

red lights than at the tower with white strobe lights or the control site. Furthermore, lighting type was significantly associated with number of nonlinear flight paths, with twice as many nonlinear flight paths at the tower with red lights than at the tower with white strobe lights on average, and nearly **14** times more nonlinear flight paths at the **red** lighted tower than at the control site.

The results suggest that although white strobe lights cause birds to take more nonlinear flight paths, they do not result in birds accumulating around the tower. Cauthreaux and Belser conclude that the significantly greater number of paths per 20 minutes around the tower with red lights resulted from the attraction of the lights, added to the influence of the lights on orientation, leading⁷⁸ to accumulations of individuals near the towers with solid red and flashing red lights.

Contrary to the characterization in the Avatar Report, the scientific evidence, including a study at two locations, indicates that white strobe lights on towers result in less bird attraction than red (solid and flashing incandescent) lights and, by extension, lower bird mortality. 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,⁷⁹ 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." Jones et al. similarly conclude that strobe lights with a complete break between flashes would reduce bird mortality at tall structures.⁸¹

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.⁸² 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.

78. 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.

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

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

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

82. 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.

Two television towers near Awendaw, South Carolina 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.”

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.⁸⁴

The observation that strobe-type lights (L-864 red strobes) do not attract night migrating birds has been made by those analyzing bird kills at wind turbines as well.⁸⁵ No comparison of attraction of birds to red strobes versus white strobes on communications towers is available because solid red lights (L-8 10) are always on towers along with red strobe lights. Many researchers believe that it is unlikely that red or white strobes attract birds at night.

Reports such as those from Florida, South Carolina, and Ontario are likely to be characterized as anecdotal and afforded less weight than peer-reviewed studies. But to ignore the many accounts of bird kills being virtually eliminated by changing to white strobe lights would be scientifically unsound. Anecdotal observations are data. Although they may not be accompanied by precise quantification, precision is not necessary when effects are large. For example, the dataset for the Orlando tower described by Dr. Taylor was well over 100 birds per year before the change to strobe lighting, then well under 100 birds per year following the change to strobe lighting. Even without knowing the exact number of years of observation before or after the change in light type, or the exact number of birds beyond those classes (i.e., over 100 birds/under 100 birds per year), one can conclude with a high degree of statistical certainty that the magnitude of mortality was significantly different. Absent another rational explanation for this difference (e.g., removal of guy wires, decrease in height, drastic change in weather), the only defensible scientific conclusion is that the changed lighting scheme was responsible for the difference. Furthermore, this same observation has been made on multiple occasions at different locations. It is possible, logical, and scientific to draw conclusions from multiple observations of the same phenomenon, even if those observations are not part of a pre-arranged scientific design. Multiple, consistent observations of the same response can be adequate to draw a statistically valid conclusion, so long as the effect size is sufficiently large.

To disprove the conclusion that bird kills are lower at strobe-lighted towers, many tall towers equipped with strobe lights would have to have been the site of large bird mortality events and NOT have been reported or noticed by anyone. The one reported instance

83. Dr. W. Post, Curator of Birds, The Charleston Museum, pers. comm. to G. Winegrad.

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

85. See Kerlinger, P. 2004. Attraction of night migrating birds to FAA and other types of lights. Curry & Kerlinger, LLC, Cape May, New Jersey.

of mass mortality at a strobe-lighted tower was an “abnormality”⁸⁶ confounded by the presence of other lighting at the site.

The Avatar Report concludes that the existing research is insufficient to make recommendations about lighting at communications towers. This conclusion is not accurate after considering the weight of the evidence, including the details of the Gauthreaux and Belser study that were not available to Avatar Environmental. Every known instance of changing to strobe lights at towers has reduced bird mortality and this solution has been known and recommended for 40 years. 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, which provide:

2. If collocation is not feasible and a new tower or towers are to be constructed, communications service providers should be strongly encouraged to construct towers no more than 199 feet above ground level (AGL), using construction techniques which do not require guy wires (*e.g.*, use a lattice structure, monopole, etc.). Such towers should be unlighted if Federal Aviation Administration regulations permit....

5. If taller (>199 feet AGL) towers requiring lights for aviation safety must be constructed, the minimum amount of pilot warning and obstruction avoidance lighting required by the FAA should be used. Unless otherwise required by the FAA, only white (preferable) or red strobe lights should be used at night, and these should be the minimum number, minimum intensity, and minimum number of flashes per minute (longest duration between flashes) allowable by the FAA. The use of solid red or pulsating red warning lights at night should be avoided. Current research indicates that solid or pulsating (beacon) red lights attract night-migrating birds at a much higher rate than white strobe lights. Red strobe lights have not yet been studied.⁸⁷ [Emphasis added.]

The research and studies cited and discussed above supports the U.S. Fish and Wildlife Service Guidelines for keeping towers unlit or lit exclusively with white or red strobes to minimize avian mortality. The FAA apparently concurs and has recommended the use of white strobes.

To reduce avian mortality, it is also important that accessory structures at towers, especially shorter unlit towers, not have constant exterior lighting. Studies from bird kills at

86. Woodlot Report, p. 22.

87. Clark, J.R. 14 September 2000. Service guidance on the siting, construction, operation and decommissioning of communications towers. U.S. Fish and Wildlife Service, Washington, D.C.

wind turbines reveal greater kills at turbines near lighted structures.⁸⁸ Avoidance of lights on accessory structures for towers in natural areas would also reduce adverse effects on other taxa.⁸⁹

6. Topography Influences Bird Mortality at Towers

Topography is known to concentrate migrants in certain locations such as coastlines, mountain ridges, rivers, and hills. Considerable evidence of this effect has been gathered in Europe,⁹⁰ with somewhat fewer studies in North America. A recent multi-modal research study in New Hampshire revealed the effect of the topography of the Appalachian Mountains on migratory birds, including neotropical migrants traversing southeast over the chain toward wintering grounds in Central and South America. At two ridgeline sites, the researchers observed “exceptional numbers of migrants at 2 to 30 m AGL [Above Ground Level].” They conclude, consistent with the European studies, that it should not be assumed that birds migrate in a broad front across mountains. They continue:

[This] is important for evaluation of structures such as wind-powered electrical generators or communication towers on ridge lines. Although our studies were not designed to observe concentrations of migrants at topographical features, reaction of migrants to topography that we did observe suggested such concentrations during both favorable and unfavorable conditions. Concentrations could result either as birds moved along a corridor, such as a pass or ridge line, or they could result from birds moving up and over a ridge meeting migrants already at that altitude and thus producing large numbers of birds a few tens of meters above the ridge summit. Our ceilometer observations of large numbers of birds near crests of ridges are particularly relevant in that regard.⁹²

This study, which is plainly relevant but not cited in the Avatar Report, provides convincing peer-reviewed evidence that the placement of communications towers along ridgelines is likely to result in increased bird mortality than placement elsewhere. It pro-

88. See Kerlinger, P. 2004. Attraction of night migrating birds to FAA and other types of lights. Curry & Kerlinger, LLC, Cape May, New Jersey.

89. Longcore, T., and C. Rich. 2004. Ecological light pollution. *Frontiers in Ecology and the Environment* 2:191–198.

90. Williams, T.C., J.M. Williams, P.G. Williams, and P. Stokstad. 2001. Bird migration through a mountain pass studied with high resolution radar, ceilometers, and census. *Auk* 118:389–403, citing Bruderer, B. 1978. Effects of alpine topography and winds on migrating birds, Pp. 252–265 in K. Schmidt-Koenig and W. Keeton (eds.), *Animal migration, navigation, and homing*. Springer-Verlag. Berlin. Bruderer, B. 1999. Three decades of tracking radar studies on bird migration in Europe and the Middle East. Pp. 107–141 in Y. Leshem., Y. Mandelik, and J. Shamoun-Baranes (eds.), *Proceedings international seminar on birds and flight safety in the Middle East*. Tel-Aviv, Israel. Bruderer, B., and L. Jenni. 1988. Strategies of bird migration in the area of the Alps. Pp. 2150–2161 in H. Ouellet (ed.), *Acta XIX Congressus Internationalis Ornithologici*. National Museum of Natural Science, Ottawa, Ontario. Eastwood, E. 1967. *Radar ornithology*. Methuen, London.

91. Williams, T.C., J.M. Williams, P.G. Williams, and P. Stokstad. 2001. Bird migration through a mountain pass studied with high resolution radar, ceilometers, and census. *Auk* 118:389–403, p. 394.

92. Williams, T.C., J.M. Williams, P.G. Williams, and P. Stokstad. 2001. Bird migration through a mountain pass studied with high resolution radar, ceilometers, and census. *Auk* 118:389–403, p. 401.

vides a rational explanation for why some short towers cause high bird mortality (e.g., a kill at a 100-foot unlighted tower on a ridgeline). Birds will be killed at a tower whenever large numbers are flying near it at the same elevation as the tower. This can occur because the tower is tall or because it is placed topographically where birds are concentrated close to the ground. At ridgeline locations, inclement weather is not required for concentrations of birds to be found at low elevation. Radar studies can be conducted prior to siting a tower in an area that might concentrate night migrants so that the tower can be located to avoid such sites.

7. Data Quality Act

The communications industry appears eager to use the Data Quality Act and its implementation by the FCC as a way to discount the available information about bird mortality at communications towers. The National Association of Broadcasters et al. asserts, “As described in more detail in the attached Technical Comments, most reports, observations and studies on the supposed effects of communications towers on migratory birds have not been peer-reviewed and would not qualify as ‘quality information’ under the Commission’s own DQA Information Quality Guidelines.”⁹³ In their commissioned report, Woodlot Alternatives writes:

Most of the literature cited, particularly those involving observations and incidental reports, was found to be of limited scientific value. Referring to some aspects of the FCC’s Data Quality guidelines (transparency and reproducibility), we used these criteria to assess the 27 peer-reviewed studies used in this review. In accordance with these guidelines, published papers were required to 1) have a research protocol with a clearly described methods section; 2) maintain sufficient metrics for statistical analyses; 3) have clearly stated results; and 4) have reproducible results. The studies that appeared to meet these criteria were published in peer-reviewed scientific journals. We found that 19 studies met the above criteria as discussed in the guidelines and 8 studies were doubtful in this regard (Table 4). None of the 173 incidental reports of avian mortality met the FCC Data Quality guidelines for transparency and reproducibility.

The eagerness to characterize incidental reports of bird mortality at particular towers as “of limited scientific value” misses the point. Incidental observations are neither useless nor ideal for scientific inquiry. Their appropriateness for use depends upon the purpose to which they are put. As long as assumptions are made explicit, incidental observations can be used to develop a description of reality using the scientific method.

While the communications industry concentrates on the elements of “reproducibility” and “transparency,” it does not discuss the need for analysis to be objective. In the FCC’s implementing guidelines, this means that if alternative explanations for patterns in data exist, they should be included in any discussion of results.⁹⁴ Both the Woodlot Report

93. CITIA/NAB Comments, p. 28 (footnote omitted).

94. The Information Quality Guidelines (FCC 02-277) read, in part: “Objectivity will be demonstrated by including in the information dissemination product’s methodology section or appendix a discussion of

and the Avatar Report fail to do this. Many of the conclusions presented above are alternative, and we believe more accurate, interpretations of the material presented in the Avatar Report. The Avatar Report avoids drawing obvious inferences from the available data to such a degree that it could be interpreted as lacking objectivity. For example, it claims that little research on bird mortalities at towers has been completed in the past twenty years,⁹⁵ despite many recent studies available to Avatar.⁹⁶

8. Conclusion

Our review of the scientific literature, combined with our analysis conducted in the preparation of this report, and the unpublished and in-press research described above, leads us to the conclusion that sufficient reliable information is available to implement communications tower guidelines that would reduce existing and future significant adverse impacts on bird populations. Many research needs are apparent — evaluating the attractiveness of strobe-type flashing red lights without the confounding effect of solid red lights and testing the hypothesis that red light disorients birds while in flight by disrupting their magnetic compass are only two. We conclude, however, that the U.S. Fish and Wildlife Service tower siting guidelines have a strong scientific basis, and their applicability has been demonstrated by research available at the time they were issued in 2000, or completed since then.

In view of the significant adverse effects on bird populations if nothing is done, an adaptive management approach would be advisable! Adaptive management allows for a management action to be taken, such as requiring only strobe-type lights on new towers, while continuing to increase scientific knowledge by studying the effects of such actions (e.g., monitoring and comparing bird mortality at towers with all white strobe lights, all red strobe lights, and mixed solid red and red strobe lights on towers). Future recommendations can be modified to incorporate the findings of such studies. Many alternative

other scientifically, financially, or statistically responsible and reliable alternative views and perspectives, if these alternative views or perspectives are not already noted in other sections of the information dissemination product.”

95. Avatar Report, p. 3-1.

96. Morris, S.R., A.R. Clark, L.H. Bhatti, and J.L. Glasgow. 2003. Television tower mortality of migrant birds in western New York and Youngtown, Ohio. *Northeastern Naturalist* 10:67–76. Nehring, J., and S. Bivens. 1999. A study of bird mortality at Nashville’s WSMV television tower. *Migrant* 70:1–8. Kemper, C.A. 1996. A study of bird mortality at a central Wisconsin TV tower from 1957–1995. *Passenger Pigeon* 58:219–235. Crawford, R.L., and R.T. Engstrom. 2001. Characteristics of avian mortality at a north Florida television tower: a 29-year study. *Journal of Field Ornithology* 72:380–388. Kruse, K. 1996. A study of the effects of transmission towers on migrating birds. M.S. thesis (Environmental Science and Policy), University of Wisconsin, Green Bay. Ball, L.G., K. Zyskowski, and G. Escalona-Segura. 1995. Recent bird mortality at a Topeka television tower. *Kansas Ornithological Bulletin* 46(4):33–36. 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.

97. Holling, C.S. 1978. *Adaptive environmental assessment and management*. New York: John Wiley & Sons. Walters, C.J. 1986. *Adaptive management of renewable resources*. New York: MacMillan Press. Haney, A., and R.L. Power. 1996. Adaptive management for sound ecosystem management. *Environmental Management* 20:879–886.

mitigation strategies could be investigated and eventually adopted under an adaptive management approach (e.g, different lighting colors, different flash rates), but progress in reducing current adverse impacts and minimizing future impacts from communications towers requires immediate action based on the substantial existing research.

9. About the Authors

Dr. Travis Longcore and Catherine Rich are co-editors of the forthcoming book *Ecological Consequences of Artificial Night Lighting* (Island Press). They provide expert comments on environmental impact analysis documents, concentrating on presenting a thorough review of the scientific literature. Dr. Longcore is Research Assistant Professor of Geography at the University of Southern California Center for Sustainable Cities and Lecturer for the UCLA Department of Ecology and Evolutionary Biology and the UCLA Institute of the Environment. He was graduated *summa cum laude* from the University of Delaware with an Honors B.A. in Geography, and holds an M.A. and a Ph.D. in Geography from UCLA. Ms. Rich holds an A.B. with honors from the University of California at Berkeley, a J.D. from the UCLA School of Law, and an M.A. in Geography from UCLA. She is a licensed attorney in California, and is Executive Officer of The Urban Wildlands Group, a conservation non-profit that she co-founded with Dr. Longcore. Dr. Sidney A. Gauthreaux, Jr. has studied behavioral and physiological aspects of bird migration since the late 1950s. He is currently Professor of Biological Sciences at Clemson University and Director of the Clemson University Radar Ornithology Laboratory.

Dr. C. Zonneveld (Free University, Amsterdam) provided useful criticism of the statistical analysis. All errors and omissions remain the responsibility of the authors.

10. Appendix: Data Used in Analysis of Tower Height

To allow transparency and reproducibility of the analysis of tower height presented in Section 3, the dataset is provided here. These data were obtained from, and full citations are found in, the Woodlot Report and a report from the National Wind Coordinating Committee.⁹⁸

Table 4. Studies of birds killed at towers providing estimates of mean annual mortality.

Source	State	Tower Height (feet)	Duration of Study (years)	Mean Annual Mortality
C. Nicholson, pers. comm. ⁹⁹	TN	197	3	8
Seets and Bohlen 1977	IL	605	1	206
Young et al. 1994	KS	653	0.5	1,272
Young et al. 1994	KS	700	0.5	1,080
Bierly 1968, 1969, 1972, Remy 1974, 1975, Cooley 1977	AL	825	4	82
Morris et al. 2003	NY	961	30	267
Seets and Bohlen 1977	IL	981	0.5	130
Kemper 1996	WI	1,000	38	250
Crawford and Engstrom 2001	FL	1,010	29	1,517
Seets and Bohlen 1977	IL	1,047	0.5	1,176
Morris et al. 2003	NY	1,059	30	35
Seets and Bohlen 1977	IL	1,063	0.5	969
Morris et al. 2003	NY	1,076	30	370
Young et al. 1994	KS	1,079	0.5	912
Morris et al. 2003	OH	1,084	18	144
Young et al. 1994	KS	1,154	0.5	672
Carter and Parnell 1976	NC	1,188	2	767
Avery et al 1976	ND	1,197	3	1,075
Young et al. 1994	KS	1,253	0.5	408
Stmad 1975	MN	1,314	5	701
Seets and Bohlen 1977	IL	1,338	0.5	942
Nehring and Bivens 1999	TN	1,364	38	523
Seets and Bohlen 1977	IL	1,458	0.5	1,680
Taylor and Anderson 1973	FL	1,481	3	2,594
Seets and Bohlen 1977	IL	1,587	0.5	326
Carter and Parnell 1976	NC	1,994	2	767

98. Erickson, W.P., G.D. Johnson, M.D. Strickland, D.P. Young, Jr., K.J. Sernka, and R.E. Good. 2001. *Avian collisions with wind turbines: a summary of existing studies and comparisons to other sources of avian collision mortality in the United States*. National Wind Coordinating Committee (NWCC) Resource Document.

99. C.P. Nicholson, Ph.D., Tennessee Valley Authority, pers. comm. to G. Winegrad, March 26,2004.

Table 5. Results of logistic regression of annual mortality class by tower height.

Whole Model Test

Model	-LogLikelihood	DF	Chisquare	Prob>ChiSq
Difference	3.723222	1	7.446445	0.0064
Full	10.322085			
Reduced	14.045308			

RSquare (U)	0.2651
Observations (or Sum Wgts)	26

Converged by Gradient

Parameter Estimates

Term	Estimate	Std Error	Chisquare	Prob>ChiSq
Intercept	-3.7233453	2.3306353	2.55	0.1101
Tower Height	0.00489571	0.0023436	4.36	0.0367

For log odds of over 250/under 250

Table 6. Results of logistic regression of annual mortality class by tower height omitting the only short, unlit tower.

Whole Model Test

Model	-LogLikelihood	DF	ChiSquare	Prob>ChiSq
Difference	2.257167	1	4.514335	0.0336
Full	10.252893			
Reduced	12.510061			

RSquare (U)	0.1804
Observations (or Sum Wgts)	25

Converged by Gradient

Parameter Estimates

Term	Estimate	Std Error	ChiSquare	Prob>ChiSq
Intercept	-3.4047111	2.5411879	1.80	0.1803
Tower Height	0.00458966	0.0025254	3.30	0.0692

For log odds of over 250/under 250



Land Protection Partners

P.O. Box 24020, Los Angeles, CA 90024-0020
Telephone: (310) 276-2306

Reply to Comments Filed With Federal Communications Commission on WT Docket No. 03-187, Avatar Environmental, LLC, Report Regarding Migratory Bird Collisions With Communications Towers

Prepared for:

American Bird Conservancy
Defenders of Wildlife
Forest Conservation Council
The Humane Society of the United States

March 9, 2005

Prepared by:

Travis Longcore, Ph.D.
Catherine Rich, J.D., M.A

Reply to Comments Filed With Federal Communications Commission on
WT Docket No. 03-187, Avatar Environmental, LLC, Report Regarding
Migratory Bird Collisions With Communications Towers

1. Introduction

On December 14, 2004, the Federal Communications Commission (“FCC”) made available a review of comments received for its Notice of Inquiry on Avian/Communication Tower Collisions. The Notice of Inquiry was issued on August 20, 2003 and closed on December 6, 2003. A team of consultants (Avatar Environmental, LLC, EDM International, Inc., and Pandion Systems, Inc.) was retained by the FCC in May 2004 and reviewed all of the comments received. Their report, “Notice of Inquiry Comment Review Avian/Communication Tower Collisions” (“Avatar Report”), dated September 30, 2004, includes recommendations of actions that might be taken by the FCC. The FCC received comments on the Avatar Report with a closing deadline of February 14, 2005.

Land Protection Partners has been engaged by the American Bird Conservancy, Defenders of Wildlife, Forest Conservation Council, and The Humane Society of the United States to review the scientific merit of the comments raised by other parties in response to the Avatar Report. We downloaded all applicable comments from the FCC’s online Electronic Comment Filing System and reviewed them for consistency and scientific merit. Our review does not engage legal issues, such as those concerning jurisdiction and the applicability of specific statutes, but does engage the major policy issues that are based on interpretation of the scientific literature.

2. General Observations

The filings from parties who do not represent the telecommunications/tower industry were generally supportive of the interpretation of the state of the science presented in our own comments on the Avatar Report,¹ and submitted as part of the comments filed on behalf of American Bird Conservancy, Defenders of Wildlife, Forest Conservation Council, and The Humane Society of the United States. For example, Dr. Joelle Gehring submitted a report of her research that shows a greater risk to migratory birds from taller structures, and from guyed towers.² The Arizona Game and Fish Department provided comments that were largely consistent with our observations as well. The U.S. Fish and Wildlife Service also submitted comments that were consistent with our review of the scientific literature.

Dr. Gehring’s comments, and our previous report submitted to the FCC (as an attachment to the comment letter from the American Bird Conservancy et al.) were the only materi-

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1. Longcore, T., C. Rich, and S.A. Gauthreaux, Jr. 2005. Scientific Basis To Establish Policy Regulating Communications Towers To Protect Migratory Birds: Response to Avatar Environmental, LLC, Report Regarding Migratory Bird Collisions With Communications Towers, WT Docket No. 03-187, Federal Communications Commission Notice of Inquiry. Land Protection Partners, Los Angeles, California.
 2. Gehring, J. 2005. Letter report to Federal Communications Commission re: Notice of Inquiry comment review Avian/Communication Tower Collisions Final Report.

als submitted in response to the Avatar Report that provided any substantive scientific information or analysis.

The comments submitted by or on behalf of the telecommunications/tower industry are substantially lacking in analytical quality and are, at least in substantial part, inconsistent with the scientific literature. Before addressing the areas of scientifically substantive disagreement (e.g., biological significance, influence of tower height, lighting, and guy wires on bird mortality), we make some general observations on the comments from the telecommunications/tower industry.

2.1. Telecommunications/Tower Industry Selectively Interprets Science To Support the Status Quo and Its Financial Interest

The telecommunications/tower industry's comments are characterized by a selective interpretation of what constitutes reliable information upon which to base policy changes. The comments of Cingular Wireless are particularly illustrative in this regard.

Cingular Wireless asserts that: there is an “emerging scientific consensus” that towers < 500 feet are involved in few migratory bird deaths.³ Cingular Wireless bases this assertion on an unpublished, not peer-reviewed opinion from Dr. Paul Kerlinger prepared for submission to the FCC (File No. A0147567) for an application to construct a communications tower in Hawaii.⁴ Cingular Wireless highlights this conclusion from Dr. Kerlinger, while completely ignoring his other conclusions from the same report, “Thus, unguyed towers pose virtually no risk or minimal risk to birds,” and, “Towers with these types of lights [L-810; solid red] pose a greater risk than do towers that are unlit or towers that have only flashing lights.” Cingular Wireless rejects these conclusions, stating, “There is no consensus on the specific tower characteristics or configurations that increase the risk of avian mortality,” before reiterating the belief that “short (< 500 foot) communications towers present little if any risk to migratory or resident birds.” The “emerging scientific consensus” that is promoted by Cingular Wireless is contradicted by comments from the cellular trade organization⁶ and its expert. This expert, Woodlot Alternatives, concluded, “Both the Avatar and Woodlot reports state that there are insufficient data to draw substantive conclusions between tower height and migratory bird collisions, *particularly the critical height threshold below which little mortality would be expected to occur.*”⁷ Contrary to the claims of both Cingular Wireless and Woodlot Alternatives, our analysis based on the peer-reviewed literature shows that towers 200–500

3. Cingular Wireless. 14 February 2005. In the inatter of effects of communications towers on migratory Birds (“Cingular Wireless”), p. i.

4. Kerlinger. 4 June 2004. Assessment of collision risk to Newell’s Shearwater and Hawaiian Petrel at an AT&T Wireless telephone tower in Hawaii. Prepared for use in the matter before the Federal Communications Commission Involving the Naalehu Tower, on the Island of Hawaii, ASR No. 120110.

5. *Cingular Wireless*, p. 24.

6. PCIA. 14 February 2005. Comments of PCIA on Avatar Environmental, LLC Report (“PCIA”).

7. Woodlot Alternatives. 2005. Technical Comment on *Notice of Inquiry Comment Review, Avian/Communication Tower Collisions*, Final (Avatar et al. 2004). Prepared for: CTIA – The Wireless Association, The National Association of Broadcasters, and PCIA – The Wireless Infrastructure Association. Woodlot Alternatives. Topsham, Maine (“Woodlot Alternatives”), p. 2.

feet are responsible for a large proportion (30–40%) of all birds killed at communications towers (see Section 5 below), even though each tower < 500 feet kills fewer birds on average than each tower > 500 feet.⁸

2.2. Comments by Industry Incorrectly Maintain That Science Is Insufficient To Support Policy Changes To Better Protect Avian Species

The telecommunications/tower industry maintains that scientific understanding of deaths of migratory birds at communications towers is insufficient to take any action at all. As was documented by our previous analysis, which was submitted to the FCC by the American Bird Conservancy et al., ample scientific evidence is available to enact policy changes that would substantially reduce bird deaths at towers without interfering with the expansion of telecommunication services or the maintenance of air traffic safety.⁹ When it serves a company's or the industry's interest, the company/industry is willing to claim that the science is sufficient, as with Cingular Wireless' claim that few bird mortalities occur at towers < 500 feet tall. Contrary to the industry's unwillingness to accept the recommendations that flow from the available science, resource agencies, which have staff with expertise in these issues, concluded that an ample scientific basis to implement a policy to protect birds exists. This was affirmed by the U.S. Fish and Wildlife Service when it issued the interim tower siting guidelines, which were "based on the best information available,"¹⁰ and by the Arizona Game and Fish Department in its comments on the Avatar Report.

The industry, for its part, clings to the refuted claim that little research has been completed in the last twenty years," despite evidence to the contrary."

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8. Crawford, R.L., and R.T. Engstrom. 2001. Characteristics of avian mortality at a north Florida television tower: a 29-year study. *Journal of Field Ornithology* 72:380–388. See Longcore, T., C. Rich, and S.A. Gauthreaux, Jr. 2005. Scientific Basis To Establish Policy Regulating Communications Towers To Protect Migratory Birds: Response to Avatar Environmental, LLC, Report Regarding Migratory Bird Collisions With Communications Towers, WT Docket No. 03-187, Federal Communications Commission Notice of Inquiry. Land Protection Partners, Los Angeles, California.
 9. Longcore, T., C. Rich, and S.A. Gauthreaux, Jr. 2005. Scientific Basis To Establish Policy Regulating Communications Towers To Protect Migratory Birds: Response to Avatar Environmental, LLC, Report Regarding Migratory Bird Collisions With Communications Towers, WT Docket No. 03-187, Federal Communications Commission Notice of Inquiry. Land Protection Partners, Los Angeles, California.
 10. Clark, J.R. 14 September 2000. Service guidance on the siting, construction, operation and decommissioning of communications towers. U.S. Fish and Wildlife Service, Washington, D.C.
 11. Cingular Wireless, p. 2.
 12. See Gauthreaux, S.A., Jr., and C. Belser. 2005. Effects of artificial night lighting on migrating birds. In C. Rich and T. Longcore (eds.), *Ecological consequences of artificial night lighting*. Island Press, Covelo, California. Morris, S.R., A.R. Clark, L.H. Bhatti, and J.L. Glasgow. 2003. Television tower mortality of migrant birds in western New York and Youngstown, Ohio. *Northeastern Naturalist* 10:67–76. Nehring, J., and S. Bivens. 1999. A study of bird mortality at Nashville's WSMV television tower. *Migrant* 70:1–8. Kemper, C.A. 1996. A study of bird mortality at a central Wisconsin TV tower from 1957–1995. *Passenger Pigeon* 58:219–235. Crawford, R.L., and R.T. Engstrom. 2001. Characteristics of avian mortality at a north Florida television tower: a 29-year study. *Journal of Field Ornithology* 72:380–388. Kruse, K. 1996. A study of the effects of transmission towers on migrating birds.

2.3. Non-Expert Comments from Telecommunications/Tower Industry Are Not Grounded in Sound Science and Lack a Sound Biological Basis

The FCC should disregard argumentation, posing as science, on biological topics from telecommunications/tower industry representatives who are unqualified to present expert opinions. Of the many pages of arguments presented on behalf of the telecommunications/tower industry, only the Woodlot Alternatives “technical comments” report appears to be prepared by anyone with knowledge of biology or ornithology, and even the author of this report did not provide any credentials.

The comments from Centerpointe Communications represent the most egregious example of lawyers attempting to practice biology without apparent training in a relevant scientific discipline. The commenter for Centerpointe Communications attempts to analyze the science presented in the Avatar Report, but his arguments and writing reveal a lack of understanding of biology and ornithology. The commenter is likely an excellent telecommunications attorney, but does not evince any credibility when discussing biology.

The commenter does not seem to understand that commonly used bird names may refer to different taxonomic levels (e.g., families, genera, or species). For example, he writes:

Avatar points out that three species that are deemed at **risk**, vireos, thrushes and warblers...¹³

Accordingly, attached hereto is a study of vireos, a neotropical migratory bird.¹⁴

Even when applied to a single species, the vireo...¹⁵

Taxonomically, there is no such thing as “the vireo”; vireos are members of the Family Vireonidae, which includes many different species. “Vireos, thrushes and warblers” refer to three *families* of birds (Vireonidae, Turdidae, and Parulidae), not “three species.” This is basic knowledge for someone trained in the biological sciences. The system of classification used to describe the taxonomic hierarchy is taught in every high school biology class. This taxonomic hierarchy (Kingdom, Phylum, Class, Order, Family, Genus, Species) was devised in the eighteenth century by Linnaeus (*System of Nature*, 1735) and has been used by scientists ever since. The reader can perhaps understand what the commenter intends, but failure to use the proper terminology reveals that the commenter lacks a basic scientific background to analyze avian collisions with towers or to evaluate the scientific literature.

M.S. thesis (Environmental Science and Policy), University of Wisconsin, Green Bay. Ball, L.G., K. Zyskowski, and G. Escalona-Segura. 1995. Recent bird mortality at a Topeka television tower. *Kansas Ornithological Bulletin* 46(4):33–36. 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.

13. Centerpointe Communications. 2005. Comments of Centerpointe Communications, L.L.C to Avatar Environmental, L.L.C.’s Report (“Centerpointe Communications”), p. 12.

14. Centerpointe Communications, p. 19.

15. Centerpointe Communications, p. 24.

The commenter's lack of knowledge about taxonomy results in claims in service of the client's interests that lack scientific merit. For example, the commenter claims that, "One type of animal which is deemed fully expendable is a bird,"¹⁶ because the federal government kills pest bird species through the Department of Agriculture and allows hunting of birds. This logic might make sense to someone who thinks that there is just one type of bird in the world. To the commenter, apparently, all birds are the same, so a European Starling is the same as an endangered Red-cockaded Woodpecker or an Ovenbird is the same as a Mallard is the same as any other bird in North America. But this is not the case, either in law or biology. There are approximately 900 avian species found in the United States. Only certain species of birds are killed as crop pests or by hunters, and only under permits or licenses issued under the Migratory Bird Treaty Act by the U.S. Fish and Wildlife Service, and even this killing can be controversial. The species of greatest concern for their deaths at communications towers are many species of neotropical migrant songbirds, which are neither hunted nor killed to protect agricultural interests. Indeed, many federal programs are in place to protect these species, and many are identified as birds of conservation concern by the federal government.¹⁷

The commenter does note that tower kill mortality might be significant to certain sensitive species individually, but quickly veers into scientifically illogical territory by claiming that it does not matter whether certain species are affected more because no mitigation measures are available that would eliminate collisions for species selectively.¹⁸ The commenter apparently does not believe that it is worthwhile to reduce mortality for all bird species at towers and thereby benefit rare species (of conservation concern) at the same time.

As the FCC considers the comments and reply comments on the Avatar Report, it should carefully review the scientific literature cited by commenters and consider the expertise of those commenting and interpreting such research. Comments of those without appropriate credentials should not be afforded the same weight as those with relevant scientific, academic, and professional credentials.

We also have serious concerns over the conclusions in the report from Woodlot Alternatives, despite the purported qualifications of the preparers of that report.

16. Centerpointe Communications, p. 20.

17. U.S. Fish and Wildlife Service. 2002. Birds of conservation concern 2002. Division of Migratory Bird Management, Arlington, Virginia. The U.S. Fish and Wildlife Service's Birds of Management Concern List is a statutorily required listing of avian species that may become candidates for listing under the Endangered Species Act without additional conservation action and for which special attention is warranted to prevent declines. Congress dictated such a list be prepared at least every five years as an early warning system to try to prevent birds from becoming listed under the Endangered Species Act.

18. Centerpointe Communications, p. 18. "The problem of ascribing significance to a bird kill based on the bird's species and the species' total population (i.e. managed or endangered or abundant) is that it does nothing to further the core discussion. Since no science is available that shows what may be done to eliminate the threat of collision by any one species, the issue regarding specific species is nearly moot."

2.4. Industry Evinces **Misunderstanding of Peer Review**

Industry representatives appear to misunderstand the nature of “peer review.” The CTIA – The Wireless Association and the National Association of Broadcasters claim in a joint comment, “In this instance, the peer reviewers (including Woodlot and Avatar) have concluded ...”¹⁹ The reviews conducted by Woodlot Alternatives and Avatar, however, do not constitute “peer review.”

“Peer review” leading to “peer reviewed scientific literature” is not conducted by consultants under contract to an industry group, government agency, or conservation group. Peer review for scientific publication is facilitated by the editor of an academic journal or book, who selects reviewers who have specific knowledge about the subject that they are going to review. The editor usually keeps the identity of the reviewer anonymous so that he or she can speak freely. The editor then weighs those comments with his or her own judgment to reach a determination whether the manuscript under consideration meets the standards of the journal or book in which it is to be published. To our knowledge, neither Avatar nor Woodlot Alternatives has personnel on staff who have published scientific papers on the topic of avian-structure collisions, or who have any special expertise in this area. They therefore would be unlikely to be selected to be peer reviewers.

This proceeding has no peer reviewers. The Avatar Report is not a peer review, the Woodlot Alternatives reports are not peer reviews, and our previous report is not a peer review. We could submit our meta-analysis of the effect of tower height on bird mortality to a scientific journal for peer review, but the outcome would not be available for this proceeding. With the exception of Dr. Gehring’s progress report and our meta-analysis of the influence of tower height on bird mortality, it is doubtful that anything else in the record of this proceeding is sufficiently novel to be considered for publication in a scientific journal and thereby sent out for peer review.

3. Tower Kill of Birds Is Biologically Significant

The telecommunications/tower industry criticizes the Avatar Report for failing to assess whether bird deaths at communications towers are biologically significant! but then continues to present a series of specious arguments about biological significance. We agree that the Avatar Report failed in not following through on the promise of assessing whether tower kill of birds is ‘biologically significant. The industry, however, continues to claim that bird kills cannot be significant for two reasons — towerkill is a small percentage of total human-caused mortality, and the total number of birds killed per year is a small percentage of the total number of birds in the United States. *Both of these arguments are wrong.*

19. CTIA – The Wireless Association and National Association of Broadcasters. 2005. Comments of the CTIA – The Wireless Association and National Association of Broadcasters on the Avatar Report (“CTIA and NAB”), p. 16.

20. Cingular Wireless, p. 4.

3.1. Biological Significance of Tower Kill Does Not Depend on Its Percentage of Total Human-Caused Mortality or Total Bird Population

Biological significance can be determined by assessing the number of individuals of each species killed at towers, not through an abstract discussion of total bird populations as if there were only one species of bird in North America.

The telecommunications/tower industry argues that tower kill represents a low percentage of human-caused bird mortality (0.42%) and is therefore insignificant.²¹ To the contrary, this percentage is irrelevant to whether tower kill is significant, both biologically and under the National Environmental Policy Act (“NEPA”). Imagine that all of the birds killed at towers are European Starlings. Then one could immediately conclude that the effect is not biologically significant because this species is an invasive exotic afforded no regulatory protection, but this determination would not depend on the number of birds killed by humans in other ways. At the other extreme, imagine that all of the birds killed at towers are Kirtland’s Warblers; this most certainly would be biologically significant, because it would cause the rapid extinction of the species. But in this example as well, it would not matter to this determination how many birds are killed by humans in other ways.

To determine significance under NEPA, the evaluating agency must make a reasoned estimate of which species are killed at towers and at what rate they are being killed. We provided such estimates in our previous report filed with the FCC,²² and the numbers presented there should be used to reach a determination whether tower kill is significant. A human action could cause 0.00001% of total human-caused bird mortality and still be considered significant both biologically and under NEPA if the birds killed were sensitive species, listed under the Endangered Species Act, or otherwise protected by statute, such as by the Migratory Bird Treaty Act.

By the same logic, it is not relevant that total bird deaths at towers each year represent some small percentage of total bird populations. This logic would only apply if there were only one bird species, or if all avian species had the same population size and tower kill affected all species evenly. Again, this percentage is not relevant, because there are hundreds of different bird species, some have small population sizes or are otherwise of conservation concern. Birds killed at towers are disproportionately neotropical migrants, many of which are declining in number and which are of official federal conservation concern.

21. Woodlot Alternatives. 2003. An assessment of factors associated with avian mortality at communications towers — a review of existing scientific literature and incidental observations. Topsham, Maine.

22. Longcore, T., C. Rich, and S.A. Gauthreaux, Jr. 2005. Scientific Basis To Establish Policy Regulating Communications Towers To Protect Migratory Birds: Response to Avatar Environmental, LLC, Report Regarding Migratory Bird Collisions With Communications Towers, WT Docket No. 03-187, Federal Communications Commission Notice of Inquiry. Land Protection Partners, Los Angeles, California, Table I.

The proper course of action from a scientific perspective is for the FCC to reject all assertions that are based on these two erroneous arguments offered by the telecommunications/tower industry.²³

3.2. Communications Towers Kill a Minimum of Four Million to Five Million Birds Per Year

The telecommunications/tower industry does not provide any real challenge to the consensus that communications towers kill a minimum of four million to five million birds per year. Cingular Wireless cautions that the numbers of birds killed at towers that are reported in the literature should be combined with towers where low mortality occurs to reach a total kill estimate.²⁴ Centerpointe similarly warns against extrapolating from towers with large kills to all towers.²⁵ This concern is unfounded; the lower mortality at many towers has already been factored in to the total mortality estimate, originally by Banks,²⁶ and then by the U.S. Fish and Wildlife Service.²⁷

Total mortality estimates have already taken into account the lower mortality at many towers, and indeed the absence of mortality at some towers. Even so, the sheer number of towers results in a staggering number of bird deaths, which are disproportionately species of conservation concern.

3.3. Decreasing Bird Mortality at Single Tower Sites Does Not Necessarily Extrapolate to Decreasing Total Mortality

Woodlot Alternatives refers to the need to investigate “decreasing bird mortality over time with increasing tower numbers.”²⁸ This is a subtle but significant misstatement of the observed trend. The trend is a decrease in number of birds killed over time at particular towers that have been monitored.²⁹ The broader conclusion, that the total number of birds killed at towers is declining, is not supported by any data or research. Many more towers have been built during the periods covered by studies showing this trend and these new towers are likely killing birds but are not monitored. So even if fewer birds are

23. Cingular Wireless, p. 11, Centerpointe Communications, p. 23–24, Woodlot Alternatives, p. 3, CTIA and NAB, p. 15.

24. Cingular Wireless, p. 5.

25. Centerpointe Communications, p. 4.

26. Banks, R.C. 1979. Human related mortality of birds in the United States. *CIS. Fish and Wildlife Service, Special Scientific Report – Wildlife* 215:1–16.

27. Manville, A.M., II, U.S. Fish and Wildlife Service. 14 February 2005. Letter to Federal Communications Commission, WT Docket No. 03-187.

28. Woodlot Alternatives, p. 4. See also Avatar Environmental, LLC, EDM International, Inc., and Pandion Systems, Inc. 2003. Notice of Inquiry Comment Review Avian/Communication Tower Collisions, p. 3-15.

29. Nehring, J., and S. Bivens. 1999. A study of bird mortality at Nashville’s WSMV television tower. *Migrant* 70:1–8. Morris, S.R., A.R. Clark, L.H. Bhatti, and J.L. Glasgow. 2003. Television tower mortality of migrant birds in western New York and Youngstown, Ohio. *Northeastern Naturalist* 10:67–76. Crawford, R.L., and R.T. Engstrom. 2001. Characteristics of avian mortality at a north Florida television tower: a 29-year study. *Journal of Field Ornithology* 72:380–388.

killed at each tower, the additional towers could result in the same number or even an increased number of birds being killed overall.

Morris et al. strongly suspect large-scale factors affect the decreasing number of birds salvaged at towers over time, specifically changing weather patterns and overall decreases in migrant population. While weather patterns may have changed sufficiently in some locations, contributing to the observed declines at specific towers, total population declines of those species found most frequently at towers likely contributes substantially to the observed patterns.³¹

The FCC and regulatory agencies should understand that if the number of birds killed at towers has declined because the populations of those species killed at towers has declined, then the significance of the recent lower mortality is not less.

4. Applicability of Wind Turbine Information

Cingular Wireless asserts that the FCC should not rely on data collected about wind turbine. There are indeed many differences in the species that are killed at wind turbines and those killed at communications towers, but many instances exist where information from wind turbine sites is useful. Some wind turbine sites are in the eastern United States where the bulk of recorded large tower kill events has been recorded. Meteorological towers are found at wind turbine sites, and these towers are often monitored along with the turbines for bird and bat mortality.³³ Bird mortality at these meteorological towers is useful in understanding overall patterns of bird mortality at towers. As long as the data from wind turbine sites include information about meteorological tower construction and lighting, the data may be extrapolated to communications towers.

5. Tower Height

The telecommunications/tower industry is inconsistent in its comments about the Avatar Report's conclusions concerning the role of tower height in bird mortality. The trade organizations and their consultant argue that the data are insufficient to draw any conclusion about the relationship between height and bird mortality. Cingular Wireless suggests that there is an "emerging scientific consensus" that towers < 500 feet present little hazard to birds. The commenter for Centerpointe Communications suggested that taller towers should have lower mortality because birds can see taller towers better than shorter towers. But this commenter also wrote, "one may theorize that birds also die

30. Morris, S.R., A.R. Clark, L.H. Bhatti, and J.L. Glasgow. 2003. Television tower mortality of migrant birds in western New York and Youngstown, Ohio. *Northeastern Naturalist* 10:67-76, pp. 73-74.

31. Nehring, J., and S. Bivens. 1999. A study of bird mortality at Nashville's WSMV television tower. *Migrant* 70:1-8.

32. Cingular Wireless, p. 19.

33. Young, D.P., Jr., W.P. Erickson, R.E. Good, M.D. Strickland, and G.D. Johnson. 2003. 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. Western EcoSystems Technology, Inc., Cheyenne, Wyoming.

from collisions with trees, rocks and cliffs,”³⁴ and, “science does not know ... whether such collisions are moreover the effect of aberrant bird behavior rather than the existence of specific obstacles to flight.”³⁵ These latter comments are difficult to take seriously — there are no natural features that have the characteristics of > 200-foot communications towers (lighted and extending into migratory altitudes), and it is unreasonable to blame collision with a 1,300-foot radio tower (for example) on “aberrant bird behavior” (without the tower there would be no collision or “aberrant behavior”). The company with “medium” towers argues that medium towers pose no problem while the company with taller towers argues that taller towers are “more visible” and speculates that it is the bird’s fault for hitting them.

Although our previous detailed analysis filed with the FCC supports the assertion by Cingular Wireless that towers < 500 feet kill fewer birds than towers > 500 feet, it does not support their conclusion that towers < 500 feet kill insignificant numbers of birds. According to FCC tower registration data,³⁶ towers between 200 and 500 feet constitute 59% of all towers (including < 199-foot towers registered with the FCC). Even a modest number of birds being killed at these towers could account for ~40% of the total bird mortality at towers. To illustrate this point, we calculated the contribution of bird kills from each tower class to total mortality by multiplying the number of towers in each class by a variable that expresses the relative mortality at short (< 199 feet), medium (200-499 feet), and tall (> 500 feet) towers. We assumed that the number of birds killed at short towers was 1x, while the number killed at medium towers was 10x, and the number at tall towers was 200x. The relation between medium and tall towers is derived from a long-term study of a tall tower that was replaced by a medium tower and showed reduction to one-twentieth to one-thirtieth of the bird mortality?³⁷ These proportions test Cingular Wireless’ claim that if medium towers kill far fewer birds per tower than tall towers, then they pose no conservation concern for migratory bird species.

The results of this exercise (Table 1) show that even if medium towers account for twenty times fewer bird kills than tall towers, their contribution to total bird mortality at towers is ~40% because of the large number of these medium towers. If medium towers kill thirty times fewer birds per tower on average than tall towers, their contribution to total mortality would still be ~30%. If medium towers kill 100 birds per year (as suggested by extrapolating the preliminary results from Dr. Gehring³⁸), they should be of great concern to regulators and conservationists alike. Towers 200-499 feet tall certainly contribute to a significant adverse impact biologically and under NEPA, and any strategy to mitigate

34. Centerpointe Communications, p. 14.

35. Centerpointe Communications, p. 15.

36. Federal Communications Commission database, as compiled by Ellen Paul, Ornithological Council, email dated February 18, 2005. Ms. Paul worked with FCC staff members to determine the numbers of towers in each height classification.

37. Crawford, R.L., and R.T. Engstrom. 2001. Characteristics of avian mortality at a north Florida television tower: a 29-year study. *Journal of Field Ornithology* 72:380–388.

38. Gehring, J.L. 2005. Avian collisions with communication towers: a comparison of tower support systems and tower heights. Central Michigan University, Mount Pleasant, Michigan.

the adverse effects of towers that does not include medium towers cannot address 3040% of the total mortality.

Table 1. Influence of tower number on contribution of towers in three height classes to total bird mortality at towers.

Tower height class (feet)	Number of towers	Percent of towers	Estimated annual mortality per tower	Contribution to total bird deaths at towers
< 199	31,169	37%	1x	3%
200-499	49,650	59%	10x	41%
500-2,100	3,419	4%	200x	56%

6. Tower Lighting and Bird Mortality

Telecommunications/tower industry comments on lighting are consistent with the overall industry position that the science is inadequate to make recommendations. In commenting on the Avatar Report they misinterpret the character and results of the Gauthreaux and Belser study. Centerpointe describes this study as “one, unpublished study,” but the research is now in press in a peer-reviewed book.³⁹

Centerpointe further confuses the issue by quoting the website of an animal welfare organization, which states “white light is worse than red light,”⁴⁰ and an environmental report from Hong Kong that concluded that red strobes were preferable to avoid bird collisions with towers, claiming that these contradicted the findings of Gauthreaux and Belser. They do not. As for white lights, *solid* white lights appear to attract more birds than red lights, if only because they are usually brighter. The statement about white lights on the Animal Protection Institute website is a popular, non-peer reviewed article and does not apply to strobe lights. It is hardly the type of evidence with which to refute the Gauthreaux and Belser study. The Hong Kong environmental report is completely consistent with Gauthreaux and Belser’s findings that strobe lights result in less bird accumulation in the airspace around the tower. As we noted in our comments on the Avatar Report, the short duration of the light and a period of darkness between flashes characteristic of a strobe light results in less bird attraction! While we are not aware of studies

39. Gauthreaux, S.A., Jr., and C. Belser. 2005. Effects of artificial night lighting on migrating birds. In C. Rich and T. Longcore (eds.), *Ecological consequences of artificial night lighting*. Island Press, Covelo, California.

40. Centerpointe Communications, p. 13.

41. Longcore, T., C. Rich, and S.A. Gauthreaux, Jr. 2005. Scientific Basis To Establish Policy Regulating Communications Towers To Protect Migratory Birds: Response to Avatar Environmental, LLC, Report Regarding Migratory Bird Collisions With Communications Towers, WT Docket No. 03-187, Federal Communications Commission Notice of Inquiry. Land Protection Partners, Los Angeles, California, Section 5.2.

of red strobe lights and bird attraction, we would agree that red strobe lights should attract few migrating birds.

The industry comments and the Avatar Report fail to address the current position of the Federal Aviation Administration (“FAA”) on obstruction lighting to prevent avian mortality at communications towers and other structures. In an April 6, 2004 Memorandum from the FAA Program Director for Air Traffic Airspace Management to Regional Air Traffic Division Managers, the FAA states that “medium intensity white strobe lights for nighttime conspicuity is to be considered the preferred system over red obstruction lighting systems to the maximum extent possible without compromising safety.””

I. Guy Wires

None of the industry commenters incorporates the new information emerging from Dr. Gehring’s study in Michigan, which compares mortality rates at guyed and guyless towers of medium height. After three seasons (two fall and one spring), the results incontrovertibly illustrate significantly greater mortality at guyed towers.⁴³ Neither the telecommunications/tower industry nor its expert Woodlot Alternatives addresses these results or the overwhelming evidence that guy wires dramatically increase risk to migratory birds. For example, they do not consider the results of Kruse, who correlated the location of dead birds under three guyed towers with the configuration of guy wires, supporting the conclusion that birds attracted to tower lighting collide with guy wires.⁴⁴ Even Dr. Paul Kerlinger, in comments for AT&T Wireless supporting the location of a cellular tower, stated that “unguyed towers pose virtually no risk or minimal risk to birds,” and, “This conclusion is based on the fact that not a single large scale or multiple bird fatality event has ever been reported from an unguyed tower.”⁴⁵ Although Dr. Gehring’s data indicate that birds are killed at unguyed towers, all experts agree, based on the data available, that guy wires significantly increase bird mortality at towers.

8. Conclusions

The comments filed by others on the Avatar Report did not contain novel information that would change our analysis of the Avatar Report and our interpretation of the existing scientific literature.⁴⁶ The conclusions of our previous analysis remain.

42. Memorandum from Sabra W. Kaulia, FAA Program Director for Air Traffic Airspace Management to Regional Air Traffic Division Managers dated April 6, 2004.

43. Gehring, J.L. 2005. Avian collisions with communication towers: a comparison of tower support systems and lower heights. Central Michigan University, Mount Pleasant, Michigan.

44. Kruse, K. 1996. A study of the effects of transmission towers on migrating birds. M.S. thesis (Environmental Science and Policy), University of Wisconsin, Green Bay.

45. Kerlinger. 4 June 2004. Assessment of collision risk to Newell’s Shearwater and Hawaiian Petrel at an AT&T Wireless telephone tower in Hawaii. Prepared for use in the matter before the Federal Communications Commission Involving the Naalehu Tower, on the Island of Hawaii, ASR No. 120110.

46. Longcore, T., C. Rich, and S.A. Gauthreaux, Jr. 2005. Scientific Basis To Establish Policy Regulating Communications Towers To Protect Migratory Birds: Response to Avatar Environmental, LLC, Report Regarding Migratory Bird Collisions With Communications Towers, WT Docket No. 03-187,

8.1. Avian Mortality at Communication Towers Is Significant

In our previously filed analysis, we concluded that the mortality for the ten avian species killed most frequently at towers ranges from 490,000 individuals per year for the most frequently killed species to 85,000 individuals per year for the tenth most frequently killed species. Upper estimates of mortality are an order of magnitude higher. The top ten most commonly killed birds include two U.S. Fish and Wildlife Service birds of conservation concern, Bay-breasted Warbler and Blackpoll Warbler. We estimate the mortality for Bay-breasted Warblers at 225,000 to 2.25 million per year and for Blackpoll Warblers at 136,000 to 1.36 million per year. The killing of 100,000–200,000 individuals per year of a bird species of regulatory concern is a significant impact both biologically and under NEPA. The extrapolated mortality rate of ~40–400 Red-cockaded Woodpeckers per year is a significant impact for this endangered species.

Even at the lowest end of estimated mortality, 17 other birds of conservation concern each have over 10,000 fatalities per year at communication towers, including 68,000 Northern Waterthrushes, 58,000 Northern Parulas, 57,000 Connecticut Warblers, and 48,000 Cape May Warblers. These numbers could be as high as 680,000 Northern Waterthrushes, 580,000 Northern Parulas, 570,000 Connecticut Warblers, and 480,000 Cape May Warblers. The mortality for birds of conservation concern is biologically significant and fully meets NEPA standards for a significant effect on the environment.

8.2. Tower Lights Should Be Avoided Where Possible; When Required, Lighting System Should Be Strobe Lights Only

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 we cited in our previously filed analysis fully supports the U.S. Fish and Wildlife Service tower siting guidelines that provide:

2. If collocation is not feasible and a new tower or towers are to be Constructed, communications service providers should be strongly encouraged to construct towers no more than 199 feet above ground level (AGL), using construction techniques which do not require guy wires (*e.g.*, use a lattice structure, monopole, etc.). **Such towers should be unlighted if Federal Aviation Administration regulations permit....**

5. If taller (>199 feet AGL) towers requiring lights for aviation safety must be constructed, the minimum amount of pilot warning and obstruction avoidance lighting required by the FAA should be used. **Unless otherwise required by the FAA, only white (preferable) or red strobe lights should be used at night, and these should be the minimum number, minimum intensity, and minimum number of flashes per minute (longest duration between flashes) al-**

lowable by the FAA. The use of solid red or pulsating red warning lights at night should be avoided. Current research indicates that solid or pulsating (beacon) red lights attract night-migrating birds at a much higher rate than white strobe lights. Red strobe lights have not yet been studied.⁴⁷ [Emphasis added.]

8.3. Guy Wires Should Be Avoided

As discussed above, the scientific evidence and the lack of records of mass bird kills at guyless towers in the reviewed literature is sufficient to conclude that guy wires greatly increase mortality at towers. The FCC could significantly reduce avian mortality at communications towers by allowing construction only of guyless towers unless applicants document that such construction is not feasible. We believe that the evidence supports the scientific merit of the U.S. Fish and Wildlife Service tower siting guidelines on the use of guy wires:

2. If collocation is not feasible and a new tower or towers are to be constructed, communications service providers should be strongly encouraged to construct towers no more than 199 feet above ground level (AGL), **using construction techniques which do not require guy wires (e.g., use a lattice structure, monopole, etc.)**. Such towers should be unlighted if Federal Aviation Administration regulations permit.

7. Towers and appendant facilities should be sited, designed and constructed so as to avoid or minimize habitat loss within and adjacent to the tower “footprint”. **However, a larger tower footprint is preferable to the use of guy wires in construction?** [Emphasis added.]

8.4. Towers Should Be Less Than 199 Feet Whenever Practicable

Taller towers (> 500 feet) result in higher bird mortality than medium towers (200-199 feet), which in turn result in higher bird mortality than short (< 199 feet) towers. Because towers less than 199 feet do not require obstruction lighting, they are preferable to other towers. Our analysis in this report shows that minimization of mortality at medium towers is important, because these towers likely account for 30–40% of birds killed at towers. Reduction of hazard to birds at towers taller than 200 feet should take place through design (guyless where practicable), siting (away from migratory pathways along ridgelines and watercourses), and lighting (strobe only lighting).

Implementation of the U.S. Fish and Wildlife Service tower siting guidelines would reduce the significant adverse impact on biological resources caused by communications towers. The most recent research, as we have documented, further supports these recommendations. The telecommunications industry and its consultant have not adequately considered the most recent research and are wrong to assert that scientific information is

47. Clark, J.R. 14 September 2000. Service guidance on the siting, construction, operation and decommissioning of communications towers. U.S. Fish and Wildlife Service, Washington, D.C.

48. *Id.*

insufficient to develop mitigation measures to reduce the destruction of migratory birds at communications towers.