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BIRDSTRIKE IN GEORGIA DOCUMENTS MIXED-SPECIES FLOCK OF NOCTURNAL MIGRATING VERTEBRATES

James F. Whatton
Smithsonian Institution Feather Identification Lab
PO Box 37012 MRC 116, Washington, D.C. 20013
whattonj@si.edu

Carla J. Dove
Smithsonian Institution Feather Identification Lab
PO Box 37012 MRC 116, Washington, D.C. 20013

Robert Greenwood
US Air Force, 437th Airlift Wing
102 E. Hill Blvd, Rm 236, Joint Base Charleston, SC 29404

Introduction

Previous classic studies using call notes, moon watching, light beams, and radar ornithology (see Lowery 1951, Hamilton 1962, Gauthreaux 1970, Able and Gauthreaux 1975, Balcomb 1977, and references within) have quantified nocturnal flocks of passerines in migration, but little is known about the species composition of these migrating flocks, or if various species of birds fly in close proximity (Larkin and Szafoni 2008). Some intra-flock species data can be gathered from tower kill studies, such as those by Stoddard and Norris (1967), but these studies only provide data for movements that occur throughout the night, not real-time flock composition. Birdstrikes (bird-aircraft collisions) reported to the United States Air Force (USAF) Safety Center frequently record multiple occurrences at night during migration, but until now the documentation has not been available to verify that these aircraft strikes occur simultaneously as opposed to throughout the duration of the flight. Here, we

describe the details of a dual aircraft, nocturnal, birdstrike event that occurred in the vicinity of Lawson Army Field, Fort Benning, Georgia, and involved 14 species of passerines, one cuckoo, and 2 bat species. The uniqueness of this event is that pilot interviews confirm simultaneous strikes in close proximity.

On 7 October 2013, 2 C-17A aircraft departed Charleston Air Force Base, South Carolina, on a routine low level training mission to Fort Benning, Georgia. At approximately 2200 hours both aircraft encountered birds at about 600 m above mean sea level and sustained multiple birdstrikes. The strike for the lead aircraft occurred approximately 8 km from runway 33 at Lawson Army Airfield (N 32° 08' 10.6" W 84° 56' 40.7"). The pilot of the lead aircraft was aware of the birdstrike, but did not know that he had flown through a flock of birds or that he encountered multiple strikes. The second aircraft was exactly one minute behind the lead aircraft. An interview with the pilot of the second aircraft confirmed that he was aware of multiple birdstrikes occurring over a span of 30–60 seconds, covering a distance of 3.55 km–7.1 km while traveling about 426 kph, approximately 600 m above mean sea level on approach to runway 33. The temperature at time of strike was 25° C, slight winds were out of the north, broken skies at 1097 m with a ceiling of 1829 m, and rainfall was reported for this date but no precipitation was reported at the time of the birdstrike (Iowa Environmental Mesonet 2015).

Post-flight inspections of both aircraft by maintenance staff resulted in the discovery of multiple impact points and the dual birdstrike event was reported according to USAF regulation (Air Force Instruction 91-204, Safety Investigations and Reports). Strike data were accessed online in February 2014 with permission from USAF Safety Center (Kirtland Air Force Base). The lead aircraft sustained 8 different impacts, while the second aircraft sustained 26 impacts (Table 1).

Methods

Bird remains from each impact point on both aircraft were collected, labeled, and placed in separate bags for the USAF Safety Automated System mishap reports (numbers 682115 and 148990), and were submitted to the Smithsonian Feather Identification Laboratory (Washington, D.C.) for identification. The evidence included small feather fragments, tissue, and small whole feathers. The samples were processed per Dove et al. (2009). Most samples were identified to species using DNA barcoding (Cytochrome Oxidase 1) following procedures described in Dove et al. (2008). DNA sequences were matched to the Barcode

of Life Database (BOLD: http://www.boldsystems.org/) and similarity indices of 98% or greater were considered valid for these identifications. Nine of the impacts contained whole feathers or feather fragments that were matched to museum specimens for further confirmation of DNA results. Microscopic examinations were conducted when DNA extractions failed or to verify morphological results. Problematic DNA identifications with overlapping DNA barcodes (e.g., Gray-checked Thrush) were identified to species level when possible using combined methods of the tree feature in BOLD to determine groupings, feather morphology, and species distribution maps.

Results and Discussion

Six bird species struck the lead aircraft; thirteen bird species and 2 bat species struck the second aircraft (Table 1). Two samples from the second aircraft did not yield a species level identification, but were identified as insect (1) and undetermined passerine (1), based on microscopic characters. The minimum number of individuals was not determined genetically but was estimated from the number of species and reported impact points. Avian families and species most commonly identified in this dual strike event included Parulidae (6 species, 10 individuals), Vireonidae (2 species, 6 individuals), and Turdidae (2 species, 5 individuals). One insect (Lepidoptera) and 2 species of bat (Seminole Bat [*Lasiurus seminolus*] and Mexican Free-tailed Bat [*Tadarida brasiliensis*]) were also involved in the second aircraft strike. As far as we know, this is the first documented record suggesting that bats could be migrating together with flocks of birds. An alternative explanation is that the bats were coincidently feeding on insects over the airfield at the time of the birdstrike event. The lead aircraft suffered impacts (but no monetary damage) on nearly every recordable part including one engine, tail, nose, and fuselage. The second aircraft suffered monetary damage involving delamination on the inside of the panels of the nose radome and vertical stabilizer and provides further evidence that these large flocks of migrating passerines can be hazardous to night flying aircraft.

Adequate reporting, proper collecting of bird remains, species identifications, and follow-up interviews are needed to thoroughly document birdstrikes more often in order to complement data gleaned from radar ornithology and other nocturnal migration studies. In this case, these two aircraft most likely encountered a large flock of nocturnal migrating birds (and possibly foraging bats) simultaneously over a period of 30-60 seconds. This report documents that mixed-species bird flocks do migrate in close proximity. Birdstrike data

that is well-documented and when substantiated adds to our knowledge of the species composition of nocturnal flocks of migrating birds.

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Table 1. Wildlife species struck and impact points for each aircraft involved in a dual birdstrike event near Lawson Army Air Field, Georgia (October 2013).

Lead Aircraft, C-17A, tail number 10-000213		
Order	**Species**	**Impact Point**
Passeriformes	Blackburnian Warbler (*Setophaga fusca*)	Radome/Nose
Passeriformes	Chestnut-sided Warbler (*Setophaga pensylvanica*)	Fuselage/Antenna/Skin
Passeriformes	Ovenbird (*Seiurus aurocapilla*)	Landing Gear
Passeriformes	Ovenbird (*Seiurus aurocapilla*)	Inside Engine NO. 3
Passeriformes	Red-eyed Vireo (*Vireo olivaceus*)	Fuselage/Antenna/Skin
Passeriformes	Scarlet Tanager (*Piranga olivacea*)	Fuselage/Antenna/Skin
Passeriformes	Swainson's Thrush (*Catharus ustulatus*)	Radom/Nose
Passeriformes	Swainson's Thrush (*Catharus ustulatus*)	Fuselage/Antenna/Skin
2nd Aircraft, C-17A, tail number 07-007187		
Order	**Species**	**Impact Point**
Chiroptera	Mexican Free-tailed Bat (*Tadarida brasiliensis*)	Tail/Stabilizer/Rudder
Chiroptera	Seminole Bat (*Lasiurus seminolus*)	Tail/Stabilizer/Rudder
Cuculiformes	Yellow-billed Cuckoo (*Coccyzus americanus*)	Outside Engine No. 3
Lepidoptera	Insect-Lepidoptera	Tail/Stabilizer/Rudder
Passeriformes	American Redstart (*Setophaga ruticilla*)	Outside Engine No. 1
Passeriformes	American Redstart (*Setophaga ruticilla*)	Wing/Rotor
Passeriformes	Eastern Wood-Pewee (*Contopus virens*)	Wing/Rotor
Passeriformes	Golden-winged Warbler (*Vermivora chrysoptera*)	Fuselage/Antenna/Skin
Passeriformes	Gray-cheeked Thrush (*Catharus minimus*)	Tail/Stabilizer/Rudder
Passeriformes	Gray-cheeked Thrush (*Catharus minimus*)	Fuselage/Antenna/Skin
Passeriformes	Hooded Warbler (*Setophaga citrina*)	Fuselage/Antenna/Skin
Passeriformes	Hooded Warbler (*Setophaga citrina*)	Fuselage/Antenna/Skin
Passeriformes	Ovenbird (*Seiurus aurocapilla*)	Landing Gear
Passeriformes	Red-eyed Vireo (*Vireo olivaceus*)	Fuselage/Antenna/Skin
Passeriformes	Red-eyed Vireo (*Vireo olivaceus*)	Fuselage/Antenna/Skin
Passeriformes	Scarlet Tanager (*Piranga olivacea*)	Radome/Nose
Passeriformes	Scarlet Tanager (*Piranga olivacea*)	Tail/Stabilizer/Rudder
Passeriformes	Summer Tanager (*Piranga rubra*)	Wing/Rotor
Passeriformes	Swainson's Thrush (*Catharus ustulatus*)	Fuselage/Antenna/Skin

Order	Species	Impact Point
Passeriformes	Swainson's Thrush (*Catharus ustulatus*)	Fuselage/Antenna/Skin
Passeriformes	Tennessee Warbler (*Oreothlypis peregrina*)	Radome/Nose
Passeriformes	Tennessee Warbler (*Oreothlypis peregrina*)	Landing Gear
Passeriformes	undetermined passerine	Fuselage/Antenna/Skin
Passeriformes	White-eyed Vireo (*Vireo griseus*)	Tail/Stabilizer/Rudder
Passeriformes	White-eyed Vireo (*Vireo griseus*)	Wing/Rotor
Passeriformes	White-eyed Vireo (*Vireo griseus*)	Wing/Rotor