Avian Mortality at Communications Towers

A workshop sponsored by
The United States Fish and Wildlife Service, The Ornithological Council, and The American Bird Conservancy.
www.towerkill.com/index.html
www.fws.gov/r9mbmo/issues/tblcont.html

Presentation Number 5

Applications of avian night flight call monitoring for towerkill mitigation

William R. Evans, P.O. Box 46, Mecklenburg, NY 14863
Phone - (607) 272-1786   E-mail - admin@towerkill.com

Al Manville introduction of the fifth speaker, Bill Evans.

Most of you know our next speaker. He has been a birdwatcher since he was 13, has worked through Cornell University with the Library of Natural Sounds, the largest natural sound library in the world, and has been a research associate and consultant with Cornell's Bioacoustics Research Program. He's going to be talking about acoustic monitoring of nocturnal bird migration as a tool for towerkill studies and mitigation. Bill Evans.

Bill Evans

So far today we've been focusing on individual towers and what might be done to deal with bird collisions. I want to take a little different tact here and look at tower siting on a broad continental level. As I mentioned earlier, most bird migration in North America happens at night and many species give calls while they travel. We presume this is to keep contact with one another. These calls are currently the only link we have to the species of birds in active nocturnal migration over a region -- the species that would be more or less likely to be affected by a tower. So, one of the emerging concepts of acoustic monitoring is that, with some interpretation of nocturnal flight calling, we can map migration densities for many species, at least relative to other microphone stations. Therefore, with regard to tower siting, we could weigh the potential hazard of tower placement or tower height with regard to species.

But let's think this through with a few examples. In the early 1990s, I set up an east-west running transect of seven acoustic monitoring stations across central New York State. Microphones at each site were aimed at the sky and sound was recorded for 8-10 hours each evening during the fall migration period. Data recorded through 3 fall seasons revealed highly variable density patterns among different species. For example, the Bobolink is a species that nests in north-central North America and winters in central South America. Bobolink calls were much more commonly detected in the eastern half of New York than in the west. However, the Veery, a species that nests in the forests of east-central North America and winters in central South America, was detected more commonly in the western half of New York than in the eastern half. This pattern was revealed within any given evening when both species were migrating together, as well as in the general pattern revealed over the 3 years of the study. In some cases acoustic data showed that several species, or a group of species, showed the same general density pattern across the transect. But the point here is that bird migration, even down to the species level, is not typically in narrow beams covering the same stretch of ground from year to year. It tends to occur across a broad front and it is extremely complex with regard to species composition across that front, at least regarding a 300 km cross-section.

The New York acoustic data also suggest that tower siting for some species is not that important within an inland region of say 50 km by 50 km in North America.

In other words, the probability of mortality to various species might be about the same within that area. But one 50 by 50 km area might be better or worse for certain species than another. Combining weather data on the probabilities of fog or low cloud ceilings could further clarify the relative danger of different 50 by 50 km areas. The only way siting within a 50 by 50 km region would be important is if coastlines or mountains were involved. Coastlines, mountain ridges, and valleys or sides of mountains have all been shown to concentrate migrants, often in relatively low flight above ground level. Many of these zones of high bird migration density can be mapped with our current knowledge about bird migration.

Generally, it seems that a particular tower siting does not have the option for location in different 50 by 50 km areas, but rather somewhere inside of a particular 50 by 50 km area. So, the siting of the tower will not be that important regarding general bird hazards. But in 50 x 50km areas that do indicate high risk of mortality of one or more species of concern, possibly more attention could be paid to tower height and lighting so that hazards are reduced. Certainly 50 x 50 km zones in the vicinity of major coastlines should be labeled as zones of high hazard. Acoustic monitoring, with its capabilities of resolving species information, could play an important role in ranking such 50 by 50 km units for hazard to many species of night migrating birds.

With regard to rare species, acoustic monitoring is less effective. For example, let's consider the Kirtland's Warbler, a Federally endangered species. The whole population of this colorful warbler (estimated population of 2,000 individuals in 1999) nests in a very small region of north-central Michigan. Every year they migrate to and from wintering grounds that encompass a relatively large area in the Bahama Islands. So, let's think about this. If we wanted to site a tower somewhere in the Carolinas, a region where Kirtland's Warblers are known migrate across during fall and spring migration each year, where would be the least hazardous site? We could use acoustic monitoring to try and map out a migration corridor for this species but the odds of detecting even one Kirtland's night flight call at any particular site seem quite small. And even if we did detect one, I think the chances would be exceedingly slim that we would ever detect another at that same site. With the vagaries of migration weather from year to year, Kirtland's Warblers may have a 200-300 mile east-west variance in their flight path from one year to the next. We don't have much information about how accurate they are during their migration, but considering what we do know based on diurnal sightings, it seems very unlikely that acoustic monitoring would be useful for tower siting in the migration route of this species.

Similarly, tower siting would not be a major issue on Kirtland's wintering grounds in the Bahamas because the species is known to be widely distributed over many islands. Any single tower would not have an effect on a significant proportion of the population. However, on their breeding grounds, a large proportion of the population nests in a very small area. I would suggest that it would not be a good idea to locate towers in close proximity to this concentrated breeding ground.

The impact of towers on Kirtland's Warbler populations will likely be somewhat proportional to the shear number of towers across their range, especially their migration route. Certainly geographic features along their migration will concentrate migrants and therefore there will be some tower sites that are more hazardous than others. But weather conditions can concentrate migrants just about anywhere in eastern North America. So, we can generally say that the more towers there are, the more of a chance that Kirtland's Warblers will be killed. This leads me to conclude that the only way to reduce the impact of towers on Kirtland's Warbler is to make the towers safer. I believe research on tower lighting, with the goal of reducing the attraction to night migrating songbirds, is the best means to approach this problem.

Besides its applications for imaging broad front species composition and relative abundance, acoustic monitoring has proven to be a useful tool for monitoring avian activity in close proximity to towers. As I mentioned in my introduction, acoustic monitoring documented collisions and many incidences of alarm calls when a microphone was placed under a 317-foot tower in Nebraska. Also, in that study, call notes of migrating songbirds were recorded and the acoustic record indicates periods during some evenings when calling rates increase concurrently with call loudness. These appeared to have been incidences when songbirds were circling the lights on the tower. Software has been developed to automatically log such call notes and the technology exists today to outfit towers with acoustic sensors that could transmit calling information to a research station. A researcher could simultaneously monitor hundreds of towers in a region for calling situations that indicate a kill might be taking place. This information could be used to alert field researchers to which towers to check in the morning. It could also be used to automatically monitor how many nights a year birds are congregating in the vicinity of towers, how often during a night, and roughly in what numbers. Such acoustic monitoring might also be used to trigger alternative lighting schemes that would be less attractive to migrating songbirds.

Scientific Presentation Number 5
in the workshop
Avian Mortality at Communications Towers
www.towerkill.com