Exploring the use of Unmanned Aircraft Systems during a Wildlife Hazard Assessment

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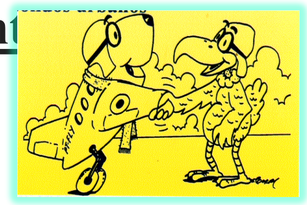

INTRODUCTION

Aircraft accidents resulting from wildlife strikes pose an increased safety and economic concern. The Federal Aviation Administration (FAA) requires airports operating under the Code of Federal Regulations Part 139 to conduct a wildlife hazard assessment (WHA) when some wildlife-strike events have occurred at or near the airport. The WHA provides the empirical framework for developing a Wildlife Hazard Management Plan. The safety efforts by airport operators have helped prevent aircraft accidents resulting from wildlife strikes. Important to note that the analyses of wildlife strike data have indicated that different strategies to mitigate such risk, including robust research projects and the use of new technologies and innovative approaches to current technologies, is vital. This ongoing study investigates how Unmanned Aircraft Systems (UAS) technologies could be effectively applied to identify hazardous wildlife species in aviation operations and potential wildlife hazard attractants within the airport jurisdiction.

CONCEPT OF OPERATIONS (ConOps)

An exploratory field campaign to identify wildlife hazard attractants was conducted between April and Nov 2022. Researchers used a DJI M210 with a Zenmuse XT2 to collect data. The date, time, and ground position system (GPS) location of the videos and images recorded during the data collection process were recorded with a GPS timestamp. Our team collected data at a field less than 2 miles from KDAB. The UAS was flown in two ways: autonomously in a basic grid pattern and manually. Our team applied different strategies to identify hazards and mitigate the risks associated with UAS operations in an airport environment, including applying crew resource management principles and using an automatic detection-broadcast (ADS-B) flight box and ForeFlight to monitor air traffic at and around. A Qualified Airport Wildlife Biologist (QAWB) assisted our team during the development and execution of this project.

AIRBORNE DATA COLLECTION

The test flights were conducted over a plot sample area of approximately 480,894 square meters just south of Daytona Beach Airport. Flights were completed using the "DJI's Go software" through the intelligent controller. We connected the controller to the monitoring station, providing a live feed for the observer in the trailer. The pilot has a visual observer that keeps an eye on the airspace to minimize the risk of manned aircraft approaching the area. Sometimes the observer in the trailer may see wildlife that may be difficult to see on the controller due to the small screen or glare from the sun. The observer will contact the visual observer via radio communications to investigate the area further.

OTHER RISK MANAGEMENT STRATEGIES

1. UAS flights were conducted below 300 feet AGL.
2. UAS flights were not conducted in the Approach, Departure, and Circling Airspaces of Daytona Beach Airport.
3. UAS flights were only conducted with a ceiling of at least 3,000 feet AGL and with visibility at or above five statute miles.
4. A visual observer, in addition to the drone operator, were present during the data collection process.
5. Any perceived flight activity in the area at or below a 1,000 feet AGL and/or in the traffic pattern was a factor that would determine UAS should not be flown or, in case the flight had already begun, that it should be terminated immediately.

Researcher monitoring the two TV screens in the trailer during data collection for the presence of wildlife and their habitats (UAS) and/or the presence of manned aircraft at and around Coe Field using the ADS-B Flight Box live feed from ForeFlight.

The photos store all the location, altitude, time, and GPS data. This will make it easier for the QWAB to assess the data plot wildlife locations and their attractants for historical analysis. The QWAB can also create an orthomosaic that would provide a snapshot of the area of interest.

KEY FINDINGS

The preliminary findings of our study have suggested that the versatility and speed of UAS, including their high-quality cameras and sensors, ensure that data can be collected more thoroughly and faster over large areas, including areas inaccessible by ground-based means (e.g., wetlands). Additionally, results have suggested that UAS can facilitate the observations made by a QAWB during a WHA, including identifying and assessing potential habitats such as wetlands and land uses (e.g., livestock operations). The use of UAS during a WHA can increase the effectiveness of data collection as well as reduce the cost of conducting a WHA by:

1. Identify the location of wildlife activities and features that have attracted or have the potential to attract hazardous wildlife species to the airport jurisdiction.
2. Establishing a relationship between identified wildlife species and habitats.
3. Obtaining information on different habitats and wildlife species simultaneously.
4. Reducing the labor, personnel, and time needed to accomplish most WHA tasks.

A QAWB very often has to collect data at or close to a wetland where hazardous species (e.g., snakes) may pose a serious risk to humans. Moreover, essential habitats could be surrounded by natural or man-made structures making it difficult to access and observe wildlife by ground-based means. Additionally, the foliage can block the view of wildlife and make it difficult to see and get a proper count of the wildlife in the area.

SELECT SOURCES

1. Cabrera, J., Chimino, A., Woolf, N., Schwarz, M., & Mendonca, F. A. C. (2021). Applying UAS for wildlife hazard management at airports. *FAA challenge: Smart airport student competition*. Retrieved from http://faachallenge.ninanet.org/wp-content/uploads/FAA_2021_TechnicalPaper_EmbryRiddleAeronautical University.pdf. **Faculty mentor.**
2. Dolbeer, R. A., Begier, M. J., Miller, P. R., Weller, J. R., & Anderson, A. L. (2021). *Wildlife strikes to civil aircraft in the United States: 1990–2019* (Serial Report Number 26). FAA. https://www.faa.gov/airports/airport_safety/wildlife/media/Wildlife-Strike-Report-1990-2019.pdf
3. Hamilton, B. A. (2020). *Airports and unmanned aircraft systems Volume 1: Managing and engaging stakeholders on UAS in the vicinity of airports* (ACRP Research Report No. 212, volume 1). Transportation Research Board on the National Academies. https://www.nap.edu/ catalog/25607/airports-and-unmanned-aircraft-systems-volume-3-potential-use-of-uas-by-airport-operators
4. Prather, C. D. (2019). *Current landscape of unmanned aircraft systems at airports* (ACRP Synthesis 104). Transportation Research Board on the National Academies. http://www.trb.org/Main/Blurbs/180032.aspx
5. Rahman, D. A., Setiawan, Y., Wijayanto, A. K., Rahman, A. A. A. F., & Martiyani, T. R. (2020, September, 28). *An experimental approach to exploring the feasibility of unmanned aerial vehicle and thermal imaging in terrestrial and arboreal mammals research*. The 1st JESSD Symposium: International Symposium of Earth, Energy, Environmental Science and Sustainable Development 2020. Jakarta, Indonesia.