

# Risk Considerations of Bird Strikes to Space Launch Vehicles

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## Abstract

Within seconds after liftoff of the Space Shuttle during mission STS-114, a turkey vulture impacted the vehicle's external tank. The contact caused no apparent damage to the Shuttle, but the incident led NASA to consider the potential consequences of bird strikes during a Shuttle launch. The environment at Kennedy Space Center provides unique bird strike challenges due to the Merritt Island National Wildlife Refuge and the Atlantic Flyway bird migration routes.

NASA is currently refining risk assessment estimates for the probability of bird strike to space launch vehicles. This paper presents an approach for analyzing the risks of bird strikes to space launch vehicles and presents an example. The migration routes, types of birds present, altitudes of those birds, exposed area of the launch vehicle, and its capability to withstand impacts affect the risk due to bird strike. A summary of significant risk contributors is discussed.

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