Temperature preference tests of seagulls

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TEST REPORT

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TEMPERATURE PREFERENCE TESTS OF SEAGULLS

BY

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TEST REPORT

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For: Associate Committee on Bird Hazards to Aircraft.

Subject: TEMPERATURE PREFERENCE TESTS OF SEAGULLS.

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Head
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SUMMARY

The experiments conducted with seagulls indicated that a bird placed in a cage where one-half of the floor was 30° F. warmer than the other, selected the warm side in preference to the cold in 8:1 ratio. However, one bird in three did not select either side decisively.

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TEMPERATURE PREFERENCE TESTS OF SEAGULLS

1. INTRODUCTION

In 1963 the Low Temperature Laboratory was requested by M.S. Kuhring, Chairman of the Associate Committee on Bird Hazards to Aircraft, to conduct a test showing whether birds, given a choice, would sit on a warm surface in preference to a cold one. This question arose during a discussion on why birds, and specifically seagulls, would gather on airport runways rather than on the surrounding grounds. The pavement can be several degrees warmer than the grass-covered ground, and it is possible that warmth is the factor attracting birds. Everyday observation would seem to confirm this, but it seems that no controlled experiments have been reported in the literature. It was, therefore, considered that such an experiment would be worth conducting. It was recognized that temperature is only one of the factors that could affect the birds' choice.

As we have had little experience with tests on biological material, we asked for the help of Dr. Munro and Mr. Benson of Canadian Wildlife Service and Dr. Hart of the N.R.C. Biosciences Division to design a proper experiment. Their help and advice is gratefully acknowledged.

Preliminary tests were conducted in September 1963, in order to perfect the equipment and the procedure. About 20 experiments with single birds were conducted, and the trend towards selection of a warm surface was evident in these tests.

In May of this year, through the courtesy of the Canadian Wildlife Service, 26 ring-billed gulls were obtained and the preference tests conducted in June are described in this report.

2. TEST DESCRIPTION

Each bird was placed separately in the cage, out of view of his companions, in order to avoid influence of one bird over another. Half of the floor in the cage was heated, the other half unheated, and the time spent by the bird on each half was recorded. The cages were positioned in the cold chamber in such a way that all conditions, including light and shadow, were identical.

3. TEST EQUIPMENT

The cages were 3 x 5 x 3 ft. high. The floor was of galvanized sheet metal, one half of it heated by electric resistance wire. The heated side was immovable, the other half was hinged and rested on two microswitches. The weight

of the bird tripped the microswitches and the signal was obtained, indicating that the bird was on the cold side. With supporting springs properly adjusted, the signal was given when the bird moved only a few inches past the centreline. A drawing of the cage is shown in Figure 1. Six cages in the cold chamber, used in each test, are shown in Figure 2.

A thermocouple was soldered in the middle of each panel and connected to an automatic recorder. The ambient temperature was also measured at each end of the row of cages. Fourteen temperatures were recorded altogether.

The microswitches were connected to a multi-point event marker, and each movement of the bird to the cold panel was recorded.

4. TEST PROCEDURE

It was decided that the experiment would be done at three ambient temperature levels: 10, 25 and 40° F. The difference between the hot and cold panel was set initially at 10° F. However, as the variations between floor temperatures of the individual cages were of the same order, this difference was increased to 25 to 30° F.

At each level, all temperatures (ambient and floor panels) were stabilized before the birds were placed in the cages. They remained in the cages for three hours, one hour to adjust to the conditions, followed by two hours in which measurements were made. At the end of each hour they were chased around the cages to ensure that they did not stay immobilized in one spot throughout the test.

The birds were divided into groups of six and each group was used in turn. The same group returned to the cold chamber every fifth test, and every bird was used three or four times during the experiment. They were not fed on the day of the test, and, indeed, not since the previous morning.

After the test, the time spent by each bird on each side was counted. It was arbitrarily decided that a positive answer was obtained if it had spent at least 75 percent of the time, or 90 minutes, on one side. Below this figure the answer was considered negative; the bird was undecided.

The automatic recording of bird position failed occasionally, and it was found necessary to supplement it by visual observation. This was done from outside the chamber through narrow slits cut in window blinds, so that the bird was not disturbed by the observer. Observations were made at half-hour intervals, the bird position was marked on the recording paper, and any faults in the equipment, such as jamming of the movable panel, were corrected immediately.

5. RESULTS

The experiment consisted of 14 tests, each using six birds. The results are summarized in Table I, which shows the conditions of test, length of time spent by each bird on each side and the preference of each bird.

The tests were started at ambient temperature of 10° F. (tests 1 to 3). The answers obtained were:

Cold preference	-	3
Hot preference	-	6
No decision	-	6
Rejected	-	3

It was observed that the birds were not very active, tended to squat in one place, and sometimes moved only when forced. This last bearing is also marked in the Table.

At higher temperature levels of 25 and 40° F. (tests 5 to 10), the following preferences were obtained:

Cold	-	1
Hot	-	24
No decision	-	11

The behaviour of the birds was different, they were more active, walking around the cages, sometimes attempting to fly, and to stand rather than squat.

Repeated tests at 10° F. (test 11 and 12) confirmed the observations of their behaviour and obtained preferences were:

Cold	-	1
Hot	-	7
No decision	-	4

In the next test (No. 13), conducted also at 10° F., the heating of the hot panel was increased from 30 to 50° F. above the cold side. Among six birds, five showed Hot preference, one was Undecided.

The two "special tests" (No. 4 and 14) applied different procedures and are described in the following Section.

6. DISCUSSION

In the first series of three tests at 10° F. a high ratio of Cold to Hot preferences was obtained and a substantial number of birds were "Undecided". These birds moved from one side of the cage to the other, seemingly not feeling the warmer surface, or not being attracted by it. The experiment at this time did not seem to show a clear-cut preference to a warm surface.

At higher ambient temperatures of 25 and 40° F. a different behaviour of the birds was noted. They were more active, wandered around the cages, and did not tend to squat in one place. In this series only one Cold answer to 24 Hot was obtained. "Undecided" answer was received 11 times.

It appeared to us that, when the temperature went down from 25 to 10° F., the cold affected them strongly, their conduct changed, and this reflected a changed distribution of preferences.

To confirm these observations we repeated the test at 10° F., and similar observations were made. This time one Cold answer to seven Hot and four Undecided was obtained.

In the next test, the difference of temperature between cold and hot panel was increased to 50° F. At this condition five birds showed Hot preference, one was Undecided, none chose Cold. This seems to indicate that, when the ambient temperature drops to 10° F., a higher temperature difference is required to be attractive to the birds.

A different procedure was tried in two "special" tests (No. 4 and 14). In these tests, during the first three hours, the panels were unheated, therefore, the whole floor was at a uniform cold temperature. During the following three hours the hot panels were heated in the usual way. The observations were made during the last two hours of each period in the standard way. The answers should show random distribution of preferences in the first period, and an obvious shift towards Hot preference in the second period. It should be noted that "Hot" and "Cold" in the first period indicates only the side of the cage and not the temperature.

One "special" test was conducted at 10 and one at 25° F. In the first period, Cold and Hot answers were received at random, as expected; in the second

period, however, one Cold answer was obtained in both tests. The results of these two tests are not included in the total count, presented in Section 7.

More tests would be required to confirm all these observations. However, the birds, having been used three or four times already, were perhaps trained to the situation, and it was considered that there was no point in continuing the experiment with the same birds.

7. CONCLUSIONS

7.1 The gulls showed an inclination to choose a hot surface in preference to a cold one; the answer, however, was not unanimous. From 12 tests, including 69 single bird experiments, the answers were as follows:

Cold preference	5	or	7 percent
Hot preference	42	or	61 percent
No decision	22	or	32 percent

7.2 The least decisive answer was obtained at the lowest temperature of 10° F. At this level, after five tests involving 27 single experiments, the distribution of answers was as follows:

Cold	4	or	15 percent
Hot	13	or	48 percent
No decision	10	or	37 percent

At this temperature the birds were visibly less active, and perhaps the difference of 30° F. was not large enough to be sufficiently felt by the bird. When, in one test, the difference was increased to 50° F., five of six birds chose the Hot side.

7.3 The preference to warm areas was shown to exist at relatively high temperature differences, 30° F. or more, which is more than could normally be expected on the paved surface. It seems, therefore, that in choosing the runway to sit on, the birds are influenced by other factors, such as surface appearance, roughness, moisture, etc., perhaps more than by temperature.

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TABLE I

SUMMARY OF TEMPERATURE PREFERENCE TESTS OF GULLS

Test No.	Ambient Temp. °F.	ΔT °F.	Cage Number 1	2	3	4	5	6
1	$8^{\pm 2}$	$22^{\pm 3}$	R	R	84 36	C f91 29	69 51	H 30 90
2	$7^{\pm 2}$	$24^{\pm 4}$	R	C f98 22	89 31	H 10 110	68 52	C 108 12
3	$9^{\pm 3}$	$25^{\pm 4}$	H f 0 120	33 87	H 3 117	H 19 101	58 62	H 16 104
4a	$4^{\pm 4}$	0	H $\frac{1}{2}$ $119\frac{1}{2}$	49 71	R	C 94 26	H 12 108	H $29\frac{1}{2}$ $90\frac{1}{2}$
4b	$11^{\pm 2}$	$33^{\pm 3}$	74 46	43 77	44 76	C 105 15	H 5 115	45 75
5	$20^{\pm 3}$	$30^{\pm 5}$	H 3 117	52 68	H 8 112	H 12 108	H 0 120	H 4 116
6	$22^{\pm 3}$	$26^{\pm 5}$	43 77	68 52	H 13 107	H 4 116	H 15 105	34 86
7	$23^{\pm 1}$	$27^{\pm 5}$	H 4 116	f85 35	H 2 118	H 1 119	H 3 117	53 67
8	$24^{\pm 1}$	$30^{\pm 4}$	H 2 118	56 64	H 2 118	H 23 97	38 82	72 48
9	$35^{\pm 1}$	$30^{\pm 4}$	H 23 97	H 2 118	H 10 110	36 84	H 4 116	H 2 118
10	$41^{\pm 1}$	$30^{\pm 3}$	H 13 107	C 116 4	H 15 105	34 86	H 20 100	H 30 90
11	$4^{\pm 5}$	$29^{\pm 3}$	C 105 15	40 80	f56 64	H f 0 120	H 5 115	H 30 90
12	$5^{\pm 3}$	$25^{\pm 5}$	H 0 120	H $\frac{1}{2}$ $119\frac{1}{2}$	H 21 99	H 29 91	84 36	65 55
13	$7^{\pm 2}$	$52^{\pm 5}$	H f 0 120	H 17 103	H 1 119	H 3 117	f56 64	H 8 112
14a	$21^{\pm 1}$	0	H 11 109	C 93 27	C 110 10	H 5 115	H 1 119	79 41
14b	$24^{\pm 1}$	$30^{\pm 3}$	H $\frac{1}{2}$ $119\frac{1}{2}$	58 62	33 87	H 6 114	H 3 117	C 90 30

Upper number indicates time in min. on Cold side, lower number on Hot side.

C COLD preference (90 min. or over on Cold side)

H HOT preference (90 min. or over on Hot side)

R Rejected, failure of equipment

f Bird will not move unless forced

FIG. 1,2
MET-460

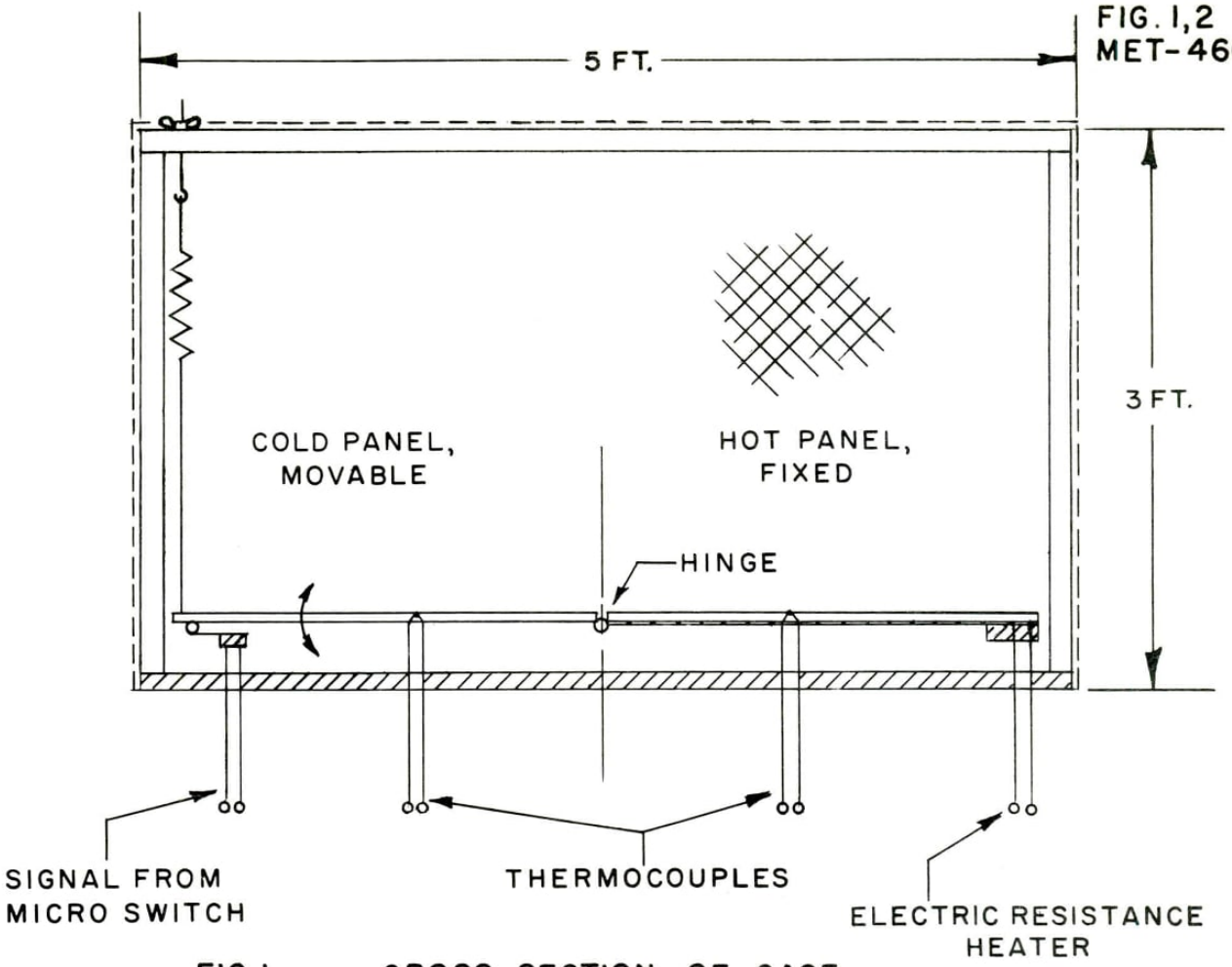

FIG. 1 CROSS-SECTION OF CAGE

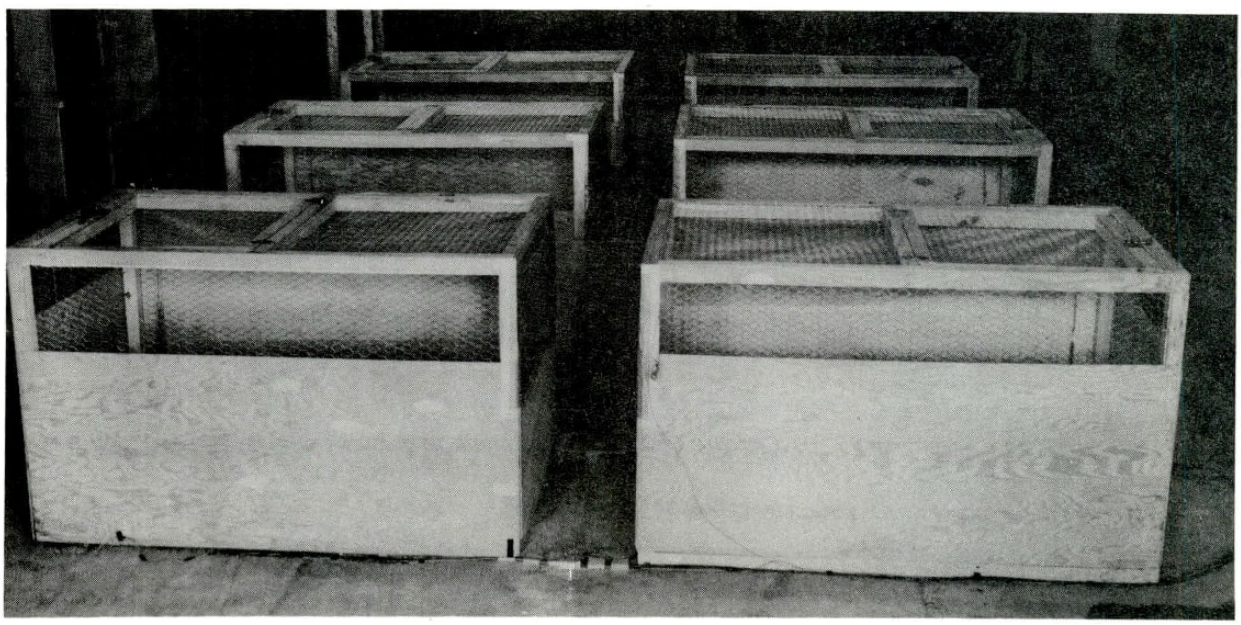

FIG. 2 CAGES IN COLD CHAMBER

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J. J. Samolewicz. September 1964. 8 pp. + 2 figs.

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