

APPENDIX D: CELLULAR TOWERS

TOWER LOCATION AND COVERAGE

How large is the service area for a single cellular tower? This is a very complicated question to answer. Coverage areas depend on topography and tower height. In order to provide a complete network, towers must be able to “see” one another.

When cellular technology first came about, analog service required towers of a height of 300 feet or more. These towers could provide coverage within a five-mile radius of the tower. Today, new digital technologies, PCS, and the wireless Internet operate at a higher frequency than the older analog towers. This increased frequency reduces the coverage from a five-mile radius to a 2-3 mile radius. As a result, there is a need for more towers to serve the same area. If new towers and antennas are needed in the town, the coverage zones will vary with frequency, height, and service type. A radio frequency engineer can determine the exact coverage areas for any new tower or antenna.

There are two “schools” of thought on tower height and location. One “school” prefers the use of several shorter towers in a community; whereas, the other group prefers the use of fewer taller towers. Each of these approaches can provide adequate coverage within a community, but do not necessarily eliminate the need for additional towers.

While the Town of Buffalo has no cellular towers at this time, as technology changes and as demand for service increases, particularly along STH 22, tower requests will soon follow.

The Town of Buffalo has several **options to reduce the overall number** of towers needed in the future and to minimize their visual impact. For example, **co-location** of several antennas on a single tower reduces the need for additional towers. Carriers also are more and more willing to **camouflage** their towers by locating antenna on church steeples, silos, and tall power transmission lines. These techniques can help to minimize the impact of the wireless industry in the Town of Buffalo.



Tower “Flag” Pole Distance
& Up- Close Views



“Cell Tree”



“Cell Tree” in Forest



Cell Antenna on Water
Tower

TOWERS AND MIGRATORY BIRDS.¹

Cellular, television and other towers pose **risks for migrating birds** on their seasonal journeys and in the places they live each summer and winter. Birds have died by the thousands in collisions with lighted television and radio towers around the country. While incidents involving massive bird kills occur infrequently, there's concern among scientists that bird deaths will greatly increase because of the explosive growth in the number of towers being sited in the U.S to provide wireless services.

The growth in tower numbers comes when evidence shows the numbers of songbirds migrating to and from the tropics – "neotropical migrants" – have significantly declined, mostly due to habitat loss and related problems. According to the Ornithological Council, of the 124 species on the 1995 List of Migratory Nongame Birds of Management Concern in the U.S., 60 are neotropical migrants.

Unfortunately, the types of dead birds found most frequently at tower sites are neotropical species such as **warblers, thrushes, vireos and flycatchers**. Ironically, scientists are pretty certain about this because, armed with collector's permits, the scientists themselves and amateur bird enthusiasts have been visiting tower sites for years as favored places to gather dead birds for study purposes.

So how big an impact do towers have on bird deaths? Scientists put the estimate **two to four million songbirds die each year** in the eastern United States. The overall impact of tower collisions on bird populations on a national, regional or species scale is unknown.

Most species of songbirds migrate at night, flying aloft at 1,000-2,000 feet. They rely on many aids to guide them on their journey, including the sun, moon and stars, landscape features, weak magnetic fields, polarized light, barometric pressure, low-frequency sound waves, even odors.

Lights on taller towers are thought to lead to bird deaths by confusing the different cues birds use on their journeys to nesting or wintering grounds. Most bird-tower deaths occur when there is fog or low clouds. Towers featuring flashing red lights appear to confuse birds more than those with white strobe lights do.

Towers 200 feet or higher must be lit to comply with Federal Aviation Administration (FAA) regulations designed to aid safe airplane navigation. As of June 1999, more than 40,000 lighted towers and tower farms were registered in the FAA database of obstacles in the U.S. that exceed 200 feet in height.

¹ February 2000, Wendy K. Weisensel, DNR's Bureau of Communication and Education in Madison

According to the Ornithological Council, of the five long-term studies that have been conducted at single towers 800 feet tall or higher, annual documented mortality ranged from 375 to 3,285 bird carcasses per year (20-year average). About half the birds were found dead over many months rather than at single night catastrophes.

The most well-known series of tower kill incidents -- documented in a set of data Evans calls "phenomenal" -- occurred in Wisconsin as observed by Dr. Charles Kemper, a physician and bird enthusiast who is also a past president of the Wisconsin Society for Ornithology.

From 1957-1994, Dr. Kemper regularly collected dead birds at a TV tower in Eau Claire. During that period the kill totaled 121,560 birds of 123 species. A thousand or more birds were killed at this tower on each of 24 nights since 1957. A record 30,000 birds were estimated killed on one night in the mid-1970s.

Dr. Kemper noticed bird deaths dramatically rose after the station put up a taller tower in 1956. The new one was about 1,000 feet high, twice the height of the previous tower. "One day the county public health department called because all these dead birds were being found near the tower site; they thought the birds might have been dying from a type of disease."

The number of bird deaths could go up around Wisconsin and the U.S. because more towers, including taller, lighted ones, are being constructed or retrofitted to serve the broadcast and telecommunications industries. At the current rate of construction, the Ornithological Council says the number of towers in the U.S. will likely double to 80,000 by 2010.

To help reduce the impact of towers on migratory birds the following actions are recommended:

- o **Changes in Tower Lighting** -- When fog or clouds dissipate around towers known to kill birds, observers have noted that the birds previously flying

Why are Birds Important?

Birds are critical links in native ecosystems. Wild birds pollinate plants, distribute seeds and eat enormous numbers of insects. According to the Ornithological Council, on average, a pair of adult warblers removes caterpillars from more than a million leaves in the two to three weeks from the time the pair's young hatch until they leave the nest. This behavior provides enormous benefits to forestry and agriculture.

Birds are big business. While broadcast and wireless technologies take up a lot of people's leisure time, money, and support highly competitive industries, birds and birding also involve a lot of people and pack a financial wallop in Wisconsin and nationally. The 1996 federal Fish and Wildlife Service outdoor recreational survey reports that more than 1.65 million Wisconsin residents over age 16 participated actively in wildlife watching, photography, bird-feeding and maintaining natural areas for wildlife. Most of this activity was directed toward birds.

The dollar amount spent in Wisconsin for wildlife watching activities totaled nearly \$913 million and did not include amounts spent on fishing (\$1.1 billion) and hunting (\$855 million). Trip-related expenses for wildlife watching amounted to \$436 million, while equipment such as binoculars, bird feed, film and cameras accounted for \$476 million.

Birding is reportedly second only to gardening as the most rapidly growing leisure interest in the U.S. The number of bird-watchers in the U.S. grew 155 percent between 1983 and 1995. The FWS survey states that 62.9 million Americans participated in wildlife watching and spent \$29.2 billion doing so.

confusedly around the lit towers soon reorient themselves and fly off. That silver lining makes researchers believe that changes in tower lighting might spare birds even as more towers go up. Certain colors of lights or changes in flashing intervals may confuse birds less.

- o **Tower Height and Design Modifications** – Guy wires are the main cause of bird death at tower sites, so reliance on self-supporting or other tower designs may offer solutions. Lower tower heights remain a possible option as well. Dr. Kemper believes communities should only permit towers less than 500 feet tall, which may spare many birds, though little formal research has been conducted on the impact of shorter towers on bird deaths.
- o **Tower Sighting Considerations**-- Tower owners could co-locate their equipment where possible. Tower sitings in sensitive areas also could be limited. While the Department of Natural Resources in Wisconsin has little or no regulatory authority over tower siting, the agency has encouraged telecommunication representatives to consider alternatives if a tower siting proposal may affect natural resources.

FUTURE TOWER NEEDS IN THE TOWN OF BUFFALO.

The federal Telecommunications Act of 1996 forbids towns from barring towers completely and denying access. But the law does allow local governments great leeway in restricting the height, appearance and location of towers. A Portage County, WI ordinance that went into effect last year to protect birds and other natural resources prohibits telecommunications facilities from being sited in floodplains, wetlands, shorelands and conservancy-zoned districts.

Unfortunately, it is not possible to develop a map of specific locations to site towers in the Town of Buffalo. This is because networks provided by different carriers have different location requirements for towers. Moreover, as technologies change and new licenses are granted for additional carriers to move into the area, locations identified on a map would quickly become outdated.

It is anticipated that in the next 5-10 years the primary coverage area for wireless service in the Town of Buffalo will continue to be along the STH 22 corridor. Beyond this timeframe, coverage will likely extend next to the county trunk lines and finally to other remote areas of the town. The rate of tower construction will depend on local demand, the number of licenses granted by the FCC, and the capacity of new towers to accommodate additional carriers.