REDAC / NAS Ops

Review of FY 2022 Proposed Portfolio

NextGen – Wake Turbulence R,E&D BLI Number A11.n

Jillian Cheng (ANG-C51) March 25, 2020



NextGen Wake Turbulence R,E&D FY22 BLI A11.n

Benefits to the NAS Users & Airports:

- Initial entry of new types of aircraft into the NAS with assigned wake separations based on aircraft parameters
- Additional airport capacity during IMC
 – achieved with runway throughput increasing wake risk mitigating solutions and without additional airport infrastructure investments
- Increased capacity of the NAS air corridors achieved by more throughput efficient en route wake mitigating solutions

Program success determined by:

- Delivery of safe wake separation recommendations, that can be directly implemented by FAA
- Delivery of feasible concepts for wake risk mitigating solutions that enable the safe increased NAS throughput capacity of Interval Management, TBS, & TBO Operational Improvements
- Delivery of requirements for future technology that will allow safer, NAS throughput capacity enabling wake risk mitigating solutions





NextGen Wake R,E&D/BSLI #: A11.n Overview Capabilities

People:

- Wake Turbulence Research & Dev. Program Manager: Jillian Cheng (ANG)
- Other federal resources: AIR Wake CSTA, Volpe Center wake researchers
- SMEs: world renowned wake researchers, former air traffic controller, ADS-B requirements expert, commercial and GA pilots, probabilistic wake model developer, former AIR Wake CSTA/NASA program manager, former branch manager for AFS-450

Organizations/Laboratories:

- Volpe Center: data collection and analysis, safety case development
- MITRE/CAASD: concept development, benefits analysis
- MIT/LL: wind and weather data analysis and weather algorithms development
- CSSI: en-route wake data analysis and concept exploration
- National Research Council Canada Flight Research Laboratory
- RTCA, EASA, ICAO, EUROCONTROL

Wake R,E&D



Wake R,E&D– Accomplishments in FY20

- Performed analysis and provided recommendations for wake safe separations for new aircraft types in the NAS.
- Collected and analyzed archived wake track data and determined that wake separations can be reduced if there is sufficient wind along the approach
- Validated the proper operation of the CRJ module being added to the previously developed flight data recorder wake encounter screening utility
- Included the ADS-B Wx data elements (key to future throughput capacity increasing wake risk mitigation solutions) in the ABS-B version 3 design update
- Decoded NRC Canada collected en route aircraft wake tracks to provide measured characteristics of wakes generated at en route altitudes – many descended more than 1000 ft. before being "non-hazardous" to other aircraft



Anticipated Research in FY21/22

Planned Research Activities

- Develop FAA wake separation recommendations for new aircraft entering service in 2021-2022 timeframe. The recommendations, to be incorporated into ATC Orders and associated automation, are to ensure safe and capacity efficient NAS operations for these aircraft
- Explore using real-time aircraft-based ADS-B Wx for dynamic wake risk mitigating concepts for enabling the reduction of en route separations from 5 NM to 3 NM in-trail.
- Assessments of wake encounter risk both in terminal area and en route
- Continue wake track data collection and analysis.
- Assess UAS operations to develop wake risk mitigating solutions for their unique operating environment.
- Develop methodology for assessing UAS separation standards





Anticipated Research in FY21/22

Expected Research Products

- Each year there are 50 to 75 new aircraft types recognized by International Civil Aviation Organization (ICAO). Some will begin operating in the NAS and this program must assess and then deliver wake turbulence separation recommendations to ensure their safe operations in the NAS.
- Wake risk safety assessment of the "Total Wind" dynamic wake separation solution under development by the RECAT program
- Wake risk safety assessments of proposed changes to ATC procedures and post implementation assessment of resulting change in wake encounter risk
- Metrics for evaluating wake risk in cases that use of relative risk is not applicable
- Concepts for use of ADS-B Wx real-time aircraft-based observation data to enhance DST capabilities for ATC's delivery of safe, throughput capacity efficient separation of aircraft.





Emerging FY22 Focal Areas

- Wake risk mitigating technology-aided concepts/procedures developed for UAS operating in the NAS
- Concepts for wake risk mitigation solutions required to enable the "wake safe" use of Interval Management, Time Based Operations and Trajectory Based Operations





NextGen - Wake Turbulence R, E&D

Research Requirement

- Determine safe, throughput capacity maintaining wake risk mitigation separations for use in today's ATC operations and develop concepts for safe, dynamic throughput capacity increasing wake risk mitigating separations to enable increased number of flights at the nation's airports and in its air corridors.
- Develop requirements for future avionics and groundbased infrastructure upgrades that will enable use of safe, throughput increasing dynamic wake risk mitigating separations

FY 2022 Planned Research

- Assess new aircraft types for wake separations
- Assess proposed changes to ATC procedures for wake safety
- Assess the wake risk of the finalized RECAT terminal area dynamic "Total Wind" wake separation solution
- Develop metrics for evaluating wake risk in cases that use of relative risk is not applicable
- Collect/analyze wake track data-Develop concepts for use of ADS-B Wx real-time data to enable efficient dynamic wake risk mitigation solutions

Outputs/Outcomes

Products:

- Recommended safe, throughput capacity efficient wake risk mitigating separations for new aircraft types
- Concepts and supporting safety analyses for dynamic wake risk mitigating separation tools and procedures
- Wake risk assessments of proposed changes to ATC procedures
- Inputs to RTCA, ICAO and other aviation standards setting organizations to set in place future technology upgrades needed to for use of dynamic wake risk mitigating separations

Funding (\$M)

| FY 202 | 20 | FY 2021 | FY 2022 |
|--------|----|---------|---------|
| \$5.0 |) | \$3.7 | \$ 3.7 |



