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**Louis Peraertz**

**From:** Gerald Winegrad [gwwabc@comcast.net]  
**Sent:** Thursday, February 02, 2006 4:21 PM  
**To:** Louis Peraertz; Aaron Goldschmidt  
**Subject:** Towers and Birds

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Federal Communications Commission  
Office of the Secretary

Louis and Aaron:

Thanks for speaking with me about towers and birds. Several items we discussed led to the provision here of further information on tower kills.

Louis raised an issue concerning the need for guy wires for towers over 350'-400'. In the Michigan studies by Dr. Joelle Gehring, one of the MSP UNGUYED towers is 475'. Clearly, companies can and do construct communication towers at 475' without guy wires. Our position is simply: if an antenna cannot be co-located, keep the tower under 200'; if the tower must exceed 200', keep the tower unguyed where possible and lit only by medium intensity white or red strobes. These measures would greatly reduce avian mortality and all research, including Dr. Gehring's, confirms this.

As to **TOWER LIGHTING**, the evidence is there that towers lighted with solid red (L-810) and flashing red (incandescent L-864) lights cause most avian mortality, including nearly all mass mortality events. Simply requiring white or red strobe lights will greatly reduce avian mortality.

We discussed the recently published book (Dec 2005) by Dr. Travis Longcore and Catherine Rich entitled *Ecological Consequences of Artificial Night Lighting*. It is available for \$29.95 on Amazon.com. These authors, along with Dr. Sidney Gauthreaux, also prepared the comprehensive analysis of the science, conclusions, and recommendations found in the Avatar Report. We submitted their analysis with our comments on the Avatar Report. You may recall their report cited as the Land Protection Partners Analysis.

Dr. Gauthreaux has been a pioneer in the use of weather radar to detect and estimate migratory bird numbers and movement. He has also conducted critical research at communication towers on lighting effects on birds. His tower lighting study is one of the chapters in the book and the study was cited and discussed in the LPP Report we filed. In the book cited above, Gauthreaux and Belser conclude that significantly greater numbers of birds are attracted to towers with the combination of solid red and flashing red lights, than to a white strobe lit tower nearby or a control tower with no lights. There were accumulations of individual birds around and near the towers with solid red and flashing red lights caused by the attraction of the lights plus the influence of the lights on orientation. These were tall TV towers in GA and SC that were studied.

In the Land Protection Partners Report we filed with the FCC the authors conclude: "Reducing the attraction of birds to towers is a critical factor in minimizing bird deaths at towers. Without attraction, birds may still encounter and be killed in collisions with towers that are sited in migratory pathways, but the sum of the available scientific evidence indicates that mortality would be greatly reduced by using only strobe lights at towers. The evidence above supports the U.S. Fish and Wildlife Service tower siting guidelines."

Aaron and I discussed how birds circling a tower with red solid state lights quickly departed once the lights were turned off: In the LPP Report the authors note: "Observation of bird behavior at towers

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lighted with solid red (L-810) and flashing red (incandescent L-864) lights confirms that light is the stimulus that keeps birds circling the tower and thereby substantially increasing risk of mortality. Cochran and Graber observed birds flying around incandescent red lights on a tower. When the lights were switched off, the birds dispersed. Birds congregated anew when the lights were switched back on. [1] Avery et al. repeated this experiment, and birds dispersed when the lights were extinguished.[2] As others have noted, "Avery's data suggest that the tower's obstruction lights were the sole factor in the congregation of birds." [3] Larkin and Frase also documented the circular flight paths of birds around a broadcast tower lighted with solid red and flashing red lights. [4] The Avatar Report does not adequately convey the certainty of this information or the central importance of lights in causing birds to collide with towers. The combination of solid red and flashing red lights (L-810 with incandescent L-864) attracts and disorients birds, which accumulate around towers, collide with each other, the tower, guy wires, and the ground, die of exhaustion, or deplete their fat reserves."

- [1]. Cochran, W.W., and R.R. Graber. 1958. Attraction of nocturnal migrants by lights on a television tower. *Wilson Bulletin* 70:378-380.
- [2]. Avery, M., P.F. Springer, and J.F. Cassel. 1976. The effects of a tall tower on nocturnal bird migration — a portable ceilometer study. *Auk* 93:281-291.
- [3]. Weir, R.D. 1976. *Annotated bibliography of bird kills at man-made obstacles: a review of the state of the art and solutions*. Department of Fisheries and the Environment, Environmental Management Service, Canadian Wildlife Service, Ontario Region, Ottawa, p. 18.
- [4]. Larkin, R.P. and B.A. Frase. 1988. Circular paths of birds flying near a broadcasting tower in cloud. *Journal of Comparative Psychology* 102:90-93.

The LPP report further notes that: "All reports indicate that replacement of solid lights with white strobe lights (and no other lights) reduces bird kills. When stacks and towers at a power plant in Canada were equipped with strobe lights, bird kills were "virtually eliminated." [1] Some U.S. television towers were equipped with white strobe lights (e.g., L-865) instead of solid red (L-810) and flashing red (L-864) for the first time in 1973. [2] Although 11 of the one-night kills reported in the literature occurred since 1973, none was at a tower with only strobe lights. [3]. "

- [1]. Ogden, L.J.E. 1996. *Collision course: the hazards of lighted structures and windows to migrating birds*. World Wildlife Fund Canada and the Fatal Light Awareness Program, Toronto, Canada, p. 29.
- [2]. Avery, M., P.F. Springer, and J.F. Cassel. 1976. The effects of a tall tower on nocturnal bird migration — a portable ceilometer study. *Auk* 93:281-291, p. 289.
- [3]. See reports reviewed in Woodlot Report. We consider the mass kill of Lapland Longspurs at a strobe-lighted tower to be a special event, likely explained by attraction to lighted facilities near the tower, an opinion that is shared by many experts. See Eaton, J. 2003. Tower kill. *Earth Island Journal* 17(4):32-35.

Indeed, the use of strobe lights has been recommended by a series of researchers investigating this topic. Verheijen, who wrote the classic review on the attraction of animals to light, [2] concludes that, "Success has been achieved in the protection of nocturnal migrant birds through interrupting the trapping stimulus situation by ... replacing the stationary warning lights on tall obstacles by lights of strobe or flashing type." [3] Jones et al. similarly conclude that strobe lights with a complete break between flashes would reduce bird mortality at tall structures. [4]

Dr. W. Taylor, Professor Emeritus of Biology at Central Florida University, reports drastic reduction of bird mortality when lighting of a tower in Orlando, Florida was changed from solid red and flashing red lights to white strobe lights (pers. comm.). The tower was the site of large bird kills, and Professor Taylor and colleagues had collected more than 10,000 birds over the years and reported these kills in the literature. [5] In 1974, the ~1,000-foot guyed tower blew down, and was replaced with a taller guyed tower with white strobe lights. Following the replacement, bird mortality was reduced drastically and no mass kills (i.e., >100 birds) were ever again reported at the site."

- [1]. See also Graber, R.R., and W.W. Cochran. 1960. Evaluation of an aural record of nocturnal migration. *Wilson*

*Bulletin* 72:253–273. Avery, M., P.F. Springer, and J.F. Cassel. 1976. The effects of a tall tower on nocturnal bird migration — a portable ceilometer study. *Auk* 93:281–291.

[2]. Verheijen, F.J. 1958. The mechanisms of the trapping effect of artificial light sources upon animals. *Archives Néerlandaises de Zoologie* 13:1–107.

[3]. Verheijen, F.J. 1985. Photopollution: artificial light optic spatial control systems fail to cope with. Incidents, causations, remedies. *Experimental Biology* 44:1–18.

[4]. Jones, J., and C.M. Francis. 2003. The effects of light characteristics on avian mortality at lighthouses. *Journal of Avian Biology* 34:328–333.

[5]. Taylor, W.K., and B.H. Anderson. 1973. Nocturnal migrants killed at a south central Florida TV tower, autumn 1969–1971. *Wilson Bulletin* 85:42–51. Taylor, W.K., and B.H. Anderson. 1974. Nocturnal migrants killed at a south central Florida TV tower, autumn 1972. *Florida Field Naturalist* 2:40–43.

An average of 2,300 birds per year were killed over a 10-year period at lighted smokestacks near Kingston, Ontario. After the lights were changed to white strobes, the bird kills ended.[1]

[1]. Broderick, B. 1995. Light waves: why be concerned about light pollution? *Royal Astronomical Society of Canada Bulletin* 5(3):6.

I sent Louis information from Dr. Will Post of the Charleston Museum in SC that two television towers near Awendaw, South Carolina at which he and others collected dead bird carcasses had substantial bird kills during the 1980s when they had red incandescent lighting. The towers were changed to white strobe lights in about 1990 and few dead birds have been found around them since.

## **2. TOWERS VS. WIND TURBINES: LIGHTING AND GUY WIRES MAKE A BIG DIFFERENCE IN BIRD MORTALITY.**

We discussed the work of Wally Erickson, a researcher with West, Inc., who reported that Abased on computer models, for a bird with a one-foot wing span, the likelihood of collision with a 105 m high communications tower having 1.25 miles of guy wires is three times as great as the likelihood of colliding with a 65-m rotor diameter, 92 m maximum height wind turbine....empirical data from a wind energy project in Wyoming corroborated the higher per structure collision risk for a guyed structure compared to a wind turbine for songbirds." The requested citation is Erickson, Wally, *Bird Fatality and Risk at New Generation Wind Projects* (West, Inc.) 2004, in the Proceedings of the Wind Energy and Birds/Bats Workshop: Understanding and Resolving Bird and Bat Impacts, Washington, D.C. May 18-19, 2004. Prepared by RESOLVE, Inc., Washington, D.C., Susan Savitt Schwartz, ed. September 2004. You can access these on the web site of AWEA or the NWCC or go to: [www.abcbirds.org/policy/webb\\_proceedings.pdf](http://www.abcbirds.org/policy/webb_proceedings.pdf) and scroll down to page 31.

The computer modeled wind turbine was unguyed as are all wind turbines except for a few small, older turbines. The Wyoming wind energy project cited is at the Foote Creek Rim wind energy facility. The average number of birds killed per guyed meteorological tower was approximately 3 times higher than the per turbine mortality. Young, David P., et al., *Foote Creek Rim Final Bird and Bat Mortality Report: Avian and Bat Mortality Associated with the Initial Phase of the Foote Creek Rim Wind Power Project*, Carbon County, Wyoming. November 1998--June 2002. Final Report. January 10, 2003. West, Inc., (2003).

Other recent U.S. studies indicate that bird mortality at wind turbine projects varies from less than one bird/turbine/year to as high as 7.5 birds/per turbine/year. The latter fatality rate was at Buffalo Mountain, TN in 2003, where three unguyed wind turbines are in use, each with a 154' diameter, 3-blade rotor mounted on a 213' tall tubular steel tower. A guyed unlit 197' meteorological (met) tower constructed for the Buffalo Mountain wind plant had a mortality rate of 8.1 birds/year, greater than the average fatality rate for the three wind turbines. Mortality was monitored from October 2000, when construction was completed, through September 2003. Charles P. Nicholson, PhD., Tennessee Valley Authority, 400

West Summit Hill Drive, WT 8C, Knoxville, TN 37902-1499, personal communication, March 26, 2004. [cpnicholson@tva.gov](mailto:cpnicholson@tva.gov).

Why do wind turbines kill less birds than guyed communication towers adjacent to them and why are there no cases of mass avian mortality events at wind turbine farms, even those with many individual wind turbines? Because wind turbines are unguyed, and are not all lit, and lit turbines employ only red strobe lights with pulse rates of 24 per minute. The Mountaineer Wind energy project in WV has 44 turbines and only 12 are lit, all 12 with red strobes.

Large bird kills almost always involve towers that have guy wires and solid state red lights. Observational studies of birds in the vicinity of towers show that birds are much more likely to collide with the guy wires than with the tower itself.

Dr. Joelle Gehring's study in Michigan provides strong evidence of increased mortality caused by guyed towers compared to guyless towers of the same height and lighting regime. The Gehring study includes 12 guyed and 9 guyless communications towers 380 feet to 480 feet tall. During spring and fall 20-day survey periods in 2004, **guyed towers killed close to ten times more birds than guyless towers.** This same ratio was found even after adjusting for scavenger removal and search efficiency. Dr. Gehring estimates that 90% of mortality at guyed towers results from collisions from guy wires, based on the location of the birds, which is consistent with the ten-fold increase in mortality. See Gehring, J. 2004. Avian collision study plan for the Michigan Public Safety Communications System (MPSCS): Spring 2004 summary. Central Michigan University, Mount Pleasant. Gehring, J. 2004. Avian collision study plan for the Michigan Public Safety Communications System (MPSCS): Fall 2004 summary. Central Michigan University, Mount Pleasant. Also, see the discussion and charts in the LPP Report at page 31.

Higher mortality from guyed towers would be expected because of the circling behavior exhibited by migrants under the influence of lights on towers. Furthermore, a study of bird mortality at transmission towers in Wisconsin found a high correlation between the locations of dead birds and guy wires, implicating collisions with guy wires as the cause of death.

**3. CONCLUSIONS.** Tower lighting and guy wires are key determinatives in rates of avian mortality. By using white or red strobes exclusively and by keeping guy wires off of towers under 500', unless demonstrated to be absolutely necessary, would greatly reduce avian mortality. Of course, as Dr. Gehring's and others' research reveals, tower height is also a major factor in bird kills, but by switching to strobe lights, even avian mortality at the tallest towers will be greatly reduced.

Thanks for reading this.

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