REDAC / NAS Ops

Review of FY 2020/21 Proposed Portfolio

NextGen – Wake Turbulence R,E&D and Wake Re-Categorization BLI Numbers: A12.a and 1A06B

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Wake R,E&D and Re-Categorization A12.a and 1A06B BLI's for FY20/21

Wake turbulence research and development (Wake R&D) and Re-Categorization (RECAT) projects support the NextGen objective to accommodate increased demand during peak demand periods. They have increased access to airport runways and airspace while maintaining or enhancing the safety of the National Airspace System (NAS).

Wake R&D and RECAT mature wake mitigation operational concepts to the point they can be directly implemented by FAA orders. If NAS infrastructure enhancements are required, the concepts are developed to the point that they can be operationally demonstrated and a repeatable process can be handed off to the ATO for implementation.



Wake Turbulence R,E&D/BLI #: A12.a Capability Overview

People:

- Wake Research Manager: Paul Strande (ANG)
- Wake Technical Lead: Jillian Cheng (ANG), Jeff Tittsworth (ANG)
- Other federal resources: Edward Johnson (AIR Wake CSTA), Wayne Gallo (AFS)
- Contract support SMEs: 4 world renowned wake experts, two previous AFS Chief Science and Technology Advisors for Wake, retired branch manager for AFS-450

Organizations:

- Volpe NTSC: data collection and analysis, safety case development
- MITRE/CAASD: concept development, benefits analysis
- MIT/LL: wind and weather data analysis and prototyping
- CSSI: en-route wake data analysis and concept development
- NEXTOR II: future concepts modelling and analysis





Planned Research Activities

- Develop FAA wake separation recommendations to be applied to new aircraft entering service in 2020-2021 timeframe. This work will be incorporated into ATC Orders and associated decision support automation to further enhance NAS capacity.
- Explore the use of aircraft wake transport and decay real-time predictions in determining wake mitigation protection to support future ATC operations.
- Continue measurement, modeling and analysis hardware capabilities to evaluate new aircraft wake hazards generated and capabilities of mitigating a wake encounters



Expected Research Products (continued)

- Each year there are 100 to 125 new aircraft types recognized by International Civil Aviation Organization (ICAO), which the FAA must assess for wake turbulence separation recommendations prior to their entry into service in the NAS.
- Wake encounter mitigation technology aided concepts/procedures developed for piloted aircraft en-route trajectories – FY 2020
- Wake encounter mitigation technology aided concepts/procedures developed for Unmanned Aircraft Systems (UAS) operating in the NAS - FY 2020
- Develop concept for evolution from distance based wake separations to time based operations-FY 2020
- Complete cost/benefit assessment of transition from static to dynamic wake separation standards and procedures– FY 2020
- Develop/acquire enhanced wake/wind tracking sensors for collection of wake transport and decay data – ongoing activity





Expected Research Products (continued)

- Standards developed for real time in-flight observed weather information transmitted by aircraft – information needed for dynamic wake mitigation tools and other users of aircraft observed weather data –FY 2020
- Incorporate Canadian NRC en-route aircraft wake measurement data into the FAA wake transport and decay data base – FY2020
- In depth wind tunnel and computational fluid dynamics analysis of Boeing 777-8/9 series aircraft in coordination with Boeing to determine wake separation recommendations- FY2020
- In collaboration with Flight Standards Service, continued monitoring and enhancement of flight data recorder screenings of aircraft series for potential medium to low level wake encounter events-Ongoing Activity
- Update to Generic New Aircraft Type methodology to include repeatable processes for UAS type assessments-FY2021



Wake Turbulence R,E&D

Research Requirement

Wake turbulence research focuses on accommodating increased demand during peak demand periods. and increasing access to airport runways and airspace while maintaining or enhancing the safety of the National Airspace System (NAS)

Outputs/Outcomes

FY18 Major Outputs:
Develop Generic methodology (documented in SRMD or other format) for new aircraft types
Develop concepts and perform safety analyses to support authorization and implementation of dynamic wake separation tools and procedures
Determine required wake separations for new aircraft: 777X

FY 2018 Accomplishment / Issues

- Developed initial software tool to assess flight data recorder data to establish wake encounter frequency in the NAS
- Performed analysis of new aircraft types for safe wake categorization in the NAS.
- Collection and analysis of wake encounter data.
- Applied generic methodology to provide recommended separations for A35K, A320 NEO, A330 NEO and B737 Max aircraft

Out Year Funding (\$M)*

| FY 2018 | FY 2019 | FY 2020 | FY 2021 | FY 2022 |
|---------|---------|---------|---------|---------|
| \$ 6.8 | \$5.7 | TBD | TBD | TBD |

*Funding for the project's contracts





Wake Re-categorization 1A06B

The RECAT project supports the NextGen objective to accommodate increased demand (flights) during peak demand periods by developing wake separation standards that are tailored to aircraft performance characteristics rather than the more general single aircraft weight parameter of the present standards.

Wake RECAT uses matures wake mitigation operational concepts to the point they can be directly implemented by FAA orders. If NAS infrastructure enhancements are required, the concepts are developed to the point that they can be operationally demonstrated and a repeatable process can be handed off to the ATO for implementation.





Wake Re-Categorization/BLI #:1A06B Capability Overview

People:

- Wake Research Manager: Paul Strande (ANG)
- Wake Technical Leads: Jillian Cheng (ANG), Jeff Tittsworth (ANG)
- Other federal resources: Edward Johnson (AIR Wake CSTA), Wayne Gallo (AFS)
- Contract support SMEs: 4 world renowned wake experts, two previous AFS Chief Science and Technology Advisors for Wake, retired branch manager for AFS-450

Organizations:

- Volpe NTSC: data collection and analysis, safety case development
- MITRE/CAASD: approach/departure speed analysis, benefits analysis
- MIT/LL: wind forecast algorithm development





Planned Research Activities

- Develop parameters for use in en route wake risk mitigation decision support tools and through modeling develop safety assessment of wake risk mitigation guidance for en route controllers.
- Develop Functional Descriptive Narrative for the use of time interval wake separation minimums in ATC's terminal area operations – to include throughput capacity benefit and safety assessments
- Develop design description of the enhanced Terminal Wind Forecast Algorithm to be used in determining the minimum time interval separation between aircraft
- Develop Safety and benefit assessments of the wake risk mitigations and associated DST functional requirements proposed for guidance to en route controllers in providing climb-through, descend-through and passing clearances.





Expected Products

- Definition of the RECAT Pairwise Dynamic concepts that will be developed by the RECAT project.
- Develop preliminary requirements for adding Dynamic wake risk mitigation enhancements to ATC Decision Support Tools.





Wake Re-Categorization (RECAT)

Research Requirement

The Wake Turbulence Re-Categorization (RECAT) project will develop the system adaptation, procedures, training, documentation and repeatable process for implementing the airport specific wake mitigation Wake Turbulence Re-Categorization Dynamic Pair-Wise Static separation standards.

Outputs/Outcomes

•RECAT Categories Expanded without the use of additional ATC tools

• Finalize SRMD to authorize new aircraft separations

•Concept development for dynamic wake separations (including Time Based Separations)

FY 2018 Accomplishment / Issues

- RECAT Phase 2.5 Separation Recommendations Report
- Coordination with AJT, AJV, and AJM for implementation.
- Out-year funding may effect future concepts.

CIP Funding (\$M)

| FY 2018 | FY 2019 | FY 2020 | FY 2021 | FY 2022 |
|---------|---------|---------|---------|---------|
| \$2.0 | \$0.0 | \$ 2.5M | \$ 2.5M | \$ 2.5M |



