the airport or consultant must record the data as operations occur
- **Commercial vendors:**
  - Historical data
  - Non-fed sensors and data collection; those that receive FAA data are civil only with privacy filters
  - Not AIP eligible
  - Consider data needs in scoping

Traffic Flow Management System Counts (TFMSC)

What is TFMSC?



TFSMC Reports, Login Notes

Available reports at FAA Operations & Performance Data:

- **Without login:**
  - **Airport**: Aggregate counts by date/aircraft type for top 2000 airports
    - For other than top 2000 airports, must login and use city pairs report (this is a function of the system architecture to optimize for speed)
  - **Distributed OPSNET**: hourly distribution at towered airports

TFSMC Reports, Login Notes (Continued)

- **After login (password required) with FAA approval:**
  - **City Pair**: includes Departure > Arrival pairs
    - Run separate reports for A > D, and D > A, and combine in Excel
    - Excellent source to demonstrate trip distances with regular use needed for runway length evaluations
- Airports and Consultants working on AIP funded projects can request (with their login request) access to City Pair report in ASPM.
- Identify ADO contact in request.

FAQs

- **Common reasons cited for low ops counts:**
  - Data is missing at non-towered airports!
  - Aircraft cancel flight plans when landing!
    - Or file enroute on departure
  - Based jets and turboprops can fly VFR
  - Private flights are blocked
  - Not total Operations!

FAQs (Continued)

- **Reality:**
  - Data is captured through overhead radar and flight plans; radar is not needed at airport surface
  - Private flights (PIA) are counted in TFMSC
  - Normalization of arrival and departure data captures much of this gap
    - AC does allow for additional records if type recorded
  - Jets and turboprops normally file flight plans and usually IFR, given ease of IFR and need to access fuel efficient altitudes above 18,000 feet
  - Why is total operations needed?

Robust Data = Robust Forecasts

- **Data to Story**
  - Explain complex data with the Planning Story
  - Not: Start with story, then find data that fits it
- **Speedy forecast approvals:**
  - Develop a realistic, data-driven forecast