

Aircraft noise is specifically addressed in Federal Aviation Regulation (FAR) Title 14 Part 36. Maximum sound pressure levels (SPL) are set by aircraft type for aircraft in the phases of flight in close proximity to airports where the noise created will be most noticeable to observers on the ground. Abiding by the noise regulation assists in maintaining healthy relationships between aircraft operators, airports, and local residents and businesses. With the increase of unmanned aircraft systems (UAS) in the civilian sector, perceived UAS noise may also be of concern in the near future. Recent and future exponential growth of the UAS market, fueled by affordable and easy to use systems and the unveiling of enabling regulations, will increase UAS density in the airspace above many populated areas. In order to mitigate the possible public backlash to the associated increase in noise caused by UAS, the noise levels created by these systems must be addressed. A major source of the perceptible noise created by aircraft of any size is the propeller/rotor. UAS are no exception. Propeller/rotor SPL is directly affected by rpm. The small diameter of UAS propellers/rotors allows for extremely high rpm compared to that of larger aircraft. High rpm is typically associated with high SPL. The author has undertaken to design and build apparatuses, in which to record the SPL and thrust of small UAS propellers/rotors. Small UAS propellers/rotors were then modified in an attempt to reduce the SPL with as little effect on thrust as possible. The modifications were inspired by characteristics found on the primary feathers of certain owls. These feathers have a comb-like fringe on the leading edge, a hairy upper surface, and a downy tufted trailing edge. The leading edge comb was cut into small 8" plastic propellers of a size common to many multicopters and fixed-wing UAS. The modified propellers/rotors reduced the SPL below that of the unmodified propeller/rotor; however, thrust levels were also reduced. At a constant thrust level, the modified propellers/rotors were still able to reduce the SPL, albeit at a slightly higher rpm.