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FAA Office of NextGen (ANG)

REDAC / NAS Ops

Review of FY2023 – 2026 Proposed Portfolio

Name of Program: Wake R,E&D

BLI Number: A11.p

Presenter Name: Jillian Cheng

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Wake R,E&D Overview

What are the benefits to the NAS User

Wake R,E&D's assessment of aircraft wake encounter risk provides the information to develop ATC wake risk mitigations that enable fewer flight delays/cancellations and reduced inflight operating costs.

- Assessments of wake generation and resistance to wake encounter for new aircraft types entering service in the NAS

- Wake risk mitigation solutions for specific airport/airspace ATC operations

- Aircraft wake generation/encounter databases, modeling and analysis tool development that enable increased flight flexibility and capacity for NAS Users

What determines program success when research is implemented

- No increase in the reported wake encounters per flights in the NAS

- Increased Airport Arrival Rates set by ATC when in IMC

- ATC able to mitigate wake encounter risk when separating en route aircraft at distances less than 5 NM

- Wake encounter risk mitigation strategies developed for AAM aircraft

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Wake R,E&D
Program Support

People:

- Program Manager: Jillian Cheng

- Subject Matter Experts: wake data collection & analysis experts, pulsed LIDAR application experts, statistical wake encounter FOQA data extraction experts, wake modeling experts

Laboratories/R&D Centers:

- Volpe Center
- National Institute of Aerospace
- National Research Council Canada Flight Research Laboratory
- MIT/Lincoln Laboratory

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Current Wake R,E&D FY23 Accomplishments

- Developed wake generation and wake encounter response assessments for new aircraft types (piloted and large UAS) slated to receive ATC Separation Service when operating in the NAS (50 assessments through 3rd Qtr. FY23)
- Progressed in the development of candidate absolute wake encounter metrics (projected severity if aircraft encounters a wake from another aircraft) for use in developing safe, flight capacity efficient ATC applied separations between aircraft
- Continued the collection and assessment of aircraft generated wakes at SFO and JFK airports – resulting in decreased "uncertainty" buffers included in wake risk mitigation recommendations
- Handoff of the Wake R,E&D developed statistical wake encounter FOQA data screening utility (SU) to AVS for their use in evaluating the current wake encounter risk in selected portions of the NAS and for conducting wake encounter risk assessments post implementation of changes to ATC aircraft separation procedures (a requirement of the FAA Safety Management System)
- Analysis of en route aircraft wake data enabled the modification of low altitude wake generation models for use in developing wake risk mitigation solutions for en route airspace

Anticipated Wake R,E&D Research in FY24

Planned Research Activities:

- Develop wake risk assessments for New Entrants (e.g. Fixed Wing and AAM) operating in the NAS
- When requested, assess airport/airspace ATC operations to develop wake risk mitigation solutions that will address specific operational constraints
- Continue collection and analysis of aircraft wake tracks at SFO and JFK airports to include repair of LIDAR systems
- Continue developing absolute wake encounter metrics for aircraft flying en route
- Continue developing a hazardous wake location algorithm design that uses real time and forecast weather data

Expected Research Products:

- Wake risk assessments for New Entrants

- Wake generation/transport analyses of wake data from aircraft flying at cruise altitude as inputs for en route absolute wake encounter metric development
- Wake risk assessments of proposed changes to ATC procedures/systems used in ATC Separation Services
- Wake risk mitigation solutions for unique airport/airspace operational constraints
- Initial high-level conceptual design of hazardous wake location algorithm

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Anticipated Wake R,E&D Research in FY25

Planned Research Activities:

- Develop wake risk assessments for New Entrants (e.g. Fixed Wing and AAM) operating in the NAS
- When requested, assess airport/airspace ATC operations to develop wake risk mitigation solutions that will address specific operational constraints
- Continue collection and analysis of aircraft wake tracks at SFO and JFK airports to include repair of LIDAR systems
- Develop absolute wake encounter metrics for aircraft flying en route
- Initiate development of a hazardous wake location algorithm design that uses real time and forecast weather data

Expected Research Products:

- Wake risk assessments for New Entrants
- Wake generation/transport analyses of wake data from aircraft flying at cruise altitude as inputs for en route absolute wake encounter metric development
- Wake risk assessments of proposed changes to ATC procedures/systems used in ATC Separation Services
- Wake risk mitigation solutions for unique airport/airspace operational constraints
- 2nd interation of a hazardous wake location algorithm conceptual design

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Emerging Wake R,E&D FY26 Focus Areas

Application of Wake Generation and Encounter Data

- Provide wake risk assessments for New Entrants slated to begin operating in the NAS and receiving ATC Separation Services

- When requested, assess airport/airspace ATC operations to develop wake risk mitigation solutions that will address specific operational constraints

- Continue the development of absolute wake encounter risk metrics for use in determining an aircraft's wake encounter risk

Acquiring Additional Wake Generation/Transport Data

- Continue collection and assessment of aircraft generated wakes with suites of sensors to characterize the aircraft generated wake and how its transport is affected by atmospheric conditions and airport location

Continuing Development of Wake Hazard Location Algorithm design

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Wake R,E&D

Research Requirements

- Assess wake risk in today's and future ATC operations to ensure target level of safety is maintained
- Provide aircraft wake generation/transport analyses to developers of wake risk mitigation solutions that allow increased flight efficiency/capacity in the NAS
- Provide wake risk mitigation solutions for specific ATC airport/airspace operating constraints and concepts for the future NAS
- Develop metrics for use in determining safe/flight efficient ATC wake risk mitigation aircraft-to-aircraft separations

Outputs/Outcomes

- Wake risk assessments for New Entrants that are to begin operating in the NAS and will require ATC Separation Services and updates to assessments for current operating aircraft as more wake generation data is collected
- Wake risk assessments of proposed changes to ATC separation procedures
- Wake risk mitigation solutions for specific airports/airspace
- Wake encounter risk metrics for determining safe separation from a leading aircraft's hazardous wake

FY 2026 Planned Research

- Continue developing wake risk assessments for New Entrants (e.g fixed wing and AAM) slated to receive ATC Separation Services
- Assess proposed changes to ATC procedures for wake risk
- Continue ground-based collection of wake generation/ transport data to enhance the statistical data used for wake risk assessments
- Continue development of absolute wake encounter risk metrics
- Continue development of wake hazard location feasibility prototype algorithm

Out Year Funding (contract dollars)*

R,E&D	FY23 (Enacted)	FY24 (President's Budget)	FY25 (CIP)	FY26 (CIP)	FY27 (CIP)	FY28 (CIP)
	$ 2.5M	$3.6M	$ 3.2M	$ 2.6M	$ 2.6M	$ 2.6M

* An additional $1.2M contract dollars per year (FY25 – 28) is needed to fully fund wake risk mitigation concept development and wake data collection instrument replacement. (Current wake LIDARS are near the end of useful life.)

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