DISPERSAL OF GULLS FROM THE AIRPORT ENVIRONMENT

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Introduction

According to U.S. Air Force records and information contained in the report of the Ninth Meeting of the BSCE, gulls are the most frequent species involved in air strikes with both civil and military aircraft. As significant proportions of these gull-aircraft collisions have occurred during landing and take-off, long term dispersal of gulls from the immediate airport environment is important.

Numerous dispersal procedures have been developed with varying degrees of effectiveness. Scaring procedures, including playback of distress calls and use of pyrotechnics, have generally not achieved long term dispersal of the gulls. These birds tend to return to the scaring site relatively quickly, and may habituate to the procedures used.

Over the past two years we have developed more effective dispersal procedures with the support of contracts from the U.S. Air Force, and the Smithsonian Institution.

Saul (1967) reported effective long term dispersal by using formalin preserved corpses of gulls. Based on these results and our previous work with sea gull models we have successfully developed artificial models of gulls and have structured a dispersal program involving the use of these models and distress call playbacks.

Methods

Experiments and observations on aggregations of the Glaucous-winged Gull (Larus glaucescens) were made on Shemya Island, Alaska between 5 August and 22 August 1973.

Studies were conducted on aggregations of Ring-billed Gulls (Larus delawarensis) at Ellington AFB, Texas and 1 January to 18 January 1974. The experiments made at Ellington AFB were based on the results of our work at Shemya AFB.

Experiments were conducted on Colville Island, Flower Island and the Whidbey Naval Air Station (WNAS) Sanitary Landfill. These

experiments were conducted between 0600 hrs [illegible] June to 21 August 1974. Experiments in a [illegible] Distress call were conducted only at the end of the reproductive season so as to cause as little disturbance as possible.

Four types of models were constructed [illegible] of a taxidermy mounted head and neck of a [illegible] wooden body of approximately the normal body shape and size. Real wings were folded and attached to the wooden body. The second model type was similar to the one just described except the head, neck and wings were molded from fiberglass components, painted and had body colors of L. glaucescens, and attached to the [illegible] model type was a complete taxidermy mount of [illegible] used in conjunction with the fourth model type which was a molded fiberglass whole mount of a dead gull.

Experiments Using Visual Stimuli

Two taxidermically mounted model gulls [illegible] placed on the mudflat along the west side of the [illegible] Island where gulls frequently aggregated. The [illegible] by the gulls was noted.

At Ellington AFB six gull models were constructed [illegible] of a taxidermy-mounted head and neck of a [illegible] wooden body of approximately the normal body size [illegible] for each experiment in the Aggressive Upright display posture [illegible] 1959). Wings were folded and attached to the wooden [illegible] models. The sixth model had the wings outstretched as before [illegible] These models were placed in areas where gulls were frequently observed. Time was recorded [illegible] models, to the return of the first bird. The behaviors of [illegible] gulls were carefully noted.

The following experiments were conducted at the [illegible] Landfill near Ellington A.F.B. to determine the effectiveness of the models in different positions.

i Model in upright with wings [illegible]
ii Model lying on its side with wings raised
iii Model upright with wings outstretched

Based on the results of the above three experiments, a [illegible] was conducted to test the dispersal effectiveness over a long period of time. This was done by placing three models (one model lying on [illegible] with wings folded) in an area that consistantly [illegible]. Models were left in place for eight days and [illegible]

A control was made for the effect of [illegible] dispersal behavior of gulls. This was done by [illegible] cation of gulls with no model. Time was recorded [illegible]

towards the gulls began until the moment the gulls returned. This enabled us to differentiate between effect of the model and human disturbance.

Model/Sound Experiments

The Glaucous-winged Gull Distress call was tested for its effect on gulls in a breeding colony. The Distress call was played at 5 minute intervals for 15 seconds, the total experimental time being 30 minutes.

The number of birds in a prescribed area were recorded before and after each call. Time was also recorded from the moment the sound stimuli ceased to the moment the first bird returned. Two series of sound experiments were conducted. They are as follows:

The Distress call consisted of a 15 sec. tape loop that was started at random spots on the tape loop.

The Distress call consisted of different 15 second calls taken from a continuous recording.

The proportion of birds remaining after the call was determined.

A number of model experiments were conducted with models in different positions. The function of these experiments was to determine combination of models with sound to see if model types make any difference in keeping gulls away from a prescribed area. Experiments were run both with and without the Distress call. In each experiment where the Distress call was used, the call was played at 10 minute intervals for 15 seconds. In the experiments where no call was used observations were made on the same 10 minute interval. The number of birds in a prescribed area were recorded before and after the call or the placing of a model. Time was recorded from the moment the sound stimuli ceased to the moment the first bird returned.

The model experiments with an imitation fiberglass head, neck and wings mounted on a wooden body in the Upright posture are referred to as the "imitation model". The model with a real head, neck and wings mounted on a wooden body in the upright posture are referred to as the "real model". The taxidermy mount of a complete dead gull is referred to as the "real whole mount" and the fiberglass model of a complete dead gull is referred to as the "imitation whole mount".

The series of experiments conducted were as follows:

One imitation model lying on its side was placed in territories and used with the Distress call until 20 experiments were recorded.

One real model lying on its side was placed in territories and used with the Distress call until 25 experiments were recorded.

Two models, both imitation and real, standing upright or lying down were placed in territories and used with the Distress call until 10 experiments were recorded.

Two models both imitation and real were either standing upright or lying down, were placed in territories and used with no Distress call until 10 experiments were recorded.

One real whole-mount was placed in territories and used with the Distress call until 11 experiments were recorded.

One imitation whole mount was placed in territories and used with the Distress call until 11 experiments were recorded.

Dispersal Experiments

Dispersal experiments using models and Distress calls were conducted at the WNAS Sanitary Landfill. Data was collected on the behavior of birds subjected to models and Distress calls. Experiments consisted of a 15 second Distress call, played with an imitation and real models lying on their side and the imitation whole mount. The number of birds before and after the placing of models or the playing of the Distress call was noted. Time was recorded from the beginning of the sound stimuli to the moment the birds returned. Particular attention was given to how long the birds stayed away.

Habituation to Sound Stimuli

Experiments with the Glaucous-winged Gull Distress call played in a colony showed that when a 15 second call recorded on a tape loop was played repeatedly, habituation occurred rapidly (Figure I). After six repetitions of the calls on this loop, 5 minutes apart, 33% of the birds in a given area remained unaffected by the call. When a continuous recording was played for 15 seconds at 5 minute intervals habituation was not as apparent (Figure I). In this series the Distress call was different for each interval and depending on the nature of the call the response was different. The calls that contained high shrill shrieks were observed to be more effective in causing birds to fly than low intensity calls.

Dispersal Using Visual Stimuli

At Shemya AFB, Glaucous-winged Gulls continued to come to the Upper Lake following placement of two model gulls in an upright position (Figure II). However, the day after the models were placed, a fox knocked one of the models on its side. Following this incident no birds were seen at the lake until the models were removed two days later. During this time birds used the Middle Lake for drinking and washing, a lake which had not been used by the birds previous to the placement of the models at the Upper Lake. Also, during this time we frequently saw gulls fly over the Upper Lake without landing. Following removal of the models, birds were seen on the Upper Lake again within six hours.

Table I summarizes the results of experiments with real models on the dispersal of Ring-billed Gulls from the vicinity of the Pasadena Sanitary Landfill near Ellington AFB. The models in the upright position with wings folded, proved least effective in causing gulls to disperse. Gulls readily returned near this model, but always remained 50 feet or so away.

The models on their sides with wings folded were effective in dispersing gulls for long periods of time (as long as eight days). The same was true for the model in the upright with wings outstretched. The effectiveness of this model appeared to be enhanced by wind blowing the primary feathers back and forth.

The typical response of the gulls to the models was similar to that observed to an injured or dying gull. Gulls would initially circle the models, sometimes in a dense mass. This would take place for two or three minutes with the circles becoming larger and larger. The gulls would then completely leave the area.

The control for the model experiments demonstrated that the reaction to the models was not the result of human disturbance as gulls returned almost immediately when disturbed by a human approaching their aggregations without placing gull models at the aggregation site. The experiment testing the effectiveness of models over long periods of time (eight days) indicated that as long as the models were present no gulls returned. Certain limitations were observed with the taxidermically mounted models. After extended periods of field use, the models began to deteriorate due to wet weather and insect infestation.

On one occasion approximately 750 gulls were observed loafing on the airfield at Ellington AFB. This large aggregation consisted of three groups situated at the beginning of runways 35, 17, and also 50 yards north of the center taxiway. Transit Alert attempted to disperse the gulls by driving their truck through aggregations only to find the gulls flew and quickly settled again close by. With the use of models and distress call playback, these gulls were cleared from the aerodrome within five minutes. It was shown that for the models to be effective they must first be visible to birds on the ground. It was therefore, necessary to raise the gulls off the ground

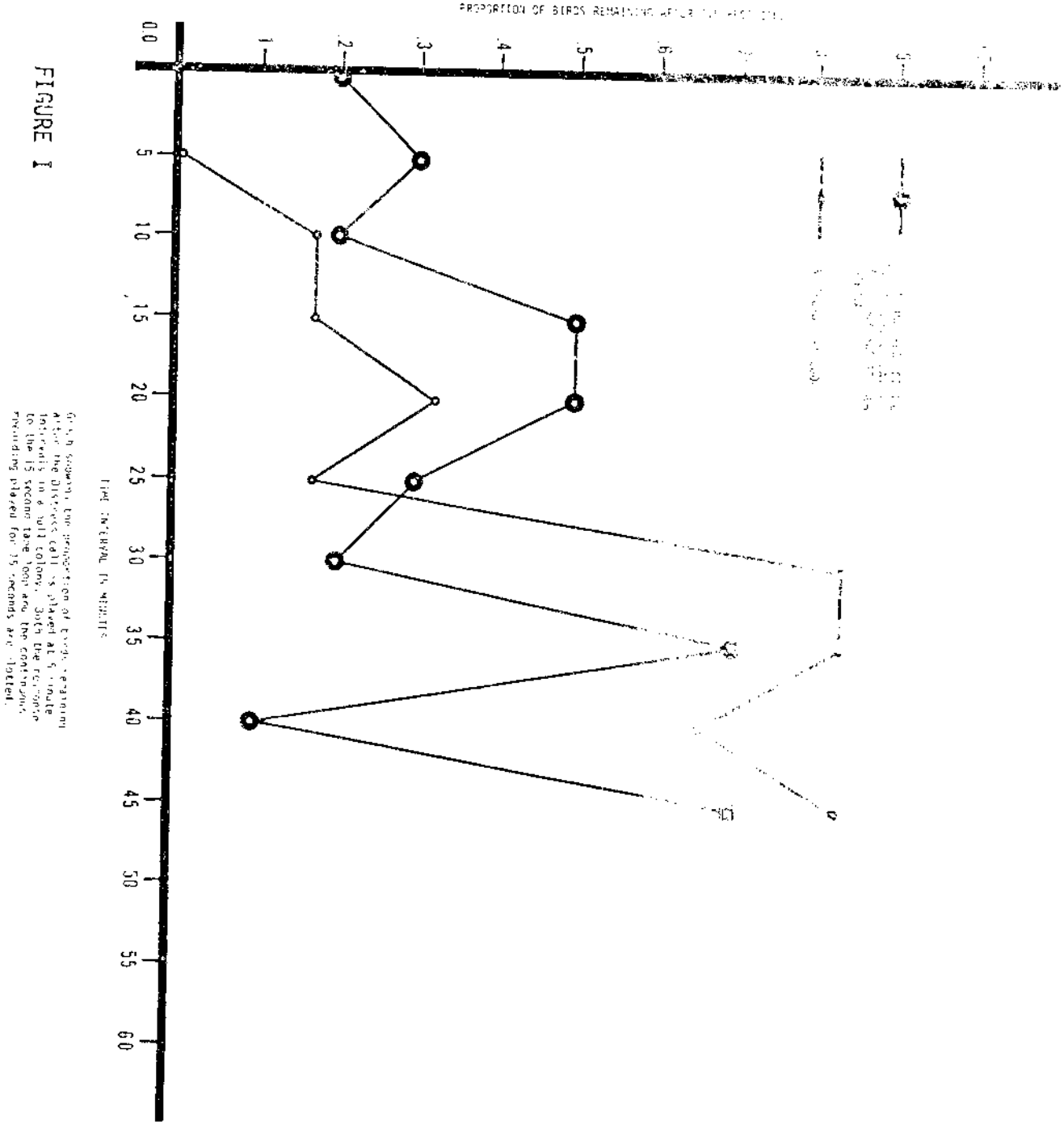

FIGURE I

Graph showing the proportion of birds remaining after the Discrete Cell is placed at 5 minute intervals in a full colony. Both the regression to the 15 second time mean and the continuous recording played for 15 seconds are plotted.

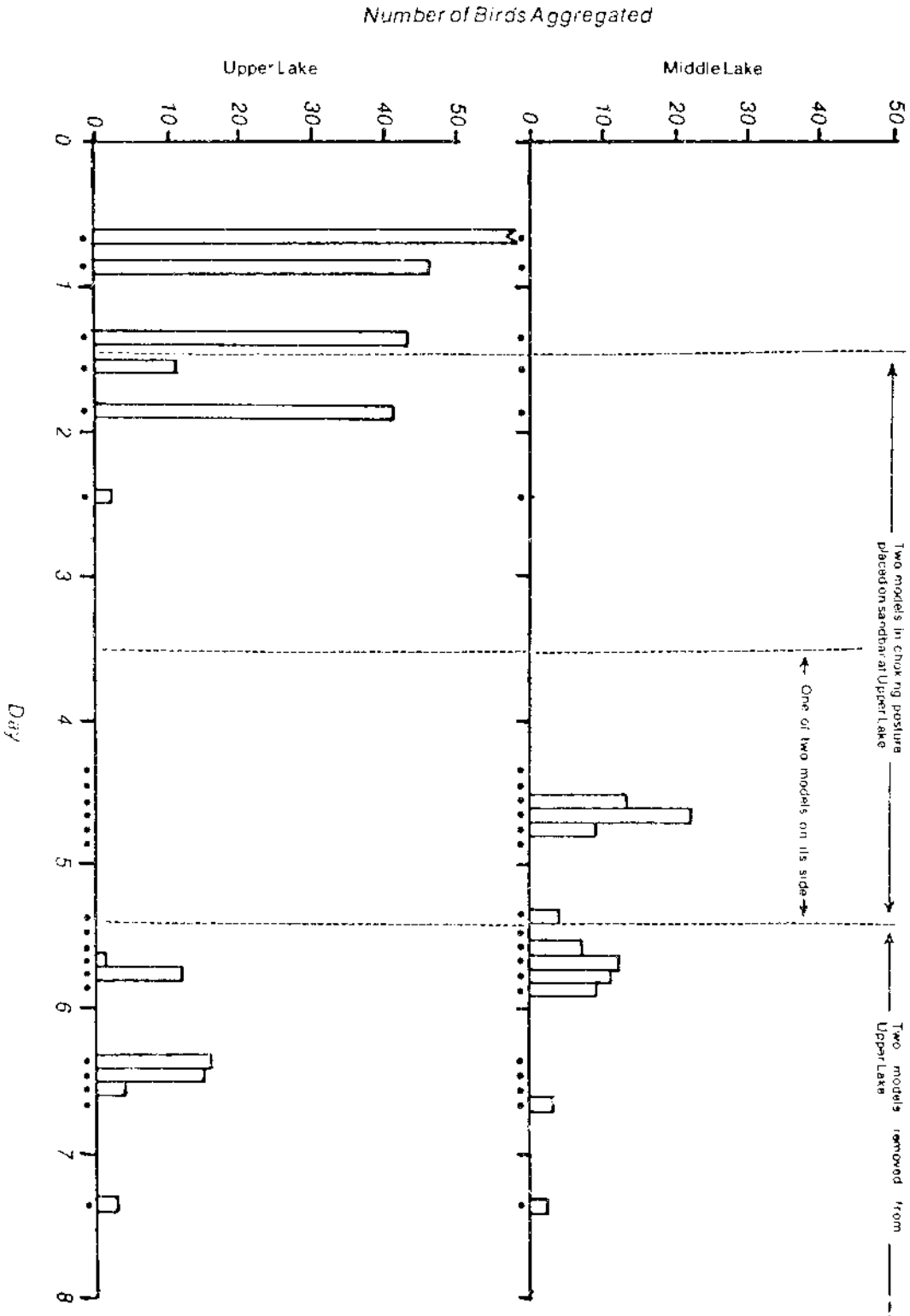

Figure II. Comparison of aggregations of the Glaucous-winged Gull (Larus glaucescens) on the Upper and Middle Lakes, Shemya Island, in response to two static models placed on a sandbar of the Upper Lake. The dots (.) below the x-axes denote times of observation.

TABLE I The dispersal effectiveness of models mounted in different positions for Ring-billed Gulls.

NUMBER OF BIRDS	NUMBER OF MODELS	TIME FIRST BIRDS RETURNED	LENGTH OF EXPERIMENT
i. Model upright with wings folded			
400	3	5 min	5 min
325	3	50 min	120 min
255	4	4 min	5 min
170	4	3 min	5 min
ii. Model on its side with wings folded			
125	3	-	200 min
175	3	*1 min	120 min
225	1	-	240 min
350	3	-	120 min
325	3	-	120 min
440	3	-	90 min
365	2	-	90 min
iii. Model upright with wings outstretched			
225	1	-	30 min
1,300	1	-	120 min
250	1	-	120 min
325	1	-	120 min
380	1	-	200 min

*Left after 30 seconds

with the Distress call. The gulls then from the air began to exhibit the typical behavior pattern of flocking over the models and leaving the entire area.

Dispersal Due to Model/Sound Experiments

The results of the model/sound experiments conducted in a breeding colony of Glaucous-winged Gulls are summarized in Table II. No distinct habituation was observed in these experiments in fact in many cases the reverse was found to be true. The imitation model on its side reinforced with the Distress call was demonstrated to have the least proportion of birds remaining after the call. The gulls however, returned fairly rapidly. In all the experiments involving models reinforced with the Distress calls the gulls that returned would not settle close to the models. In fact in many experiments there seemed as if an invisible fence was placed 5 feet around the model. In experiments involving just real models, the proportions of birds remaining after the call were the greatest.

The experiment involving a combination of models used with no Distress call was observed to have the shortest time for the first bird to return. When the Distress call was played back, it was observed that the mean time for the first bird to return was doubled indicating the effect of the Distress call. The experiments with the real and imitation whole mounts were shown to have consistently longer times for the first bird to return. The imitation whole mount with Distress call had not only the longest time for the first bird to return but also had a low proportion of birds remaining.

Dispersal Experiments at UNAS Sanitary Landfill

Table III summarizes the results of experiments conducted at the UNAS Sanitary Landfill. Models reinforced with sound proved effective in keeping gulls away from certain areas. When models were placed close to a food source keeping gulls out for a long period of time was difficult. As soon as one gull landed the rest would soon follow. This was observed when both the imitation or the real models were present. In all cases gulls would not stay close to the models but would remain 5 feet or so away. The imitation whole mount was probably the most effective in preventing gulls from landing. No gulls were observed close to this model. It was noted that all the models must be visible at all times for maximum effectiveness.

The reaction of the gulls to the models was similar to that observed in previous studies. The gulls would initially circle the models with the circles becoming increasingly larger. After two or three minutes the gulls completely left the area. Gulls returning to the landfill would observe the models, fly low over them and land some distance away or in many cases leave the area entirely.

TABLE II

The results of experiments conducted to show the effect of different model/sound combinations in keeping Glaucous-winged gulls out of their territory.

EXPERIMENT	MEAN PROPORTION OF BIRDS REMAINING	S.D.	MEAN TIME FIRST BIRD RETURNED	S.D.
An Imitation Model on Its Side with Distress Call	.02	.08	21.1 seconds	13.79
A Real Model on Its Side with Distress Call	.13	.24	27.0 seconds	17.8
A Combination of Models with Distress Call	.12	.17	39.2 seconds	24.4
A Combination of Models with No Distress Call	.05	.06	.19.4 seconds	9.8
Real Whole Mount with Distress Call	.16	.16	39.7 seconds	26.5
Imitation Whole Mount with Distress Call	.07	.11	53.0 seconds	27.5

TABLE III

The dispersal effectiveness of different models for Glaucous-winged Gulls

NUMBER OF BIRDS	NUMBER OF MODELS	TIME FIRST BIRD RETURNED	LENGHT OF EXPERIMENT
i Imitation Model Lying on Its Side			
50	2	20 minutes*	20 minutes
75	2	---	60 minutes
60	2	---	60 minutes
75	2	35 minutes *	35 minutes
30	2	---	60 minutes
ii Real Model Lying on Its Side			
50	2	20 minutes*	20 minutes
75	2	---	60 minutes
60	2	---	60 minutes
75	2	35 minutes*	35 minutes
30	2	---	60 minutes
iii Imitation Whole Mount			
75	1	---	120 minutes
40	1	---	60 minutes
25	1	---	60 minutes
50	1	---*	60 minutes

* Models were placed close to food source

Discussion

The possibility that habituation [illegible] Distress calls and the fact that these calls [illegible] permanent removal of gulls caused us to [illegible] the preliminary experiments with models [illegible] Apparently, the gulls perceived the model [illegible] injured gull and would not land in the area [illegible] that crucified corpses of gulls tested at the [illegible] Airport, New Zealand, elicited similar responses [illegible] Gulls (Larus dominicanus) and Red-billed Gulls (L. novaehollandiae scopulinus).

The experiments conducted at the [illegible] Ellington AFB proved that models were definitely [illegible] ing gulls. Significantly, gull models mounted [illegible] tion with wings folded were not effective [illegible] the models flying on their sides or upright [illegible] provided a stimulus that would disperse [illegible] ficant that before a large aggregation of [illegible] respond to the models placed on the airfield [illegible] first had to be stimulated with the Distress call so that they could see the models from the air. This demonstrated [illegible] a combination of the Distress call played [illegible] vide a more effective stimulus for disp [illegible] using the Distress call or models alone.

However, the models were quickly [illegible] tests were made with fiberglass as a material [illegible] of movement and/or sound to the models [illegible] effectiveness.

Habituation to the Distress call [illegible] models beside a gull colony (Figure 1). [illegible] made by Graves (1952) who experimented with [illegible] solely outside a colony. In the non-colonial [illegible] made on Stewart Island and Ellington AFB, [illegible] habituation to the Distress call. It must be [illegible] requisite total of breeding birds in a colony [illegible] predicting the effectiveness of the Distress [illegible] habituation was observed to be not as [illegible] calls were played as with the continuous [illegible]

Models associated with Distress calls [illegible] no noticeable habituation in the colonies [illegible] the Distress call the gulls would fly [illegible] models. The flight of most birds was [illegible] territories took place rapidly. When [illegible] by the gulls over territory the models were [illegible] frequently [illegible] more circling periodically. [illegible] When the gulls finally landed the birds [illegible] the territory away from the models. [illegible] model was played the same 15 second call [illegible]

with no model was habituated too rapidly as cited above. It was apparent that the gulls must associate the Distress call with the model causing the absence of habituation.

The imitation model on its side with the Distress call was the most effective model/sound experiment causing the least proportion of birds remaining after the experiment (Table II). It was interesting to note that the gulls returned rapidly to following this experiment. The imitation model alone was not successful in keeping the gulls away. A combination of models which included both the real and imitation models placed side by side showed that the mean time for the first bird to return was greatly increased, and had the longest time for the first bird to return in all the wooden body model experiments. Without the Distress call the combination of models showed very short times for the first bird to return. This again indicates the importance of using the Distress call with models for maximum effectiveness.

Experiments were also conducted in a non-colony situation at the WNAS Sanitary Landfill (Table III). All the models were found to be effective in dispersal. It was noted however, that when large quantities of food were present the gulls would overcome the fear of the models and land close by. In no instances did the gulls stay close to the models but would always stay 5 or 6 feet away. In all cases of gulls returning, a single gull first took the initiative and landed, followed soon by others. A second burst of the Distress call however, would rapidly cause the birds to leave again. With the imitation whole mount no gulls were observed to return near the location of the model. It can be assumed that the imitation whole mount was the most effective model used in conjunction with the Distress call to cause gull dispersal.

The results presented in this paper clearly indicate that imitation model seagulls have been developed that are effective in gull dispersal. It was shown that there is a definite model sound association that substantiates the added effectiveness of having both sound and visual stimuli. Use of models may achieve a permanent dispersal of gulls from critical areas.

Literature Cited

1. Brown, R.G.B. 1962. "The reactions of gulls (Laridae) to distress calls". Annales des Epiphyties 13:153-155.

2. Saul, E.K. 1967. "Birds and aircraft: A Problem at Aukland's new International Airport". J. Royal Aeronautical Soc. 71:366-376.

3. Tinbergen, N. 1959 "Comparative studies of the behavior of gulls (Laridae): a progress report". Behaviour 15:1-70.