SFO's Strategic Plan to Improve On-Time Performanc

San Francisco International Airport

Regional Airport Planning Committee, September 23, 2011

Presentation Topics

- History of SFO's weather related delay problems
- Causes of delay and low airline on-time performance
- Strategic Plan Initiatives to improve airline on-time performance
- Next steps

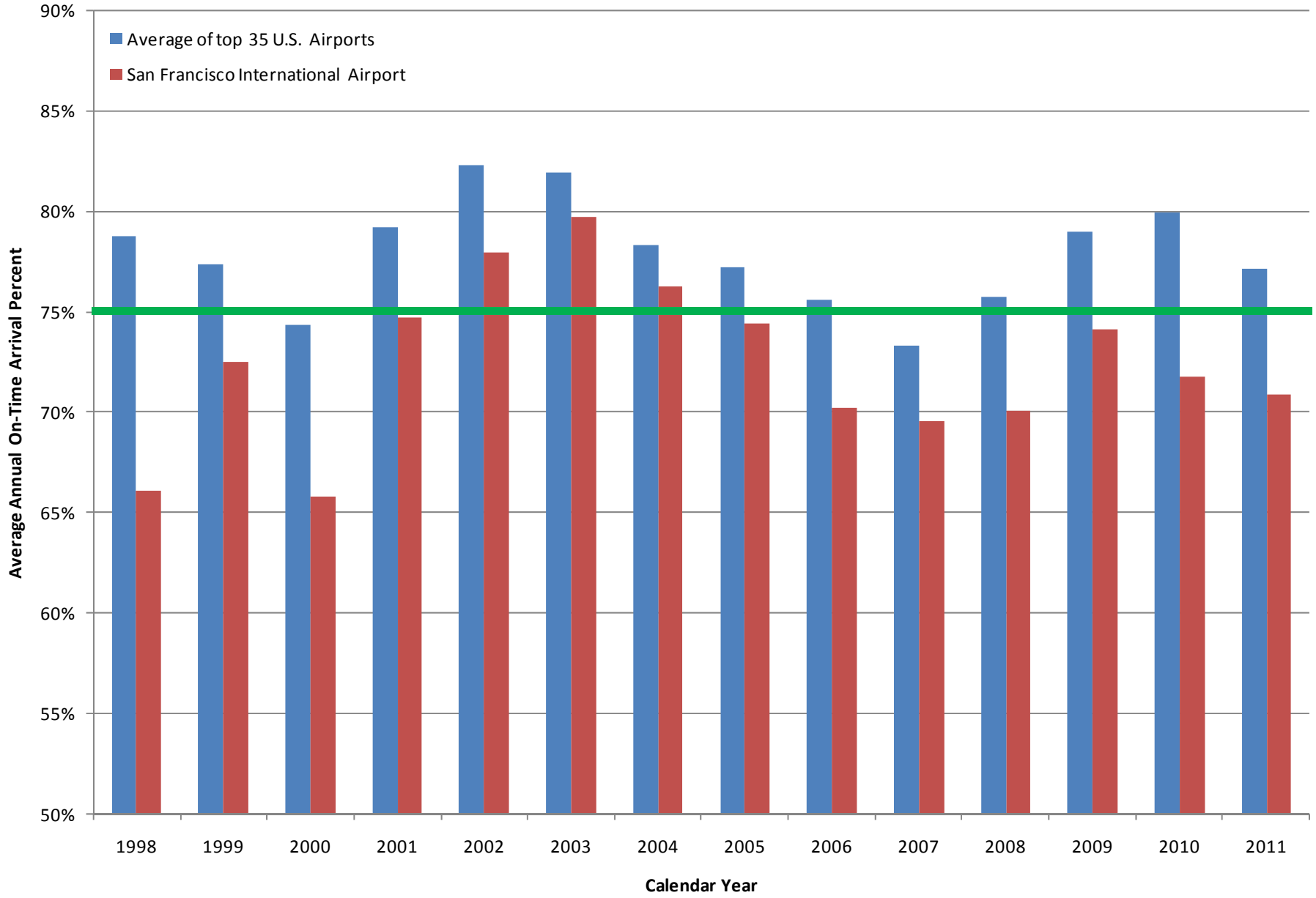
History of SFO's weather-related delay problems

- **SFO has a unique delay problem**
  - Combination of its runway configuration, local weather patterns, and airline scheduling practices
  - Marine climate makes low ceilings/visibility frequent and unpredictable
  - When scheduled arrivals exceed bad weather runway capacity, delays inevitably result

- **SFO's chronic poor on-time performance had improved significantly as demand dropped following 9/11**
  - On-time performance previously lagged behind the national average and was among the worst compared to other U.S. airports

- **As traffic growth has returned, SFO's on-time performance has again lagged the national average, particularly in the winter**

Average Annual On-Time Arrival Percent: Major U.S. Airports vs. SFO

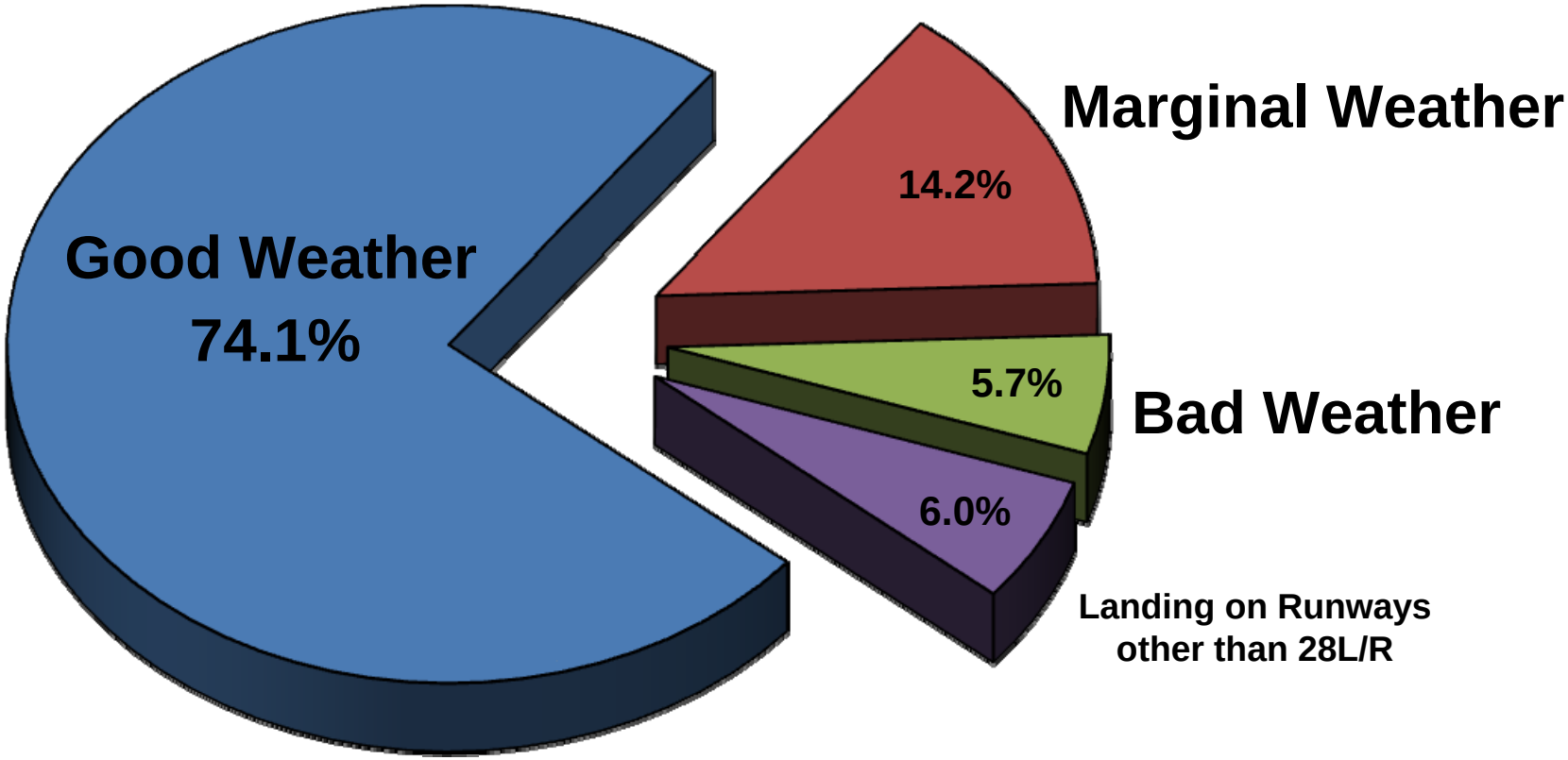


Source: FAA Airline Service Quality Performance, 1998-2011.

Causes of delay and low airline on-time performance

- Weather variability
- Decreased arrival capacity in bad weather
- Airline scheduling – especially during peak morning periods
- Airline fleet mix choices – more flights with smaller aircraft vs. fewer flights with larger aircraft

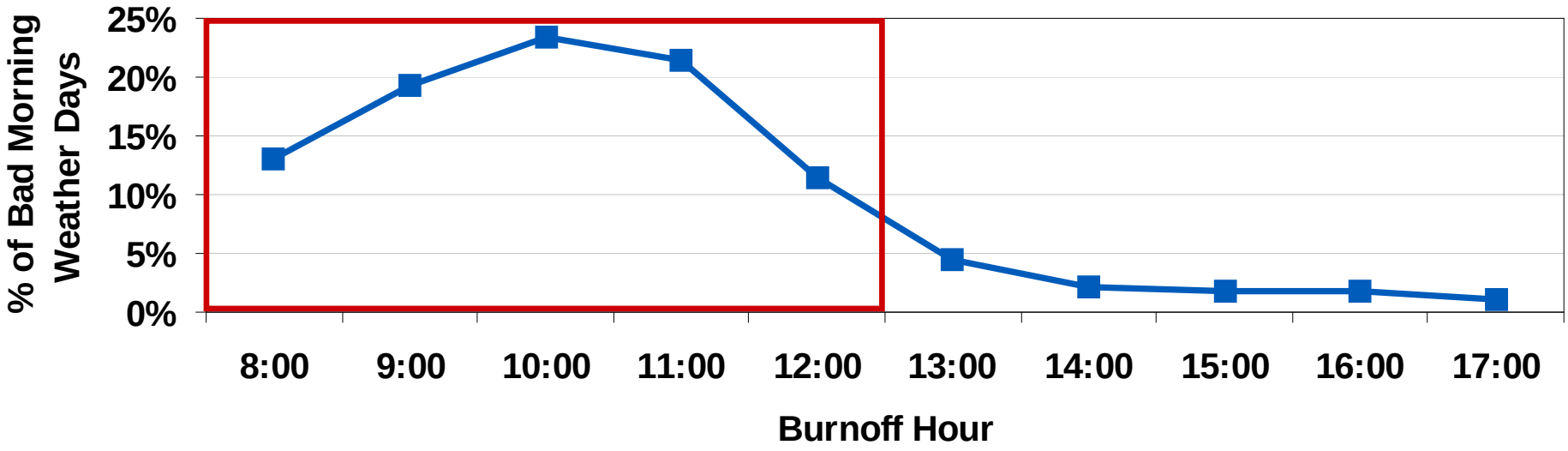
Average Annual Weather Conditions



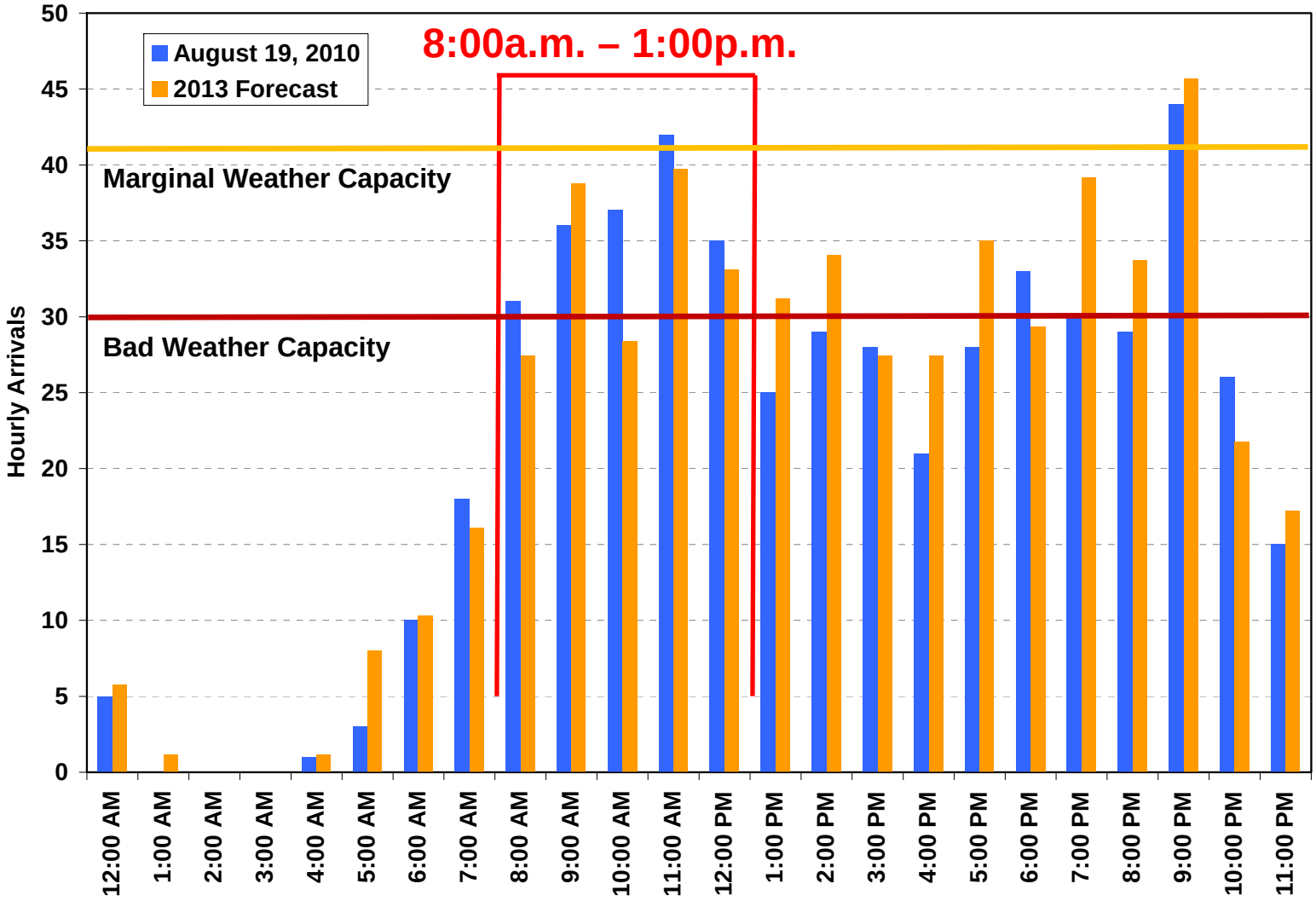
Bad morning weather followed by periods of recovery are one cause of delays

- Even in the best weather year, the Airport experienced bad weather on approximately 1/3 of the days
- In an average year, the Airport experiences bad weather on approximately 50% of all days
- Most common type of “bad weather” continues to be “bad morning weather”

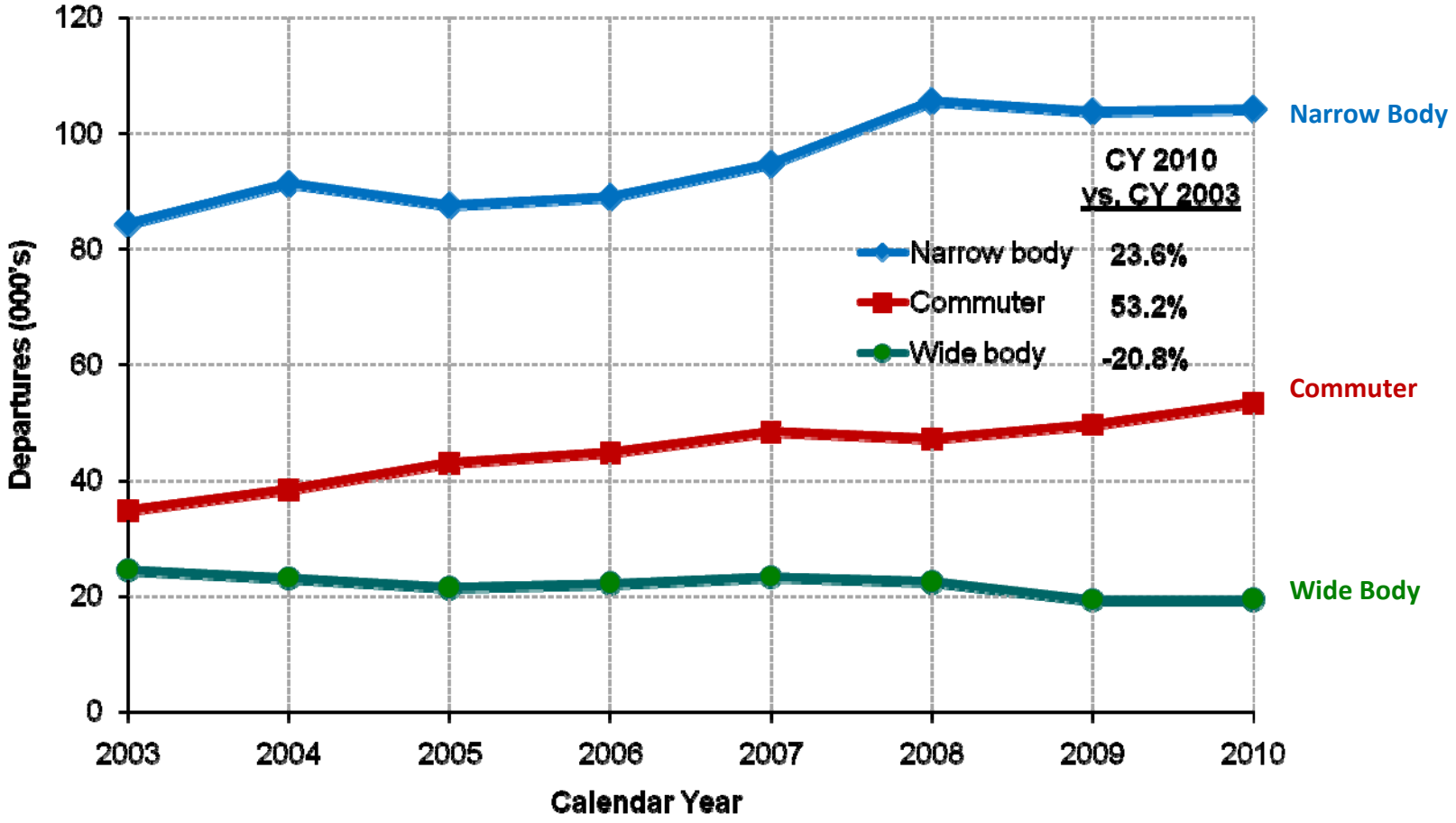
On “bad morning weather” days, conditions usually clear by late morning
Distribution of “burnoff” hour – 1996 to 2005



The combination of weather and scheduling patterns makes the 8AM-1PM period the key to addressing the coming delay problem



SFO Scheduled Passenger Departures by Aircraft Type
Calendar Year-Over-Year



Source: Official Airline Guide (OAG)

Variability in Seats per Operation

- **Average seats per operation for domestic airlines for domestic flights only and for domestic/international flights combined (2010 OAG data):**

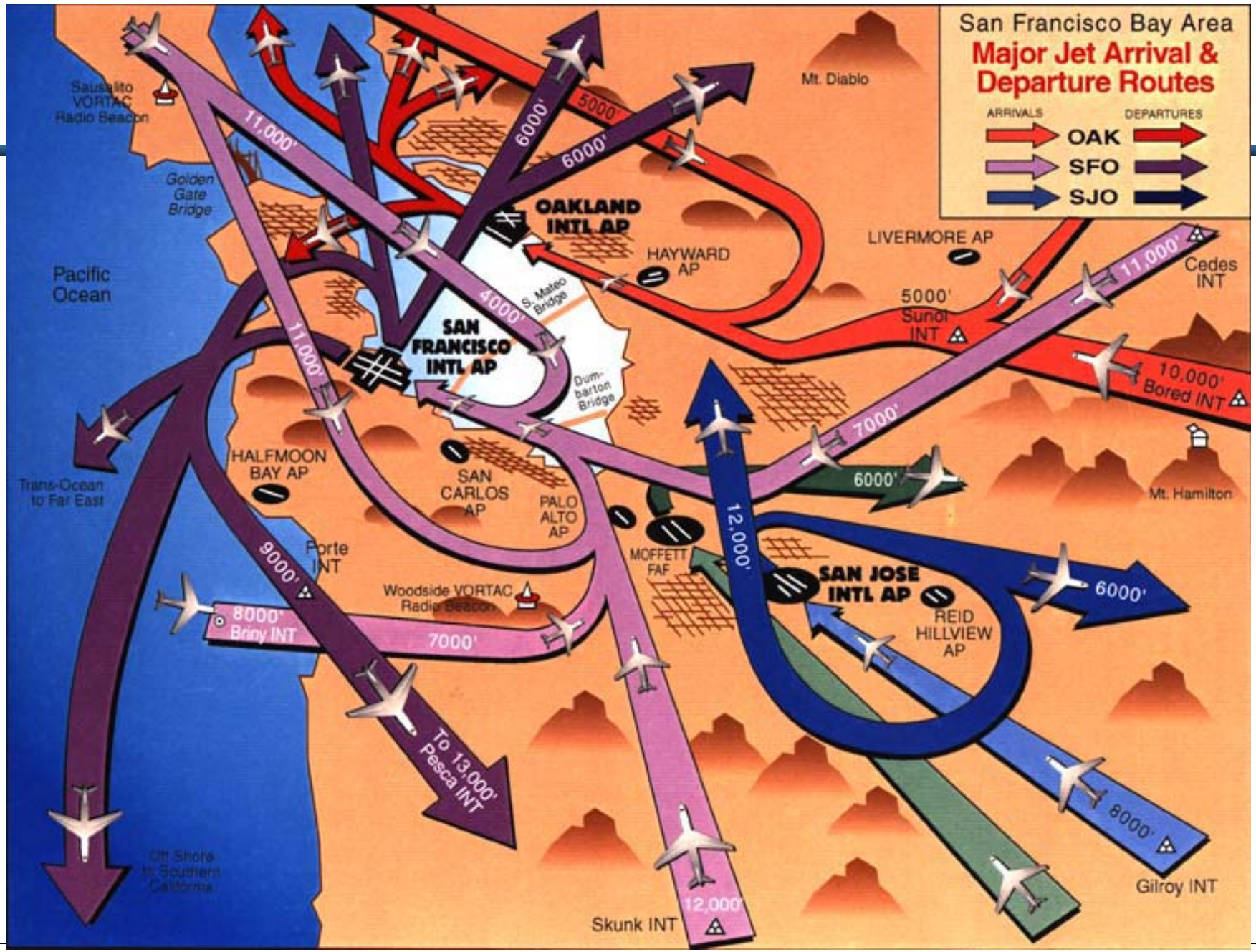
Airline	Average Seats (Dom only)	Average Seats (Intl+Dom)
Airtran Airways (FL)	137.0	137.0
American Airlines (AA)	166.7	166.7
Alaska Airlines (AS)	131.3	133.5
Continental Airlines (CO)	158.9	158.9
Delta Air Lines (DL)	145.7	147.4
Frontier Airlines (F9)	117.0	117.0
Hawaiian Airlines (HA)	252.0	252.0
JetBlue Airways (B6)	150.0	150.0
Southwest Airlines (WN)	136.6	136.6
Sun Country Airlines (SY)	129.0	129.0
United Airlines (UA)	90.1	100.8
US Airways (US)	152.2	152.2
Virgin America (VX)	136.5	136.8

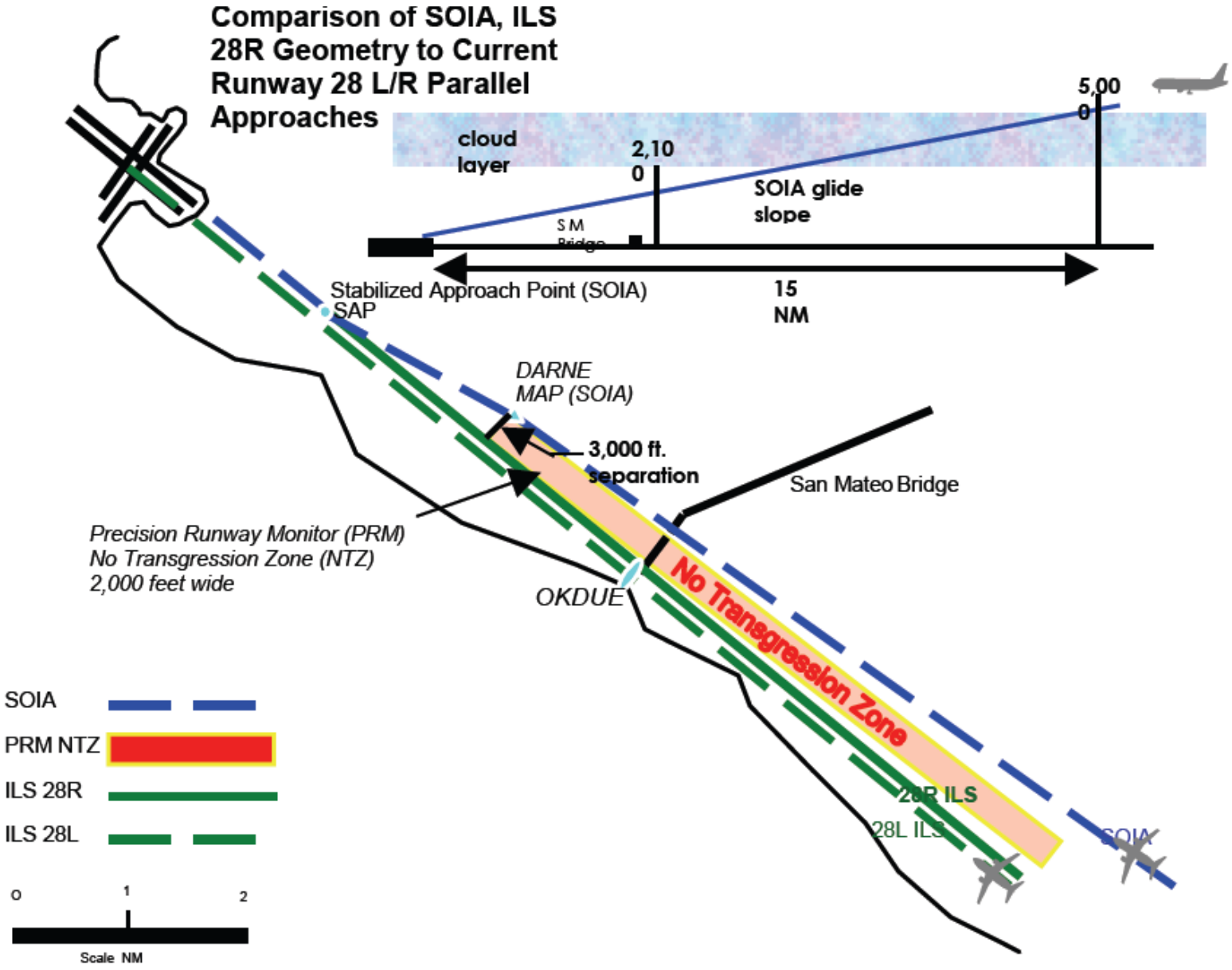
Strategic Plan Initiatives to Improve Airline On-Time Performance

- **Strategic Plan goal is to consistently maintain at least 75% on-time arrival performance**
- **Strategic Plan Initiatives include the following:**
  - Rapid pursuit of NextGen and other technology
  - Regional airport system planning
  - FAA and airline collaboration

Rapid pursuit of NextGen and other technology

- **Collaboration for Incremental Improvements**
  - Reducing SOIA minima
  - Take advantage of new wake rules (.308)
  - Potential for new RNAV procedures
  - Future concepts for RNP and ADS-B applications
- **Impact mitigations and collaboration during construction**
- **Providing transparency, analysis and data needed to help make informed decisions**

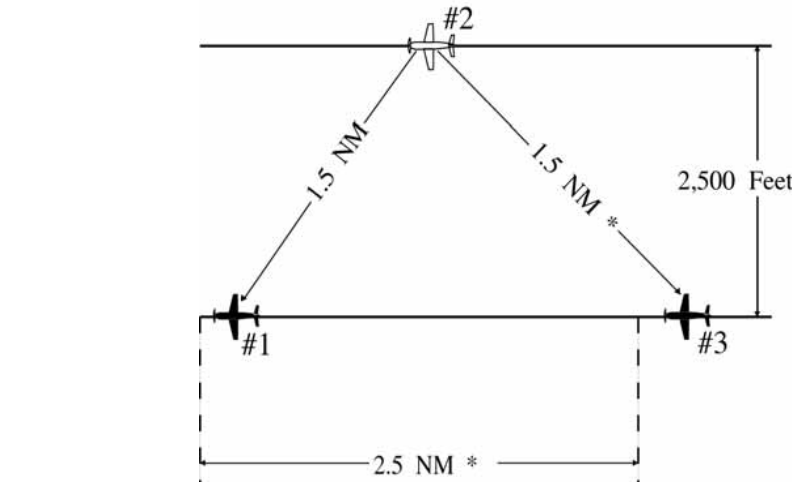

San Francisco Bay Area
Major Jet Arrival & Departure Routes
ARRIVALS
DEPARTURES
OAK
SFO
SJO
Mt. Diablo
Sausalito VORTAC Radio Beacon
Golden Gate Bridge
Pacific Ocean
11,000'
6000'
5000'
6000'
OAKLAND INTL AP
HAYWARD AP
LIVERMORE AP
11,000'
Cedes INT
5000'
Sunol INT
S. Mateo Bridge
4000'
SAN FRANCISCO INTL AP
Dumbarton Bridge
11,000'
10,000'
Bored INT
7000'
6000'
HALFMOON BAY AP
SAN CARLOS AP
PALO ALTO AP
Mt. Hamilton
Trans-Ocean to Far East
12,000'
MOFFETT FAF
SAN JOSE INTL AP
6000'
Porte INT
9000'
Woodside VORTAC Radio Beacon
8000'
Brigy INT
7000'
REID HILLVIEW AP
To 13,000' Pesca INT
8000'
Off Shore to Southern California
Gilroy INT
12,000'
Skunk INT


Comparison of SOIA, ILS 28R Geometry to Current Runway 28 L/R Parallel Approaches
cloud layer
2,100
5,000
SOIA glide slope
SM Bridge
Stabilized Approach Point (SOIA)
SAP
15 NM
DARNE
MAP (SOIA)
3,000 ft. separation
San Mateo Bridge
Precision Runway Monitor (PRM)
No Transgression Zone (NTZ)
2,000 feet wide
OKDUE
No Transgression Zone
28R ILS
28L ILS
SOIA
SOIA
PRM NTZ
ILS 28R
ILS 28L
0
1
2
Scale NM

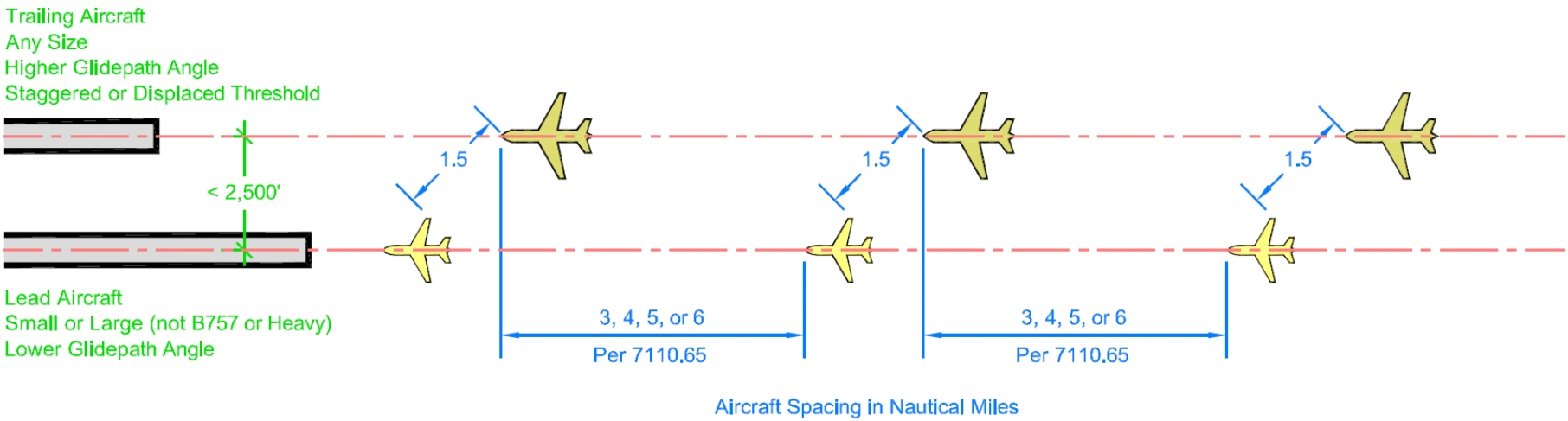
Staggered CSPROs Under FAA Order 7110.308

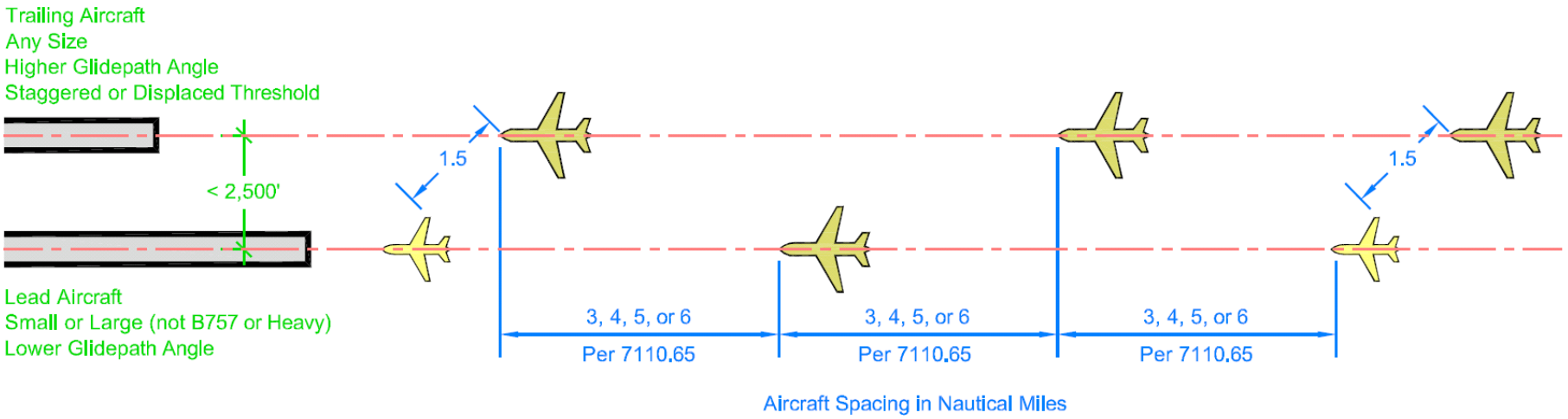
- **FAAO 7110.65, paragraph 5-9-6, limits the use of parallel dependent ILS approaches to parallel runways separated by at least 2,500 feet**

- **FAA Order 7110.308 allows the use of such approaches at specific airports with parallel runways separated by less than 2,500 feet.**

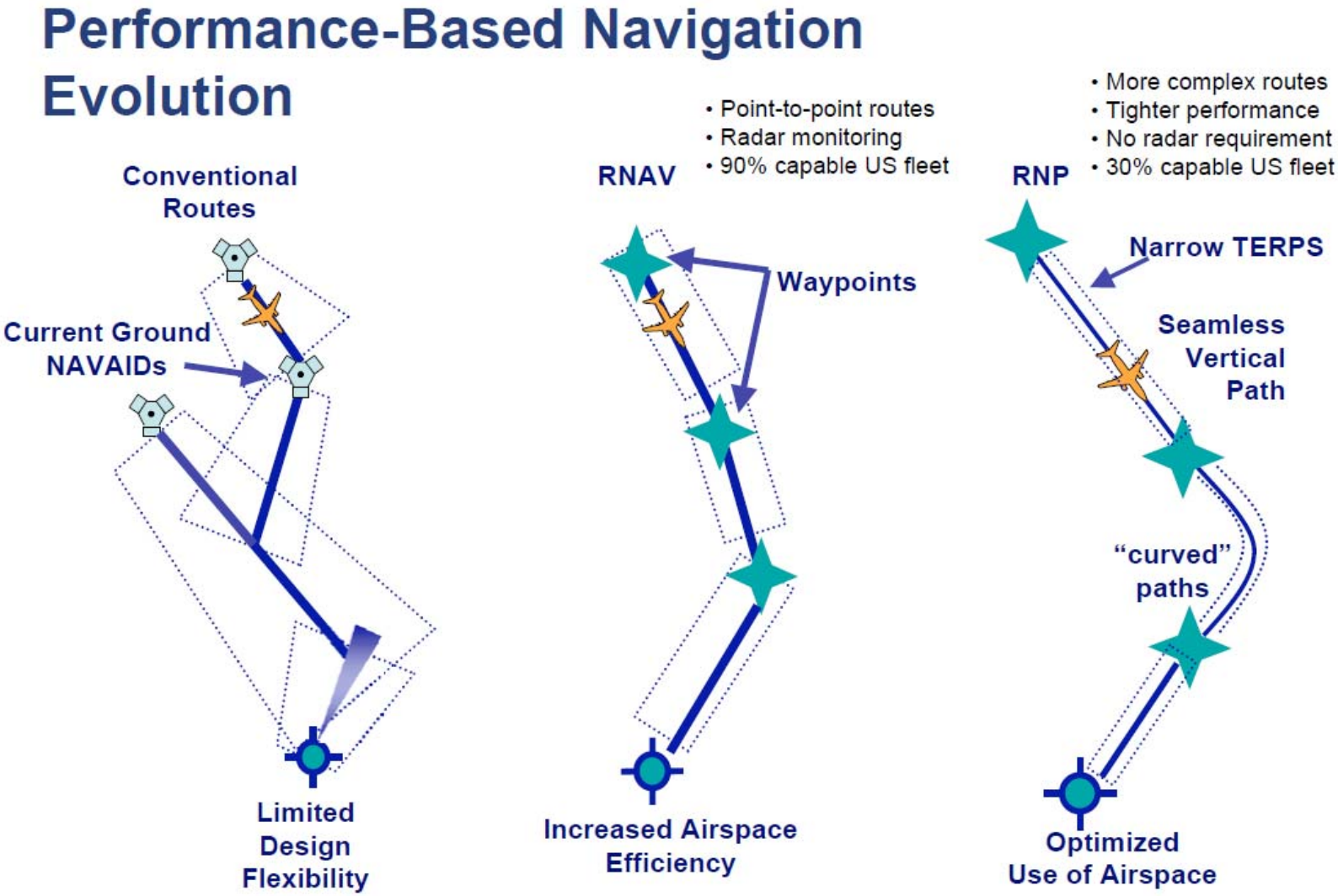


Staggered CSPROs Under FAA Order 7110.308



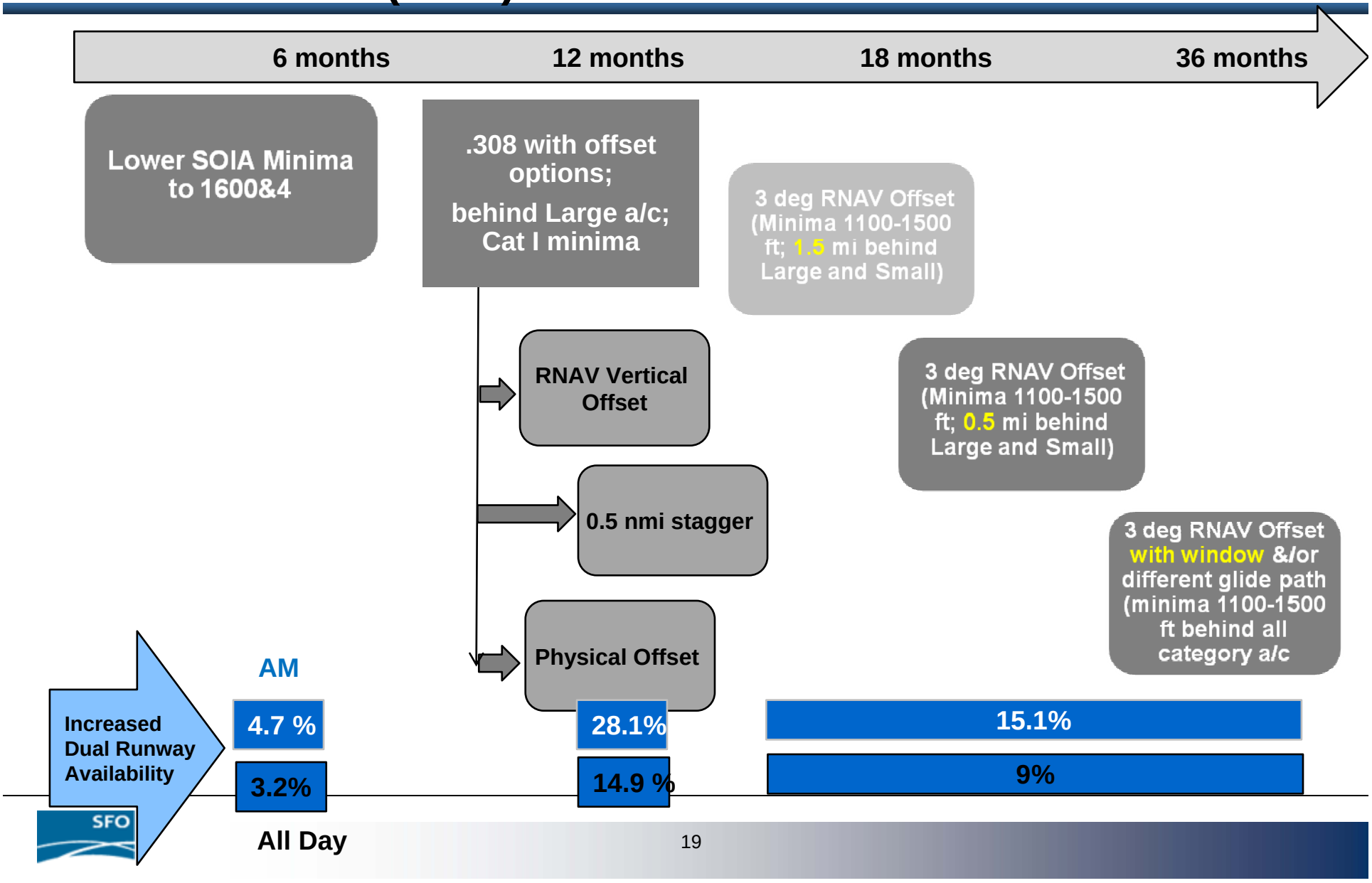


RNAV Offset


Performance-Based Navigation Evolution
Conventional Routes
Current Ground NAVAIDs
Limited Design Flexibility
RNAV
• Point-to-point routes
• Radar monitoring
• 90% capable US fleet
Waypoints
Increased Airspace Efficiency
RNP
• More complex routes
• Tighter performance
• No radar requirement
• 30% capable US fleet
Narrow TERPS
Seamless Vertical Path
"curved" paths
Optimized Use of Airspace

RNAV Offset

Potential Near Term Concepts
6-36 months (draft)



Potential Near Term Concepts 6-36 months (draft)

- **These concepts would deliver more use of existing runways when SFO has bad or marginal weather – reducing delays and improving on-time performance**

Concept	Projected Timeframe	Estimated Increased Dual Arrival Runway Availability	
		During AM Peak Period	All Day
SOIA Improvements	6 months	4.7%	3.2%
FAA Joint Order 7110.308	12 months	28.1%	14.9%
RNAV Step 1	18 months	15.1%	9.0%
RNAV Step 2	24 months		
RNAV Step 3	36 months		

Regional System Plan Update

- **Regional System Plan Update includes the following recommendations:**
  - Encourage redistribution of domestic air passenger demand from SFO to OAK and SJC
  - Increased use of Sonoma County Airport to serve local air passenger demand
  - A robust demand management program at SFO

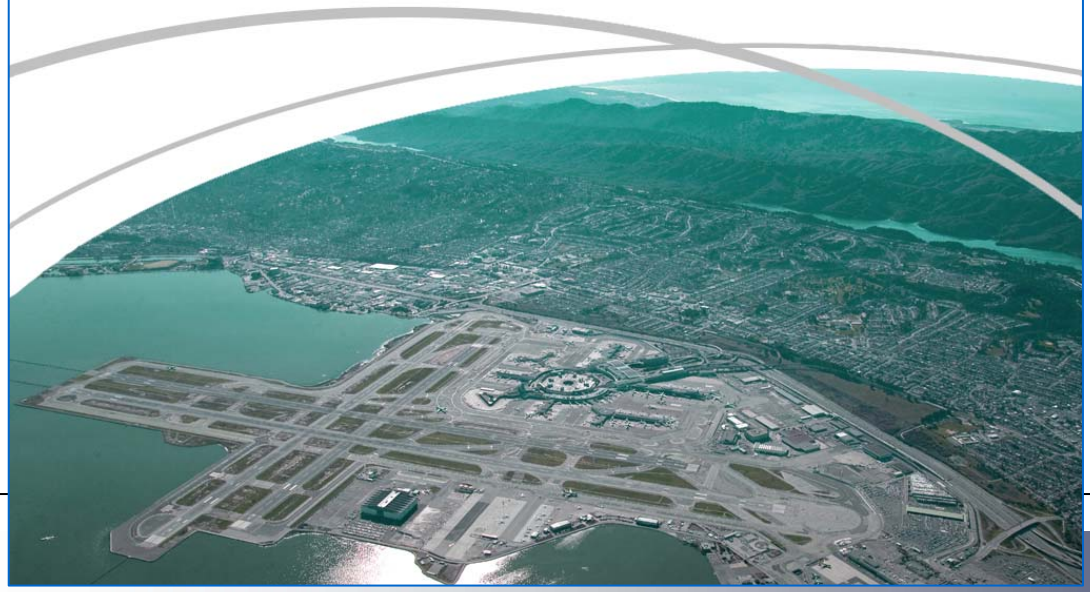
Collaboration with airlines

- **Goals:**
  - Limit delay in the morning hours
  - Maintain a level playing field
  - Encourage use of larger aircraft
  - Preserve/protect air service to small communities
  - Recognize SFO will require unique solutions
- **Example: Potential Flight Consolidation Scenarios**
  - Consolidating flights onto larger aircraft (e.g., turboprops up-gauged to regional jets and regional jets up-gauged to mainline jets) while maintaining the same level of service (i.e., number of daily seats from each origin) could reduce arrival demand during the busy morning peak period by between 6.2% and 8.4% reducing delays by as much as **18% to 25%**.
  - Consolidating only flights by small aircraft from Large and Medium hub airports could reduce arrival demand during the busy morning peak period by 4.4% reducing delays by as much as **11%**.

San Francisco International Airport

Fly Efficient Report

September 2011
SFO Bureau of Planning and Environmental Affairs



Next Steps

- **Continue meeting quarterly with the FAA and airlines on measures to enhance efficiency and better match demand to capacity**
  - Last meeting of the SFO Delay Forum held 6/2/2011
  - Next meeting scheduled for 9/27/2011
- **Continue to support regional airport system planning work into the implementation phase**
- **Work directly with airlines to look for opportunities to adjust fleet mix choices to make better use of limited airfield resources – Fly Efficient Report**