

Avian Mortality at Communications Towers

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Presentation Number 1

Lights, towers, and avian mortality: where is the science?

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Al Manville's introduction of the first speaker, Todd Engstrom.

Our first paper this afternoon is a co-authored paper by Robert Crawford and Todd Engstrom. Robert worked at Tall Timbers Research Station in Tallahassee, Florida, from 1970 to 1985. His major responsibility then was carrying on a mortality study at a nearby television tower. He has since left Tall Timbers to go on to other endeavors but he has continued to do contract work on the archives at Tall Timbers. Our speaker this afternoon, Todd Engstrom, has been staff the ornithologist at Tall Timbers Research Station since 1990. Among other things, he has addressed issues dealing with the ecology of the Red-cockaded Woodpecker and bird populations, and relationships to fire ecology and silvaculture. The title of Robert and Todd's presentation is, "Lights, towers, and avian mortality: where is the science?"

Todd Engstrom

The first thing that I would like to point out is that bird kills at tall structures are a very old phenomenon. Avian mortality at tall lighted structures has a very well-documented, although anecdotal history. For example, in the 1891 Sherlock Holmes thriller, *The Man With the Twisted Lip*, Arthur Conan Doyle's character Dr. Watson says, "Folk who were in grief came to my wife like birds to a lighthouse." Famous lighted structures such as the Washington Monument and the Empire State Building have had bird kills for many years. Both the structure and the lights are implicated as causes of avian mortality. Many light sources not associated with prominent structures, such as ceilometers, fires for hunting and trapping, and even handheld flashlights are associated with bird kills. Again, a very large anecdotal literature database points to lights as a major factor in these mortality events.

I would like to present a brief summary of a long-term study of avian mortality at the WCTV tower in north Florida. After World War II, tall communication towers proliferated and observers began to record bird kills at them. Knowing this, Herbert Stoddard, the highly regarded naturalist, got permission to conduct a study of bird kills at a recently constructed television tower on the Tall Timbers Plantation. Two years later after he started the study, this Plantation became the Tall Timbers Research Station. Stoddard voiced a prescient concern in 1962 when he noted, "unfortunately for the birds there are some 500 TV towers in the United States and their number and height are fast increasing."

The WCTV tower is about half an hour north of Tallahassee, Florida. Height of the tower ranged from 204 m (1955 to 1960) to 308 m (1960 to 1989) to 94 m (1989 to present). The methods for the study were straightforward: daily inspection for 25 years. That's over 8,500 mornings that Herbert Stoddard and Tall Timbers staff went out to look for dead birds. As Stoddard said, "a tower-kill study is not for '10 o'clock' biologists." It was critical to be at the tower at dawn or pre-dawn to detect the kills.

Another important ingredient of the WCTV study was maintaining the grounds “like a well-cared for golf course,” which is essential so that researchers can find the birds. Finally, and perhaps the most important, is rigorous control of the predator/scavenger community, because many of the killed birds may be removed before they are detected by observers.

Over the 25-year study period, more than 42,000 individuals were killed representing 189 species. The largest single kill, interestingly enough, was about 4,000 to 7,000 individuals that occurred less than two weeks after Stoddard initiated the study. A graphic summary of the number of individual birds killed annually over the first 15 years of the study indicates that the last three years, 1967 through 1969, are much lower than the previous 12 years. Evidently, Herbert Stoddard's health was declining from 1967 to 1969 and he didn't do nearly as much to control the scavengers and predators. If you exclude those years and take the average number birds killed per year, we estimate that there were over 2,600 birds killed per year at the WCTV tower. That is more than you would get from taking the average of 42,000 birds over 25 year, but we believe that the 2,600 is closer to reality.

The seasonal pattern during the year is what you'd expect. About 20% of the total number of bird kills was during a 2-month period in the spring and 65% was in a 2-month period in the fall. The higher fall mortality is caused primarily by the large number of young birds migrating for the first time, but the migration route of some species also changes with the seasons. The Chestnut-sided Warbler, for example, migrates farther to the east in the fall than it does on its return spring migration. This is reflected in the tower kill results at the WCTV tower. All of the 480 Chestnut-sided Warblers killed at the tower were killed in the fall.

Species composition of the WCTV tower kills is revealing. Of a total of 189 species, the top 50 species, the species with the most abundant number of individuals killed, comprise about 90% of the total mortality. What are these species? The top 50 most abundant species that were killed at the WCTV tower are in 11 families; warblers and vireos, the top two families, make up nearly 62% of all the individuals killed.

Nightly patterns of mortality vary from a single individual to thousands. The nights in which thousands of birds are killed have characteristic weather conditions. These large bird kills are almost invariably associated with inclement weather along frontal boundaries during the period of heavy migration. The nights in which thousands of birds are killed are very dramatic, but these types of kills are only part of the story. The 25 largest kills represent about 30% of the total number of individuals. This means that some birds were killed almost nightly during migratory periods. This low-level of mortality is cumulatively a large proportion of the total loss of birds. This low-level of mortality, which is very important over time, can easily be masked by predation.

In conclusion, we use this quote from R.D. Weir in 1976. “Nocturnal bird kills are virtually certain wherever an obstacle extends into the airspace where birds are flying in migration. The time of year, siting, height, lighting, and cross sectional area of the obstacle, and weather conditions will determine the magnitude of the kill.” This is the most succinct description of the state of knowledge that we could find. We recommend that experimental studies of different lighting schemes on bird behavior and mortality be initiated. Any such studies must consider the influence of scavengers on the number of birds that are collected.

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