Use of Lasers in Avian Dispersal

As issues of safety, health, and property damage associated with wildlife populations increase, so too does public demand for nonlethal, non–injurious, and environmentally benign solutions to such problems. Recent research conducted by the U.S. Department of Agriculture's (USDA) Wildlife Services' (WS) National Wildlife Research Center (NWRC) indicates that relatively low–power, long–wavelength lasers (630–650 nm "red beam") provide an effective means of dispersing some "problem" bird species under low–light conditions, while presenting no threat to the animal or the environment. For example, double–crested cormorants and Canada geese have shown extreme avoidance of laser beams. In addition, a variety of other avian species, including waterfowl, wading birds, gulls, vultures, and crows, have also exhibited avoidance of the laser beam during field
trials, but response is dependent upon context and species. Recent research indicates little to no response by white–tailed deer to a red laser beam. The lower power levels, directivity, accuracy over distance, and silence of laser devices make them safe and effective species–specific alternatives to pyrotechnics, shotguns, and other traditional avian dispersal tools.

Avian Dispersal

By using lasers in avian dispersal, the operator is focusing on a primary and highly developed sensory pathway in birds, specifically vision. The repellent or dispersal effect of a laser is due to the intense and coherent mono-chromatic light that, when targeted at birds, can have substantial effects on behavior and may elicit changes in physiological processes. Best results are achieved under low–light conditions (i.e., sunset through dawn) and targeting structures or trees close to roosting birds, thereby reflecting the beam. Effective dispersal of a variety of avian species has also been achieved by using "white" light (i.e., a q–beam); however, birds generally get use to the light quickly and there is a loss of effect at a distance.

Laser Classification and Safety

The avian eye generally filters most damaging radiation (e.g., short–wavelength radiation from the sun). In tests conducted with double–crested cormorants exposed to a relatively low–power Class–III B laser (see laser classification below) at a distance of 1 meter, no ocular damage was noted. However, unlike birds, the human eye, with the exception of the blink reflex, is essentially unprotected from thermal damage to retinal tissue associated with concentrated laser radiation. Therefore, standards have been set forth for laser classification and use.

Laser classification is determined by the amount of radiant power within a 7–mm aperture at a distance of 20 cm. The Class II category comprises visible lasers that emit a radiant power less than or equal to 1 mW (low–power continuous wave). The Class III B category of lasers includes moderate–power lasers (between 5 and 500 mW, continuous wave) that are generally not capable of producing hazardous diffuse reflection except for conditions of intentional staring done at distances close to the diffuser (i.e., the laser head).

Lasers tested by the NWRC include the AC–powered, Class III B, 10–mW, He–Ne, 633–nm High–Performance Uniphase Laser; the Class III B, 5–mW, He–Ne, 633-nm Desman Laser model FL R 005; and the Class II, battery–powered, 68–mW, 650–nm, diode Laser Dissuader. WS biologists currently use the Desman Laser and Laser Dissuader in the operational program. Information on regulatory authority and safety specifications for laser use in avian damage management has been compiled in Safety Guidelines For Using the Desman Laser and Dissuader Laser To Disperse Double–crested Cormorants and other Birds, a document prepared for the WS program by the NWRC. This document is available from the NWRC librarian (970–266–6010).

Safe and successful laser dispersal of birds in a variety of settings is dependent on site conditions, particularly in urban areas. The operator should consider background, range of the beam, and reflections. The nominal hazard zone (NHZ) is 12.72 m for the Desman, when considering the human blink reflex. (The Dissuader is considered eye safe for incidental exposure). For a 10–second exposure, the NHZ is 44 and 25 m for the Desman and Dissuader lasers, respectively. Lasers should not be aimed in the direction of people, roads, or aircraft. Also, laser dispersal of birds on airports is prohibited unless U.S. Federal Aviation Administration approval is obtained.

Laser Availability

The Uniphase Laser has been used only under controlled experimental conditions, with no field application. The Desman Laser was developed

specifically for bird dispersal and is marketed by Reed–Joseph International Company for approximately $8,000. The Laser Dissuader, developed as a threat deterrent security device for the military and law enforcement agencies, is considered safe for use against humans. The Dissuader is produced and marketed by Science and Engineering Associates (SEA), Inc. and available for approximately $6,500. However, SEA has developed a version of the Dissuader, designed for wildlife management applications and priced lower than their military version. This new laser, the Avian Dissuader, retains many features of the original Dissuader, but is available for approximately $1,000. Currently, biologists with the WS program in Mississippi use the Desman Laser to disperse double–crested cormorants from night roosts proximate to catfish production areas. Further, the Avian Dissuader is widely used within the WS program.

Additional Information

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Also, information on laser dispersal of birds is available from the NWRC's Bird Program at www.aphis.usda.gov/ws/nwrc.