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BASH TEAM STUDY AT DARE COUNTRY BOMBING RANGE, NORTH CAROLINA, USA

T Adam Kelly
BASH Project Manager
Geo-Marine Inc
550 E 15th ST
Plano TX
75086 USA

ABSTRACT

The paper contains a summary of the project at Dare County Bombing Range to quantify the effects of military aircraft on endangered species and the risk of bird strikes. An outline is given of the radar and telemetry equipment used.

(Keywords: Radar, Bombing Range, Endangered Species)

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T Adam Kelly, BASH Project Manager, Geo-Marine Inc, 550E 15th ST, Plano TX, 75086, USA

The United States Air Force Bird Aircraft Strike Hazard Team (BASH Team) has contracted Geo-Marine Inc (Plano, TX) to construct and operate a mobile radar installation at the Dare County Bombing Range (DCBR), North Carolina, USA. The objective of the study is to:

a) Investigate the effects of low level bombing missions on migratory birds.
b) Quantify the risk of a bird strike to aircraft operating at the range.

The United States Fish and Wildlife Service (USFWS) first raised the question of the effects of low level military aircraft on the migration of "endangered" species through the Alligator River National Wildlife Refuge (AR NWR) in 1988. The AR NWR almost entirely surrounds the DCBR. The endangered species concerned were never specified to the Air Force. Concerns over the effects of low level flights on wildlife populations has increased in recent years (for example Kiernan 1994). The Air Force in reply to USFWS raised the question that acquisition of the land surrounding the range in the past decade to create the AR NWR may increase the risk of a bird strike to USAF and US Navy aircraft operating at the range.

Radar was recommended by the BASH Team as the best means to identify migrants whose passage was affected by aircraft operations and to quantify the risk of a bird strike at the range. In this way even if migratory birds were not adversely effected by flying operations then military training could be reduced or stopped during periods of increased or high bird activity. A computer based Bird Avoidance Model (BAM) is planned to be made available to pilots using DCBR to plan missions to lower the risk of bird strikes. If migrants are affected by operations, then mitigation may be achieved by reducing operations during periods of high migratory activity.

Four radar systems were constructed for use at DCBR.

Radar

S Band Surveillance Radar

This is semi permanently installed on a 20ft tower at Range Operations to detect large birds at long range. The radar is a Furuno FR-8300DS with a 30kw peak transmission power output. It has the advantage of not being as susceptible to the adverse effects of ground clutter and weather which can mask bird targets. The disadvantages of this system are the inability to detect single small birds at any distance. The data derived from this radar is the track of bird movements in the x and y axis over the study area. The radar is linked to a video recorder and the tapes analyzed after an observation period of 6 hours.

X Band Surveillance Radar

This is mounted on a slide in camper unit which can be easily relocated to any area accessible by a four wheel drive truck. The radar is a Furuno FR-8250D with a 25kw peak transmission power output which is sufficient to detect single small birds at short range with great precision. This radar is adversely effected by ground clutter and weather. The radar is designed to collect detailed information on bird movements in areas previously identified by the S band radar or by observation. The data derived from this radar is the track of bird movements in the x and y axis over a portion of the study area.

X Band Vertical Beam Radar

This radar is co-located with the X band surveillance radar in the slide in camper unit. The radar is a Furuno FR-8100D with a 10kw peak transmission power output. It has a vertical pencil beam pattern of radiation which serves as a precision range finder. It can detect individual small birds passing through the beam at heights from 600ft to 4000ft and gulls to 8000ft. The advantage of this design is that it has a low slant range error. The disadvantage of the system is that it observes a very small volume of airspace. When bird density and activity is low it generates very little data on the altitudes of bird flight. To some extent this

limitation can be mitigated by using the surveillance radar to find areas of bird activity under which to place the vertical beam antenna. In common with all X band systems it is susceptible to the effects of weather. Ground clutter is suppressed by shielding the antenna. The data collected indicates the numbers of birds passing through a known volume of space at a given altitude.

X Band Conical Scan Radar

This radar is co-located with the S band surveillance radar on a 10ft tower and is a semi permanent installation. The radar is a Furuno FR-8100D with a 10kw peak transmission power output. It has a 25 x 1.8 degree wide beam that scans around the vertical axis. It can detect individual small birds passing through the beam at heights from 600ft to 4000ft and gulls to 8000ft. The advantage of the design is that it scans a large volume of air and has a higher probability of detecting a bird than the vertical beam radar. The disadvantages of this system are the high slant range errors which mean that birds passing through the beam can only be allocated to height bands (ie 600-1200ft) and not actual altitudes. In common with all X band systems it is susceptible to the effects of weather. Ground clutter is suppressed by shielding the antenna. The data collected indicates the numbers of birds passing through a known volume of space at a given altitude.

All the radars are connected to video tape recorders and the tapes analyzed after a six hour observation period. This system was devised to meet the requirement that the mobile radar unit be capable of recording bird activity out on the range impact area unmanned. This is to prevent loss of life in the event of a stray bomb, rocket or ammunition round.

The truck carried slide in radar unit and the trailer unit both have 30ft telescopic masts for tracking telemetry equipped birds. Computerized data loggers and scanning telemetry receivers are also available to automatically record the presence or absence of birds in small areas of the bombing range along with activity, time and date. Telemetry transmitters will be used to study raptors and vultures on the range in addition to the movement of tundra swans between nearby refuges.

This project enjoys the co-operation and support of the USFWS. They have loaned the project rocket net equipment for trapping turkey vultures at the range and permitted access to the AR NWR and the Lake Mattamaskeet NWR. This fall we will work with USFWS biologists at Lake Mattamaskeet to install telemetry equipment on tundra swans to track local movements during the winter months. Currently many of the feeding sites used by the swans at the lake are unknown. This co-operation will permit the USAF to answer the concerns raised by USFWS, assist them in their management of wildlife at the refuges and collect vital data for bird strike hazard reduction. We will also be working with the North Carolina State Park Service at Lake Phelps. This lake lies under the holding pattern for the range. Bird altitude data collected by the mobile radar unit at this location in the migration seasons will help to identify safe heights for aircraft to fly at before using the range.

Data collection is ongoing and the results of this study and BAM are expected in the spring of 1996. This study is an example of the way in which conservation issues are increasingly being linked to the bird hazard issues handled by the BASH Team. Through co-operation we believe that both the USAF and USFWS will be able to achieve their mission requirements in the Dare County area.

Kiernan, V 1994. Top Guns trigger sea lion stampedes p8, Vol 141, No 1910, 29 Jan 1994, New Scientist London.