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ABSTRACT: Ultrasonic or high-frequency sound-producing devices are marketed as a scaring or frightening method for bird control. Although inaudible to humans, most birds also do not hear in the ultrasonic frequency ranges of above 20,000 Hz, thus the credibility of advertised claims raises questions. A review of efficacy studies conducted and published by a number of researchers fails to demonstrate the usefulness of such bird control devices.

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Ultrasonic frequencies are those exceeding 20,000 Hz or cycles per second (cps). Devices emitting such sounds occasionally have been recommended by some (mostly manufacturers and distributors) for discouraging nuisance birds. Their main attraction for pest control is that ultrasonic sounds are not audible nor disturbing to man (Frings and Frings 1967). Despite user testimonials and unsubstantiated claims of advertisers, however, ultrasonic devices have not been proven efficacious for repelling birds (Griffiths 1987, Woronecki 1988).

Hearing ranges for several bird species have been measured in the laboratory by Brand and Kellogg (1939a,b) and Edwards (1943). Values ranged from 60 to 15,000 Hz (Table 1), which is well within the hearing range of man (20 to 20,000 Hz; Spear 1966) and below ultrasonic frequencies. Even if such sounds were heard by birds and caused a frightening response, they might not be practical for use, especially over large areas because ultrasonic frequencies diminish much more rapidly than audible sounds with increasing distance from their source (Spear 1966, Stewart 1974, Blokpoel 1976). In addition, ultrasonic frequencies leave "shadows" if sound waves are obstructed (Spear 1966, Fitzwater 1970). Birds also habituate to many sounds that are heard continuously or repeatedly, thus the devices would be unlikely to produce long-term control.

Laboratory and field tests have demonstrated that ultrasonic frequencies do not disturb birds to any degree. Woronecki (1988) tested an ultrasonic device (Ultrason UET-360) against pigeons (*Columba livia*) inhabiting a vacant power house in Ohio. The unit tested could produce either continuous or pulsed output sounds and was mounted on a turntable rotating twice per minute. The device was placed near a ledge used by the birds for roosting and nesting. Pigeon numbers and nesting activity were monitored during the study. The unit was operated in the continuous mode for 10 days and in the pulsed mode for an additional 10 days. The pretreatment number of pigeons was 64 to 66. Posttreatment numbers ranged from 75 for the continuous mode to 73 for the pulsed mode. Pigeons did not avoid areas where ultrasonic waves were strongest, and they built nests and laid clutches within 7 to 20 m from the operating unit. Woronecki (1988) concluded that ultrasonic sound has no value for repelling pigeons.

Griffiths (1987) tested a commercial ultrasonic unit (unspecified) against several bird species in Maryland and Virginia One site along forest edge was baited with sunflower seeds to attract birds. The feeding station was visited by several species, especially the house finch (*Carpodacus mexicanus*), dark-eyed junco (*Junco hyemalis*), white-breasted nuthatch (*Sitta carolinensis*), tufted titmouse (*Parus bicolor*), black-capped chickadee (*Parus atricapillus*), and blue jay (*Cyanocitta cristata*). The unit was also tested against house sparrows (*Passer domesticus*) perching on electrical wires prior to entering a warehouse to roost. The device produced an output of 20,000 to 50,000 Hz and was located 10 to 30 feet from the sites. According to the manufacturer, the unit provides coverage over an area approximately 100 x 72 feet. The ultrasonic sounds had no apparent effect on bird activity at either site, and use of the unit was not recommended by Griffiths (1987) for bird control.

Several tests were conducted in England to determine if ultrasonic sounds could deter birds (Wright 1963). In one test a sound generator producing 22,000 Hz and having a range of 150 feet was used to attempt repelling starlings (*Sturnus vulgaris*) from a building. The birds did not respond to the sounds. In another test with roosting pigeons and starlings, sound at 18,500 Hz, bordering ultrasonic frequency, had no effect. One company marketing a unit claimed that their ultrasonic unit, operating at 40,000 Hz was effective for dispersing birds. When their unit was tested, however, the sound produced had no discernable effect on the birds, even those present within a few feet of the sound source.

Martin and Martin (1984) evaluated the effectiveness of an ultrasonic device for repelling birds roosting on a pier tower in California. The birds included 30 to 55 cormorants: (*Phalacrocoran* spp.), 10 to 15 gulls (*Larus* spp.), and 5 to 11 pigeons. The amount and distribution of fecal pellets deposited on a rooftop below the tower was assessed before and after control to determine the effectiveness of ultrasonic sound, propane exploders, and taped distress calls. The ultrasonic unit was tested for 2 weeks and had little if any effect in dispersing the birds. The other noise-making devices, especially exploders, however, were found to be effective.

Other tests also indicated that ultrasonic frequencies do not deter birds. Kerns (1985 as cited in Griffiths 1987) unsuccessfully attempted deterring cliff swallows (*Hirundo*

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Table 1. Hearing ranges of select bird species as determined by laboratory studies.

Species	Hearing range (Hz)	Reference
Canvasback (*Nyroca valisineria*)	190–5,200	a
Great Horned Owl (*Bubo virginianus*)	60–7,000	a
Horned Lark (*Otocoris alpestris*)	350–7,600	a
Snow Bunting (*Plectophenax nivalis*)	400–7,200	a
Starling (*Sturnus vulgaris*)	700–15,000	b
House Sparrow (*Passer domesticus*)	650–11,500	b
Pigeon (*Columba livia*)	200–7,500	b
Canary (*Serinus canaria*)	1,100–10,000	c

[a]Edwards 1943
[b]Brand and Kellogg 1939a
[c]Brand and Kellogg 1939b

pyrrhonata) from nesting under eaves of aircraft hangars in Alaska by operating a 21,000 Hz rotating ultrasonic unit (Ultrason ET). Thiessen and Shaw (1957) found that Peking ducks were sensitive only to low-frequency sounds. The ducks did not respond to ultrasonic frequencies (20,000 Hz) at intensities up to 130 decibels. Spurlock (1962) reported that starlings responded to sounds in the range of 1 to 10,000 Hz but no aversive effect was noted with sounds in the range of 20,000 to 30,000 Hz.

Meylan (1978) reported that an ultrasonic device (Vitigard) was successful in reducing damage to sunflower by greenfinches (*Carduelis Moris*) in Switzerland in 1977. Damage was low during the one month the unit was operating but increased considerably after the unit was removed. As reported by Woronecki (1988) and Griffiths (1987), however, Meylan subsequently noted that the unit operated at only about 16,000 Hz. Thus, the sound waves that deterred the birds were considerably below ultrasonic frequency.

SUMMARY

It is well established that many sounds within the audible range of birds, whether startling or biologically meaningful, can repel birds, although their effectiveness may be limited as to the species, situation, and duration (Frings and Frings 1967). At the present time, however, it appears that there is little or no theoretical or scientific basis to support even a potential efficacy of ultrasonic sound-producing devices since birds generally do not hear in frequency ranges above 20,000 Hz. A review of the efficacy studies known to us conducted by various researchers fails to demonstrate the usefulness of ultrasonic bird control devices.

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