U.S. Fish & Wildlife Service Concerns Over Potential Radiation Impacts of Cellular Communication Towers on Migratory Birds and Other Wildlife – Research Opportunities

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Issues to Be Briefly Addressed:

- Trust responsibilities and avian population status.
- Temporal and spatial use of airspace.
- Documented impacts of communication towers on migratory birds.
- Recent European research discoveries regarding towers and radiation impacts to resident and migrating birds, other fauna (esp. bees).
- Proposal for communication tower research on wildlife in the U.S.
- Next steps.

Federal Trust Responsibilities

- **USFWS entrusted by Congress, and required by statutes and regulations, to manage and protect migratory birds (and other fauna [ESA]) under authority of:**
  - **Migratory Bird Treaty Act,**
  - **Bald and Golden Eagle Protection Act, and**
  - **Endangered Species Act.**

Avian Population Status

- Status U.S. bird populations of concern. 1995, USFWS listed 124 "nongame species of management concern." Represents early warning system since possible next step is designating birds as "candidates" under Endangered Species Act – scenario we'd prefer to avoid.

- 2002, USFWS published "birds of conservation concern," as mandated by law. Number bird populations in trouble increased from 124 to 131 species – not good news. In addition, 77 endangered and 15 threatened birds included under ESA – numbers continue to increase.

- Recapping, 836 species, > 223 in trouble. In addition, Service essentially lacks data on status 1/3 N. Am. bird populations. Management challenge!

Temporal and Spatial Use of Airspace

- **Air as a habitat is a new concept, including for USFWS.**
- **Service's goal: do *no* harm.**
- **<u>Challenge</u>: All signs indicate continuing massive expansion cellular communication, DTV, emergency broadcast, paging, other electronic communications in U.S. Currently FCC's *Antenna Registry* database contains nearly 100,000 listed providers/licensees. Likely underestimates true number.**
- **Tower growth continues exponentially.**

Potential Impacts Communication Towers on Wildlife

- **Direct effects of individual towers and antenna "farms."**
  - Bird and bat strike mortality.
  - Direct habitat loss/modification.
  - Interior forest, grassland habitat loss.
  - Habitat fragmentation, increase in edge.
  - Increase in nest parasitism and predation.
  - Water quality impacts.

Indirect effects.

- Reduced nesting/breeding density.
- Loss population vigor and overall density.
- Habitat and site abandonment, increased isolation b/w patches.
- Loss of refugia.
- Effects on predator/prey relationships.
- Attraction to modified habitats.
- Effects on behavior including stress, interruption, modification.
- Disturbance, avoidance, displacement, habitat unsuitability.

Cumulative effects.



A. Manville,
~750 ft. AGL
Catholic Un.
lattice tower

Issues of Concern to the Service: *Direct Mortality*

- Bird-tower collision mortality been documented problem in U.S. since least 1948 (Aronoff 1949). USFWS (D. Banks 1979) estimated avian-tower mortality at 1.25 million birds/yr. based on assessment 505 tall towers 1975.
- DMBM became involved Feb. 1998 single night kill up to 10,000 Lapland Longspurs, others, Kansas at 3 towers and power generating station.
- Evans (1998) reassessed Banks' mortality estimate based on increased numbers tall towers, estimating 2-4 million bird deaths/yr.
- Manville (2001a) estimated annual mortality at 4-5 million bird deaths/yr., but Manville (2001b) later cited 4-5 million figure as "conservative," indicating that mortality could range high as 40-50 million. Only cumulative impacts analysis determine "true" magnitude problem.

Direct Mortality, cont. 2

- 2003 FCC issued Notice of Inquiry, "Effects Communication Towers on Migratory Birds." USFWS provided detailed comments Nov. 2003, and reply comments Feb. and March 2005.

- Nov. 2006, FCC issued Notice Proposed Rulemaking, "Effects Communication Towers on Migratory Birds," on WT Docket 03-187. Service provided detailed comments Feb. 2, '07.

- We focused on lighting (admittedly radiation issue), recommending minimum intensity, max. off-duration white strobe lighting, provisionally recommending min. intensity red-strobe and/or red flashing incandescent blinking red beacons, and other issues. Did NOT discuss other radiation issues in providing rulemaking recommendations to FCC.

Concerns with Tower-emitted Radiation

- **While focus of this briefing is pointed toward radiation impacts on human health – *e.g.*, rising levels documented "cancer clusters" – USFWS growing concerned about potential impacts of tower radiation on resident and migrating birds and bats, listed species under our jurisdiction, and other potentially impacted living resources including bees.**

- **~ 2002 at briefing similar to this one, T. Litovitz (Catholic Univ., pers. comm.) raised troubling concerns about impact low-level, non-thermal radiation from standard 915 MHz cell phone frequency impacting domestic chicken embryos (data from DeCarlo *et al.* 2002). Deformities, including some deaths under hypoxic conditions noted.**



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Radiation, cont. 2



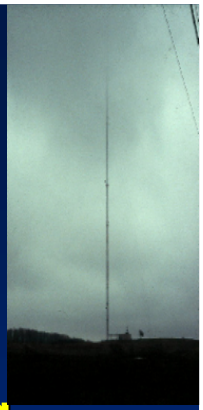
A. Manville

- Meanwhile, A. Balmori (2003) provided USFWS preliminary research from Valladolid, Spain, showing strong negative correlations b/w levels of tower-emitted microwave radiation and bird breeding, nesting, and roosting in vicinity electromagnetic fields.

- In House Sparrow, White Stork, Rock Dove, Magpie, Collared Dove, and other species, (1) nest and site abandonment, (2) plumage deterioration, (3) locomotion problems, and (4) even death were reported among those species found close to cellular phone antennas.

- No such symptoms noted prior to construction cell phone towers. Manville (2005) published these preliminary results, raising initial concerns in U.S.

Radiation, cont. 3



W. Evans

- Balmori has since published his findings on aforementioned species (2003), and on White Storks (2004, 2005) since this species appeared heavily impacted by tower radiation during 2002-2004 nesting seasons.

- Since Balmori research, seen additional avian studies in Europe. *E.g.*, Everaert and Bauwens (2007) found strong negative correlations b/w amount radiation presence (both 900 and 1800 MHz frequencies) and presence male House Sparrows – fewer House Sparrow males seen in areas w/ high electric field strength values.

- Preliminary Conclusion: long-term exposure to higher radiation is affecting abundance or behavior of wild House Sparrows.

Radiation, cont. 4



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- New problem recently documented relating to domestic honeybees and possible effects EMF radiation. Colony Collapse Disorder (CCD) been recently documented 60% U.S. West Coast apiaries and 70% on East Coast.

- CCD also being documented in Greece, Italy, Germany, Portugal, Spain and Switzerland (Harst *et al.* 2006, pilot study by Lean and Shawcross 2007). One theory: radiation from mobile phone antennas interfering with bees' navigation systems.

- Have anecdotal reports from at least 1 bee keeper in Vermont of possible cause-and-effect relationship to bee die off at his hives. Among other factors, what role is EMF playing, if any?

What's Needed?

- In 2006, Service's New England Field Office suggested to Chairman, Connecticut Siting Council, that as stipulation of tower siting permit to Nextel that they fund research effort at control and experimental study sites in Massachusetts to assess radiation. Siting Council declined Service's request.

- Sites in W. Massachusetts provide unique opportunity – along with needed replication at similar sites in Midwest and West – to test impacts radiation on breeding birds, resident bats, and other vertebrate and invertebrate species (including bees).



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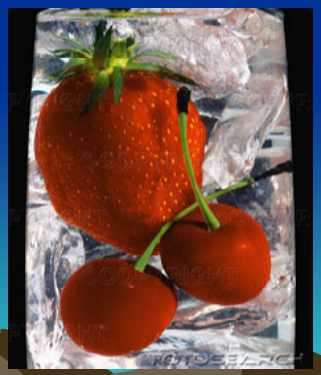
What's Needed? – Control Site

- **Berry farmer in W. Mass. picks berries at 2 sites. At the site with no cell towers, the farmer deters birds using "scarecrows" and other means to minimize damage to ripening fruit – relatively effective against birds.**

- **Wildlife presence normal – *i.e.*, abundant breeding/resident and migrating birds, resident bats, small and large mammals, invertebrates including bees, etc. -- including signs feeding on berries.**



Corbiss Photos



Corbiss Photos



Comstock Photos



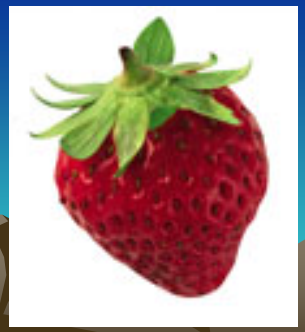
Mary Ellen Hart

What's Needed? – Experimental Site

- However, at other site w/ cell tower adjacent to berry patch, wildlife signs (tracks, scat, feathers) and animal presence noticeably absent.
- No berry damage noted at cell site, near total absence sign that birds, other animals feeding on berries. Berries over-ripening on bushes, and dropped berries not gleaned turkey, fox, other wildlife.
- Both locations have similar vegetation and edge habitats.
- Based on research conducted in Europe, raises troubling concerns – and important need to replicate what been conducted so far in Europe.



Corbiss Photos



Olconotech Photos



Corbiss Photos

What's Needed, cont.? -- 2

- **Because this issue is so potentially significant, need *not only* conduct experiments in East (not only at this site but various others), also in Midwest and West.**
- **Birds and bats are nature's 'pest control agents' -- bats can eat their body weight in insects/night, and birds eat untold quantities weed seeds and noxious insects.**
- **Birds, bats, and bees are critical pollinators – involved in > $18 billion/yr. global food and forest products industry pollination.**
- **Birds alone fuel ~ $28 B/yr. bird watching industry in U.S (1 in 4 Americans partake).**

What's Needed, cont.? -- 3

- 1/3 all our fruits and vegetables would ***not*** exist w/out pollinators visiting flowers.

- Pollinators play fundamental role in food security. As pollinator numbers decline, price groceries goes up.

  – *E.g.,* value pollination to alfalfa seed growers Canadian prairies estimated 35% annual crop production (Blawat and Fingler 1994).

  – "Despite its apparent lack of marquee appeal, a decline in pollinator populations is one form of global change that actually has credible potential to alter the shape and structure of terrestrial ecosystems" (M. Berenbaum, Chair, ND Corn Growers Assoc.).

What's Needed, cont.? -- 4

- Birds and bats already under assault from communication tower collision mortality – some impacts possibly having effect at population level. Birds, bats, bees, other wildlife also under assault from other anthropocentric challenges:
  - Other tall structures (*e,g.*, buildings, power lines, wind turbines, etc.);
  - Habitat loss, disturbance, and fragmentation;
  - Invasive species competition;
  - Toxicants, contaminants, pesticides, and spills;
  - Global climate change;
  - Other impacts.



What's Needed, cont.? -- 5

- We may already be impacting breeding bird, bee and other resident -- not to mention migrating -- wildlife populations from radiation and don't yet know it. Issue is, in part, about *cumulative impacts:*
  - What are significance of impacts cumulatively from all communication towers?
  - Overall effects habitat loss, displacement, barrier effects, and collision mortality.
  - Cumulative effects all anthropocentric structures.
  - Are impacts additive to natural mortality?

Research Needs

- **Need to critically review research protocols for studying radiation impacts to birds and bees in Europe. Can they be used in U.S.? Are experimental designs tight enough that we can tease out variables at play to remove extraneous and confounding variables? Can studies be replicated in U.S. at various locations?**

- **Will need behavioral assessments birds and bees, likely manipulation experiments, possibly multiple studies/site (to address impacts to birds, bats, and bees – possibly all different).**

- **Research MUST be conducted in as independent, scientifically credible, unbiased way as possible. Need researchers performing studies who have no vested interest in communications technology, industry, or related connections.**

Research Needs, cont. -- 2

- DMBM (Washington Office) would be interested helping lead research effort. Research may best be conducted by independent consultants and/or academicians w/ whom Service works, performed in collaboration w/ USGS/BRD scientists w/ background in communication tower, radiation issues, ornithology and entomology.

- Service has "Pollinator Campaign" (housed in Division Contaminants) which also should play role in studies, especially dealing w/ bees. Service's Field Offices, Migratory Bird offices, others also need be involved.

Next Steps

- **Publish research results in credible, refereed scientific journals.**
- **Call meeting Communication Tower Working Group to release research findings and recommendations to multi-stakeholder group (DMBM/Manville chairs CTWG).**
- **Work w/ FCC, EPA, Congress, others to update science, address issues, and avoid/minimize impacts.**

In Summary…

- The Service favors:
  - conservation of wildlife in the public trust;
  - development of communication equipment that is bird and bat friendly; and
  - use of informed decisions based on adequate environmental assessment and sound science.



Thank you