Technical Papers

Preliminary Studies on the Use of a Specific Sound to Repel Starlings (*Sturnus vulgaris*) from Objectionable Roosts[1]

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Starlings, pigeons, and occasionally other birds may become pests by roosting in large numbers on buildings or in trees in residential areas. Many methods have been tried to rid infested premises (*1*), but none has proved generally satisfactory. We therefore instituted a study of the habits of the European starling, hoping to find better means to eliminate objectionable roosts.

Starlings were collected at night during the winter in barns near State College, Pa. When the birds were held by the legs or wings, they emitted a piercing shriek. This "distress call" caused other starlings to fly out of the barns immediately, even in the dark, and they did not return, even after some months.

This suggested that a recorded distress call might be used as a repellent. Accordingly, wild starlings were induced to give distress calls by holding their legs and shaking them roughly. The calls were recorded with a tape recorder (Pentron, Model 9T-3C). About 20 sec of the call of each bird were recorded and from these a continuous hour-long tape recording was made.

The first tests with this sound were made in State College, where the midsummer roost along one street for about ¼ mi and on adjacent side streets for about 50 yd was occupied by about 20,000 starlings. When the distress call was broadcast to the starlings in 4 trees in this area, with the loud speaker of the tape recorder, the trees were cleared in 2 nights. When delivered to birds in other trees through 2 speakers of a stationary public address system for 3 nights, 10 trees were cleared. These remained free of starlings, although the trees around them were heavily infested.

The sound was applied intermittently for about 30 min before and after sunset, as the birds came into the trees to roost. Whenever the trees were cleared, the sound was discontinued and resumed only when the birds tried to return. The object was to have the trees as free of birds as possible at nightfall. They thus remained nearly free of birds all night, because starlings do not ordinarily fly in the dark.

These successes induced us to try the repellent on a bigger scale. A distance of two blocks was chosen on the street with the main roost and one block on a street joining this. A sound truck with the tape recorder driving a 30-w amplifier and 2 horns was used and treatment was as before. Within 4 nights (Aug. 25–28) the treated areas was cleared and remained clear until a later experiment, even though many starlings were present all around.

We next tried to clear a whole town (Millheim, Pa., population about 1500) of its infesting starlings. There were 10,000–12,000 birds in 2 main roosting areas. Two sound trucks were used, and the operation was directed by an observer on a building. After 3 nights of treatment (Aug. 31–Sept. 2), starting as the first birds entered the trees and concluding at nightfall, fewer than 100 birds remained in town. These were harassed for 2 more nights, and the test was discontinued. These few starlings returned the night after the last treatment, but not the following night. The town remained free of starlings until the birds left the area for the winter, about Oct. 20. Usually this town is infested until then.

We next attempted in State College to clear the roosting area in which 3 blocks had previously been treated. With only one sound truck, this whole area was cleared in 4 nights (Sept. 5, 7–9) and remained so until fall migration, about Oct. 20.

The clearance of all State College, an area of approximately 3 square miles with many trees, was attempted later (Sept. 28–30), with 2 sound trucks. At this time, there were 10,000–12,000 starlings in 2 major roosts and 2 minor roosts. Treatment was as before—one truck gave particular attention to the major roosts and the second truck to the minor roosts and the roosts which started as the birds were driven from other places. After 3 nights of treatment, about 1½ hr each night with the sound applied about 75 percent of the time, only about 200 starlings remained in this large area in 3 isolated roosts, no longer pests. This town likewise remained clear until fall migration.

The distress call is distinctly sonic; in fact, our sound equipment does not handle over 10,000 cy/sec. The intensity at which it must be broadcast on the ground to penetrate a leafy canopy is rather high, about 120 db at 1 m from the horns. When the tape recorder alone is used, however, as in the first tests against birds more than 10 m away, the peak-free field sound pressure at that distance is only about 85 db. It is disturbing to man if heard near the horns, but is not troublesome when directed upward through mobile speakers.

The distress call seems to be quite species specific. The call of the starling does not effectively repel common grackles (*Quiscalus quiscula*) or American robins (*Turdus migratorius*). Furthermore, starlings which have been in captivity for some time usually do not emit the call, or emit a variant which sounds like the cawing of a crow and is relatively ineffective against roosting birds.

Trees from which starlings have been frightened are

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avoided even by birds driven from other places. These birds fly toward the trees as if to settle, but veer off before alighting, as though there were some warning odor on the trees. This may seem strange in view of the prevalent opinion that birds lack olfactory sensitivity, but this opinion may not be correct (*2, 3*).

The use of a distress call or alarm call as a repellent may not be entirely new, but the method of application seems to be. Shooting at starlings drives them away if consistently continued (*1*), but this is expensive, dangerous, and harmful to protected species. It is certainly the sound that repels the birds, and recording with subsequent rebroadcast would obviate these difficulties.

If the general principle proves valid, it may be possible to repel other birds from objectionable roosts or from molested crops by using their distress calls. It might also be possible to use similar means to repel rodents or other mammals, or even insects such as moths (*4*), if ultrasonic frequencies are recorded and broadcast.

As far as starlings are concerned, this report must be considered as preliminary. Tests must be made in large cities, and the best times and methods of application must be determined. These studies indicate a lasting effect following the treatments, but only time will tell how lasting. Finally, much further work is needed on the habits of starlings and other pests, for this knowledge is the key to ultimate success in controlling them.

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Current Volcanic Activity in Katmai National Monument

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The combination of geological and meteorological circumstances which on July 9, 1953, caused a ¼-in. layer of volcanic ash to be deposited on the city of Anchorage (*1, 2*) focused popular attention on volcanic activity at the northern end of the Aleutian Range. The daily routine of a city of 50,000 population was unbalanced, the power and water supplies were partly disrupted, and air traffic was temporarily halted at three of the nation's busiest fields by a single, relatively minor volcanic eruption. This incident served to point up the timeliness of the National Park Service's emphasis on volcanology in investigations in Katmai National Monument during the summer of 1953 and the pertinence of the extended studies in the Aleutian Range by the Geological Survey's Volcano Investigations Unit (*3*).

Within the limits of the Monument are 15 recently active volcanoes. The spectacular activity in February of one of these, Mount Trident, has subsided to slow extrusion of very viscous blocky lava, accompanied by steady vigorous steaming. Six other volcanoes, Martin, Mageik, Novarupta, Knife Peak, Kukak, and Douglas, steamed with varying degrees of intensity during the summer of 1953.

Air photographs taken in July, 1951, showed Mount Trident, an eroded volcano without historical record of previous eruption (*4*), to be steaming from a vent at an altitude of approximately 3600 ft, southwest of its middle peak. On February 15, 1953, activity of this vent entered a violent phase that continued for several days with a series of explosive eruptions sending clouds of steam and ash to altitudes of 30,000 to 35,000 ft. Although the volcanic clouds were not visible from Kodiak, they were clearly seen and photographed from King Salmon, 70 mi to the west-northwest. On February 18 aerial observers noted a flow of viscous lava being extruded from the vent. During subsequent months the plume of steam and ash was frequently seen, rising a mile or two above the cone.

On June 19 a base camp was established on Knife Creek near the foot of Trident Volcano. From this point short trips were made throughout the Monument, and all the major peaks were visited.

From June to September Trident's activity was marked by quiet extrusion of lava accompanied by steady, moderately vigorous steaming. The flow is dark brown and blocky on the surface, but it continues to steam from hot viscous lava beneath. The flow continued to spread on the west margin, greatly increasing in volume without any evidence of abatement toward the end of the summer. Quiet steaming continues both from the new fumarolic area at an elevation of 4200 ft southeast of the middle peak (*5*) and from a large fumarole several hundred feet downslope (*6*). There is no sign of lava extrusion at either fumarole, but marked incrustation of yellow sublimates has occurred at the upper one.

During June Trident's plume of steam was visible on clear days from the shore of Bristol Bay, 80 mi to the west. Several times, with suitable winds, it spread far enough west to restrict visibility at King Salmon, and in early June traces of ash were reported on the vegetation 90 mi west-southwest at Egegik. On July 12 streamers of pyroclastic material were reported falling from the plume near the cone. In general, however, the cloud consists principally of steam with occasional small amounts of ash. Within a radius of about 10 mi of the cone, an inch or more of ash from the February eruptions mantles late-lasting snowdrifts, retarding their melting to about one-fifth of the normal rate.

In recent years Mount Martin, a 6050-ft peak 11 mi southwest of Mount Trident, has been one of the steadiest performers in this part of the Aleutian

[1] Deceased.