

# BAT DETECTORS: capabilities, limitations, and utility in THEIR USES AND ABUSES assessing use and impacts of wind farms

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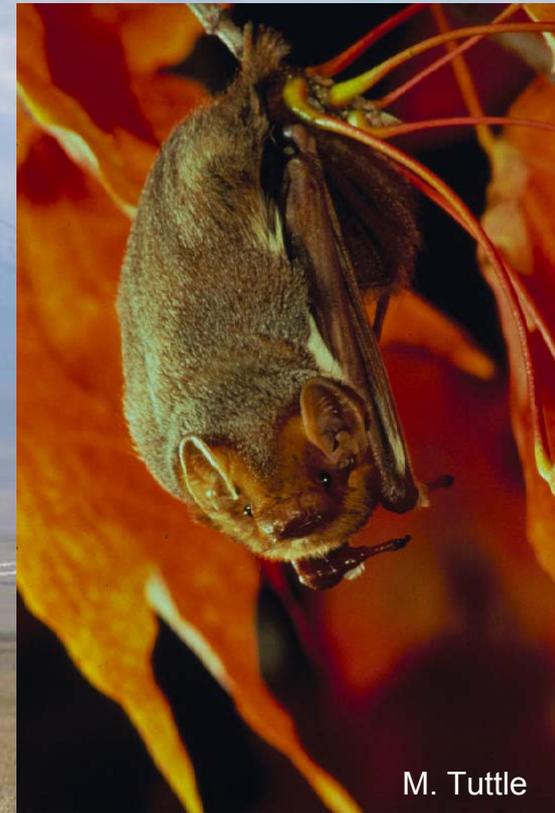
Biological Sciences  
University of Calgary



Silver haired bat

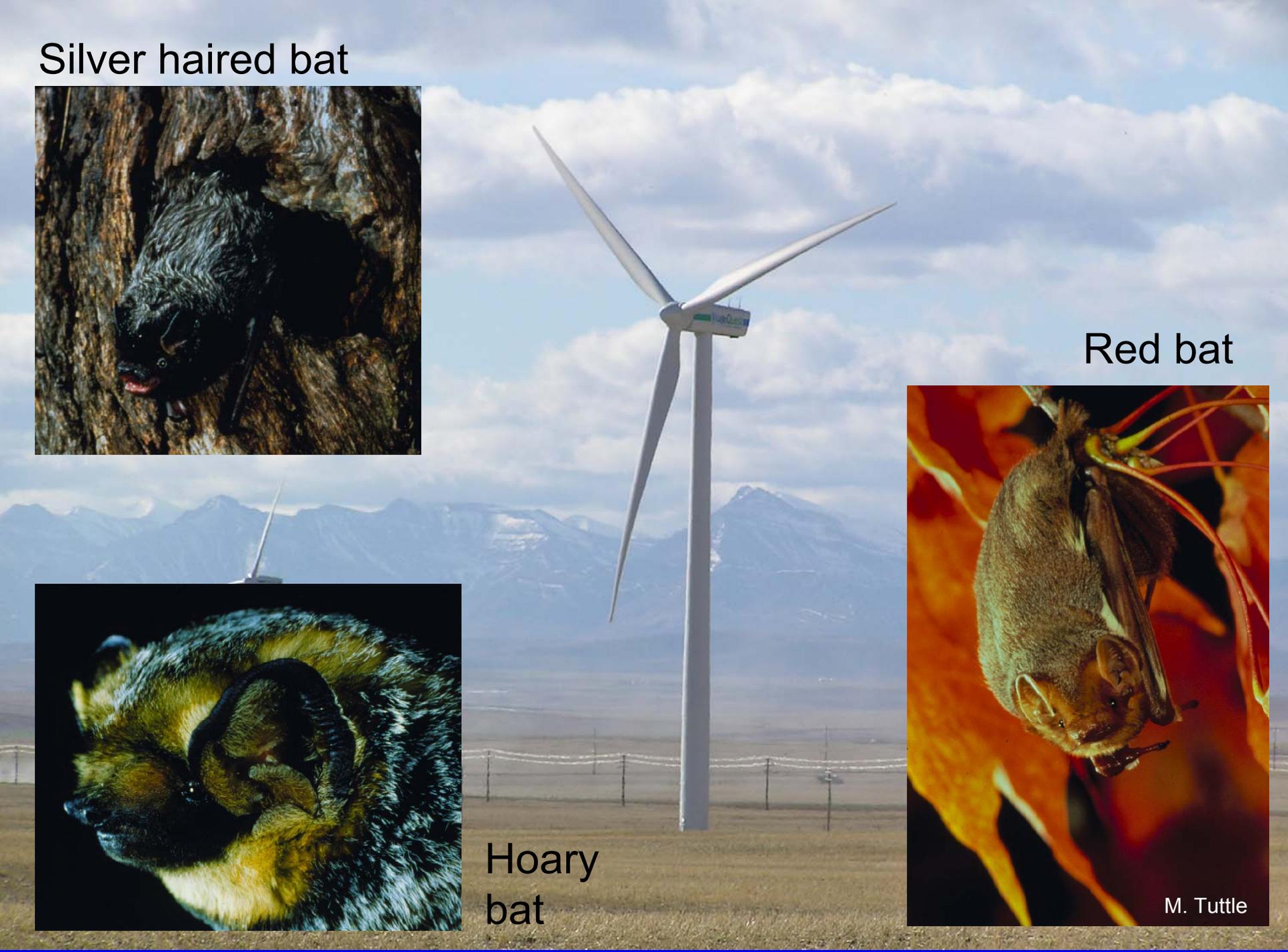


Red bat



M. Tuttle

Hoary bat



# Echolocation calls vary

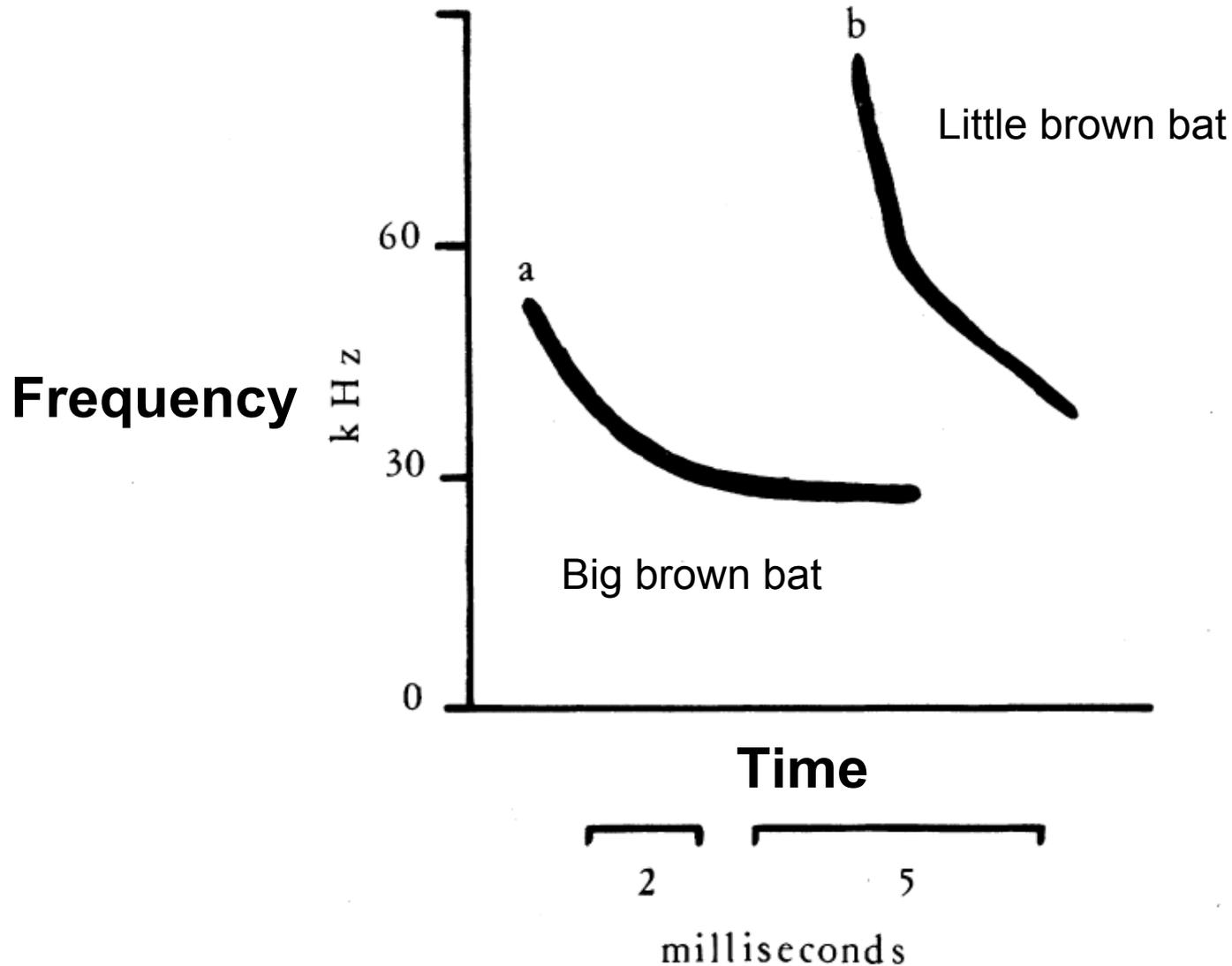


FIG. 1.—Patterns of frequency change over time in the search phase echolocation calls of *Eptesicus fuscus* (a) and *Myotis lucifugus* (b) recorded in the field in southeastern Ontario.

# Heterodyne bat detector

Inexpensive

Sensitive

Tune to narrow frequency range

Detect some species at a time



# Frequency Division Bat Detector

More expensive

Less sensitive

Broadband

Detect all species at once



# Remote detection







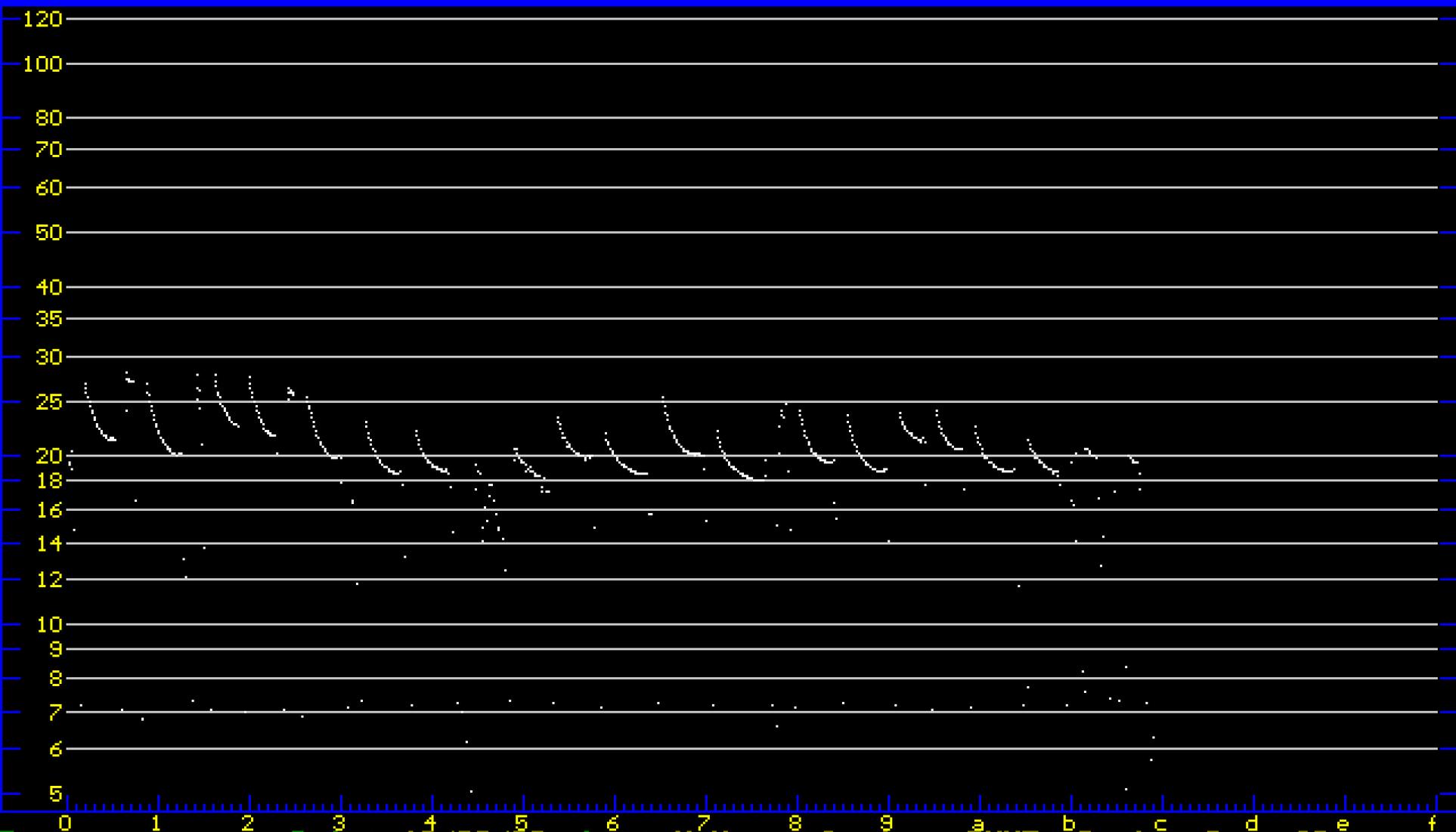
# The Potential Problems

1. Not all species are easily identifiable
2. Do migrating bats echolocate?
3. Detectors have limited range
4. How does wind influence detection?
5. Interference from various sources

# Hoary bat



# Hoary bat



Tape: Date: 13/06/96 Loc: McKenna Spring, BHNF, Custer Co., SD  
Sp: Lasiurus cinereus Spec: light tag  
Note: One harp trap, 2 30' nets in venturi and 1 18' perpendicular to harp from  
middle of round metal tank  
LASCIN.10# Div 16 Type 129 0/00/00 0000:00  
TOT 375ms TK 25ms f6 COMP St 2 FILT 0  
ANALOOK Version 4.9g 14 Jan 2003

Silver-haired bat

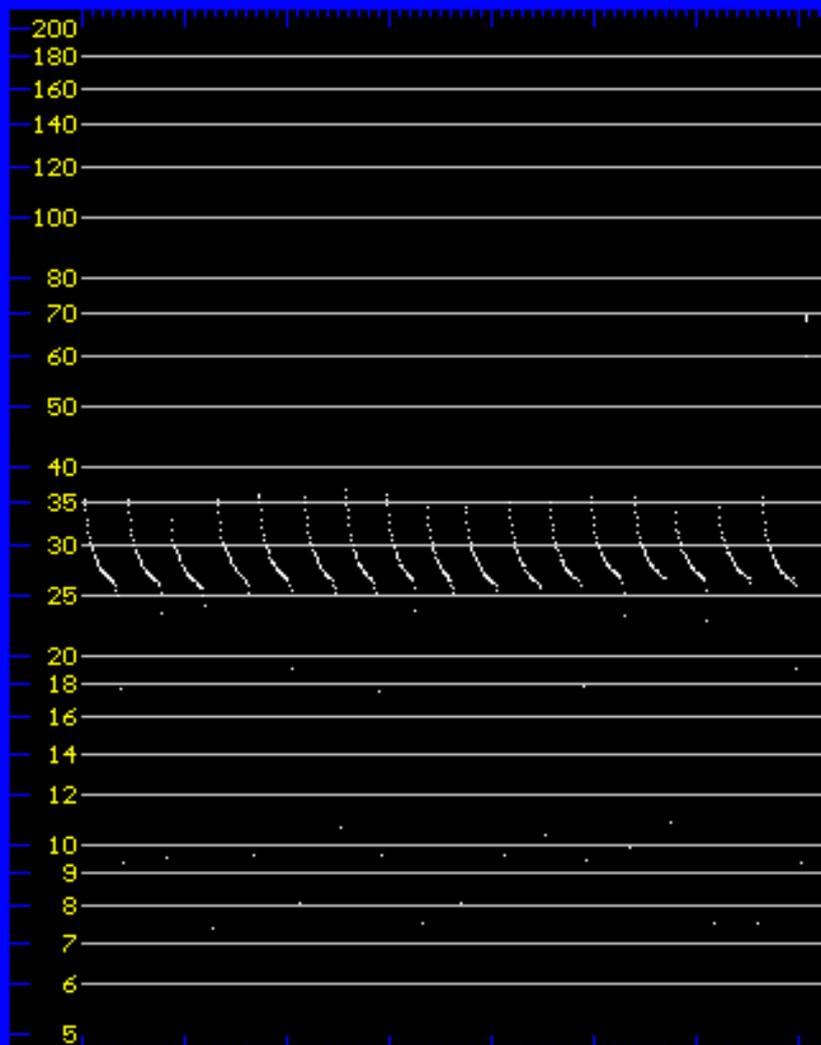


Big brown bat

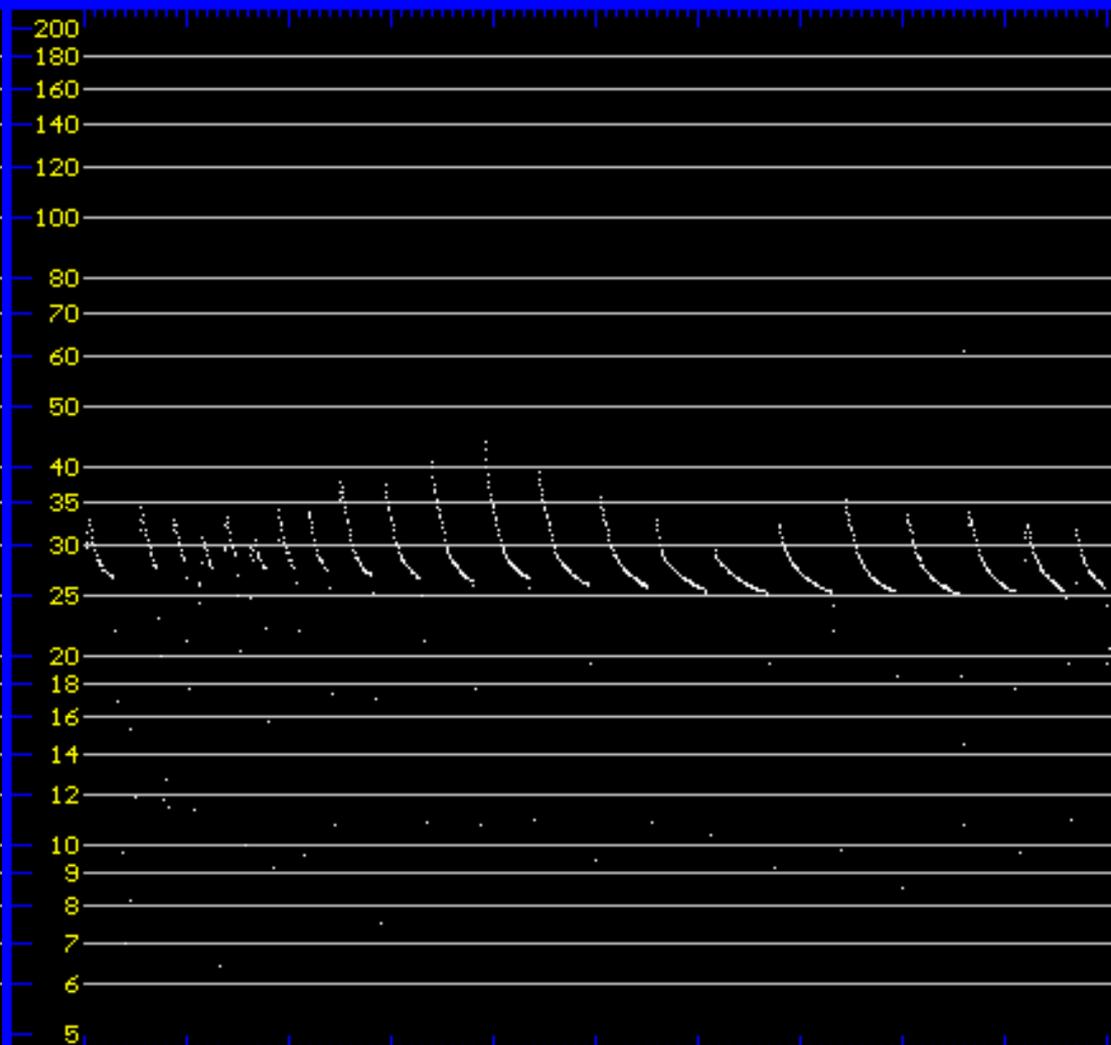


# Silver-haired bat

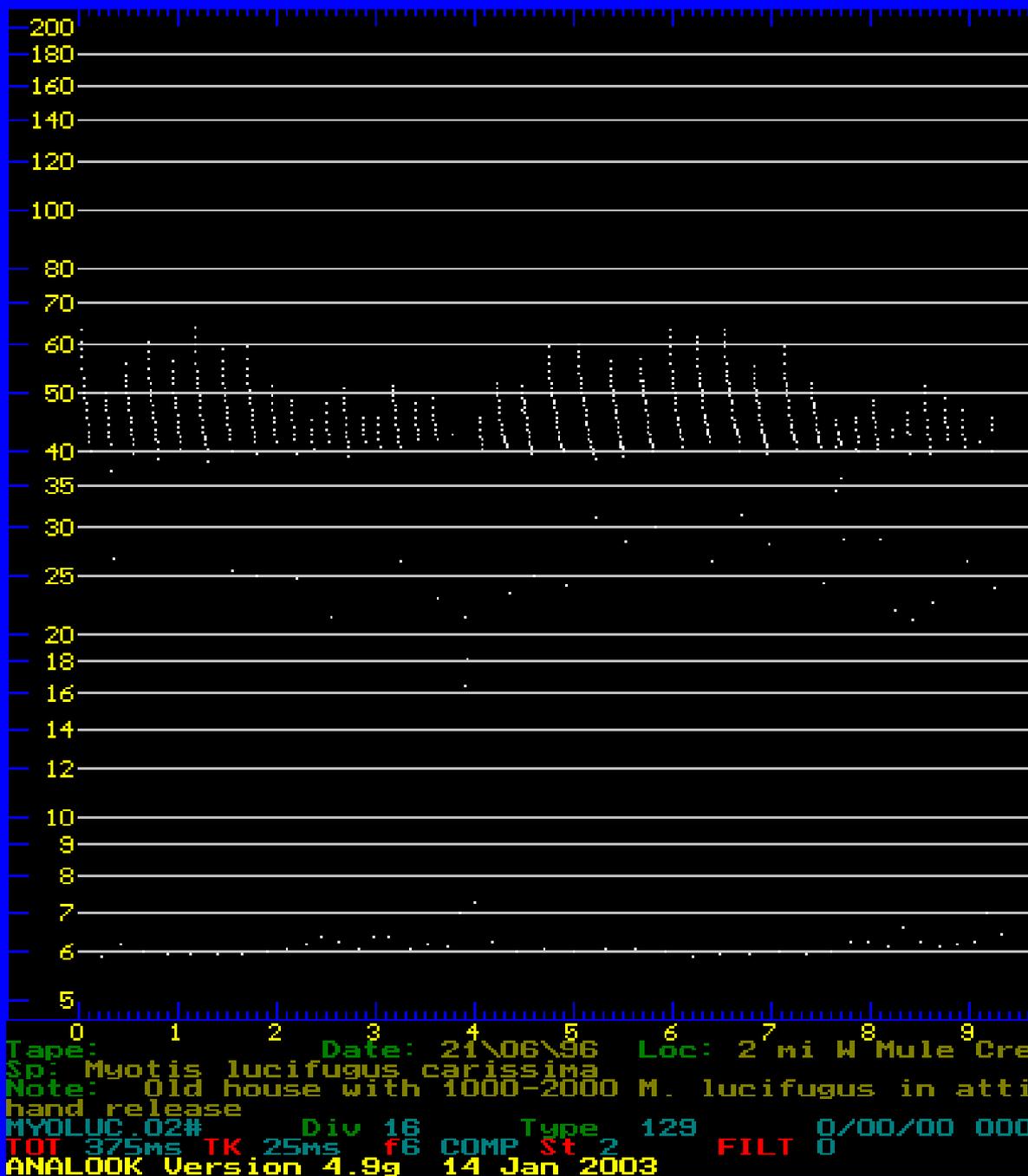
# Big brown bat



Tape: uc std Date: 97/07/15 Loc: Ins  
Sp: LANO male FA=40  
Note:  
LASNOC.06# Div 16 Type 129  
TOT 375ms TK 25ms f6 COMP St 2  
ANALOOK Version 4.9g 14 Jan 2003



Tape: uc std Date: 95/06/03 Loc: Twin Bridges, Cam  
Sp: Eptesicus fuscus female  
Note:  
EPTFUS.05# Div 16 Type 129  
TOT 375ms TK 25ms f6 COMP St 2  
ANALOOK Version 4.9g 14 Jan 2003



*Myotis*  
species can  
be especially  
hard to tell  
apart

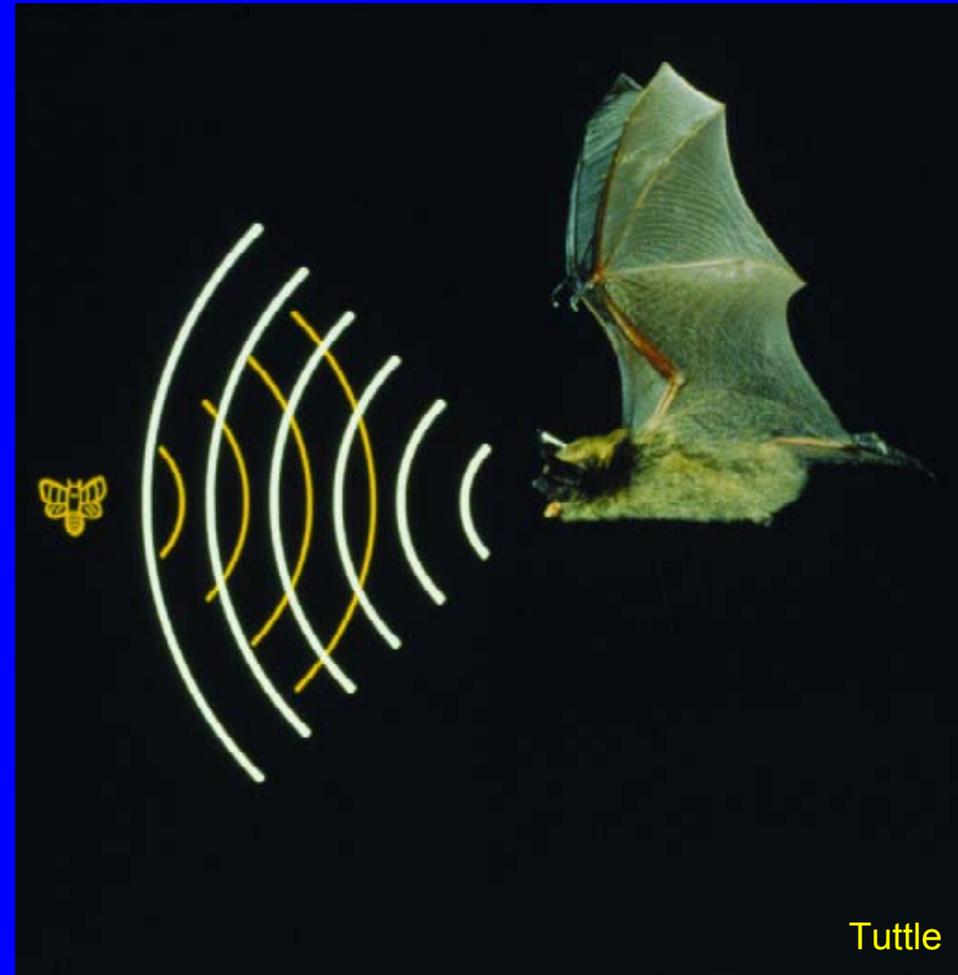
# Do migrating bats echolocate?



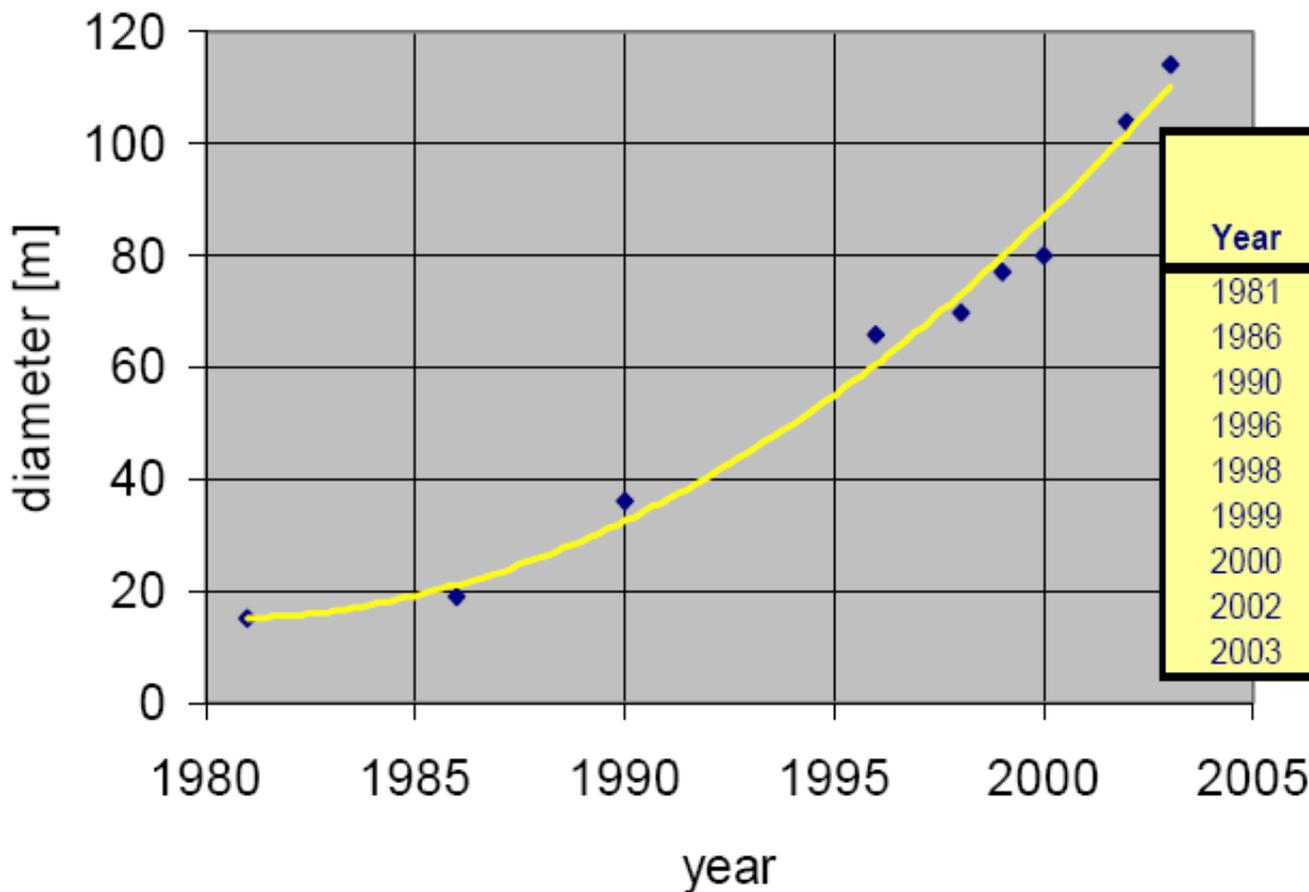
# Ultrasound attenuates rapidly

Detection range varies depending on species and detector.

Generally 20-40m



# Rotors are getting bigger, towers taller



Year	Turbine	Power Rating [kW]	Diameter [m]
1981	Vestas V15	55	15
1986	Vestas V19	90	19
1990	Vestas V36	500	36
1996	Enercon E66	1500	66
1998	Jacobs MD70	1500	70
1999	Tacke 1.5sl	1500	77
2000	Vestas V80	2000	80
2002	GEWind 3.6MW	3600	104
2003	Enercon E112	4500	114



107 m

67 m tower

80 m diameter

1.8 MW

27 m

# Nocturnal migrants fly at high altitudes

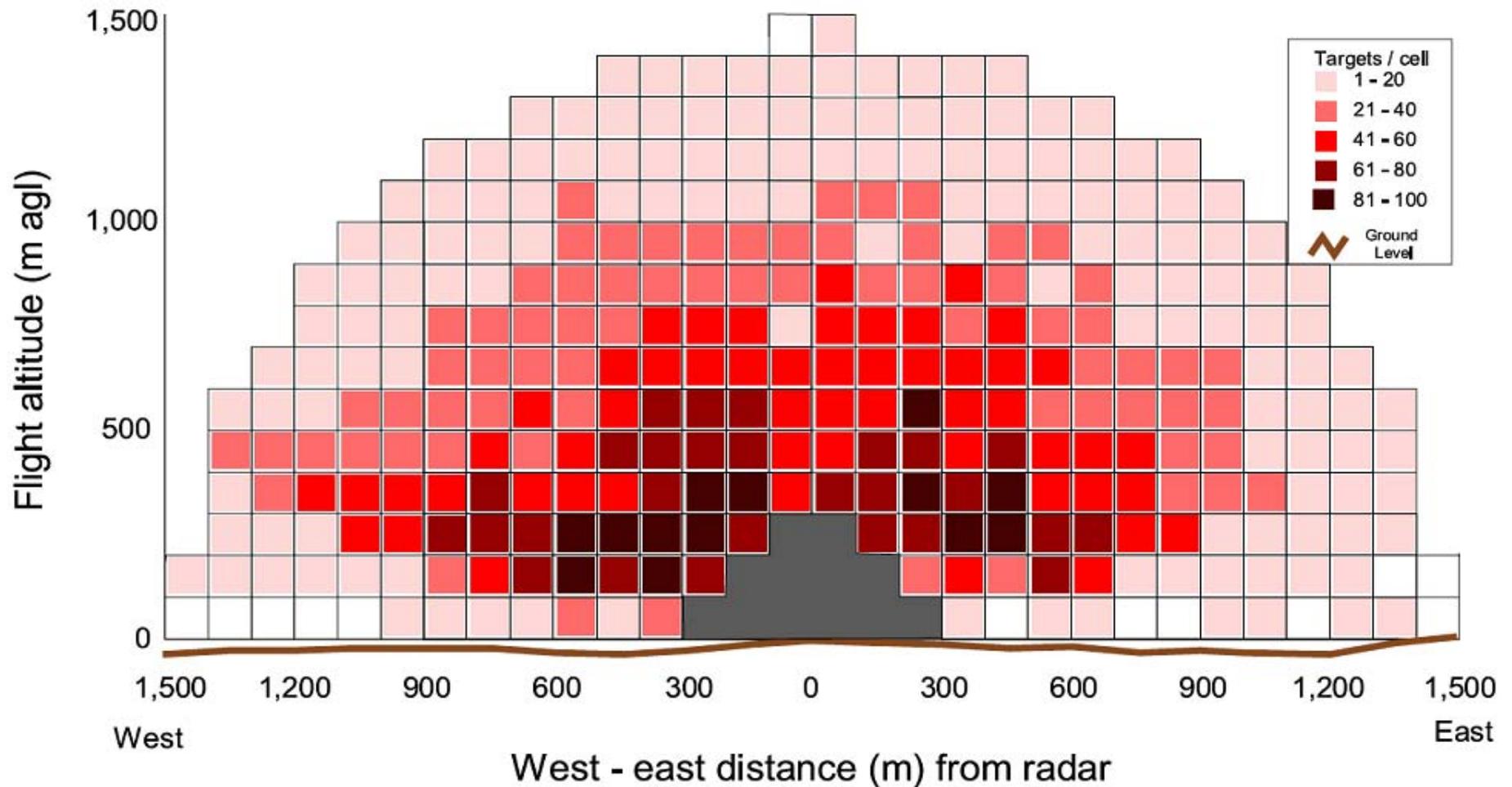
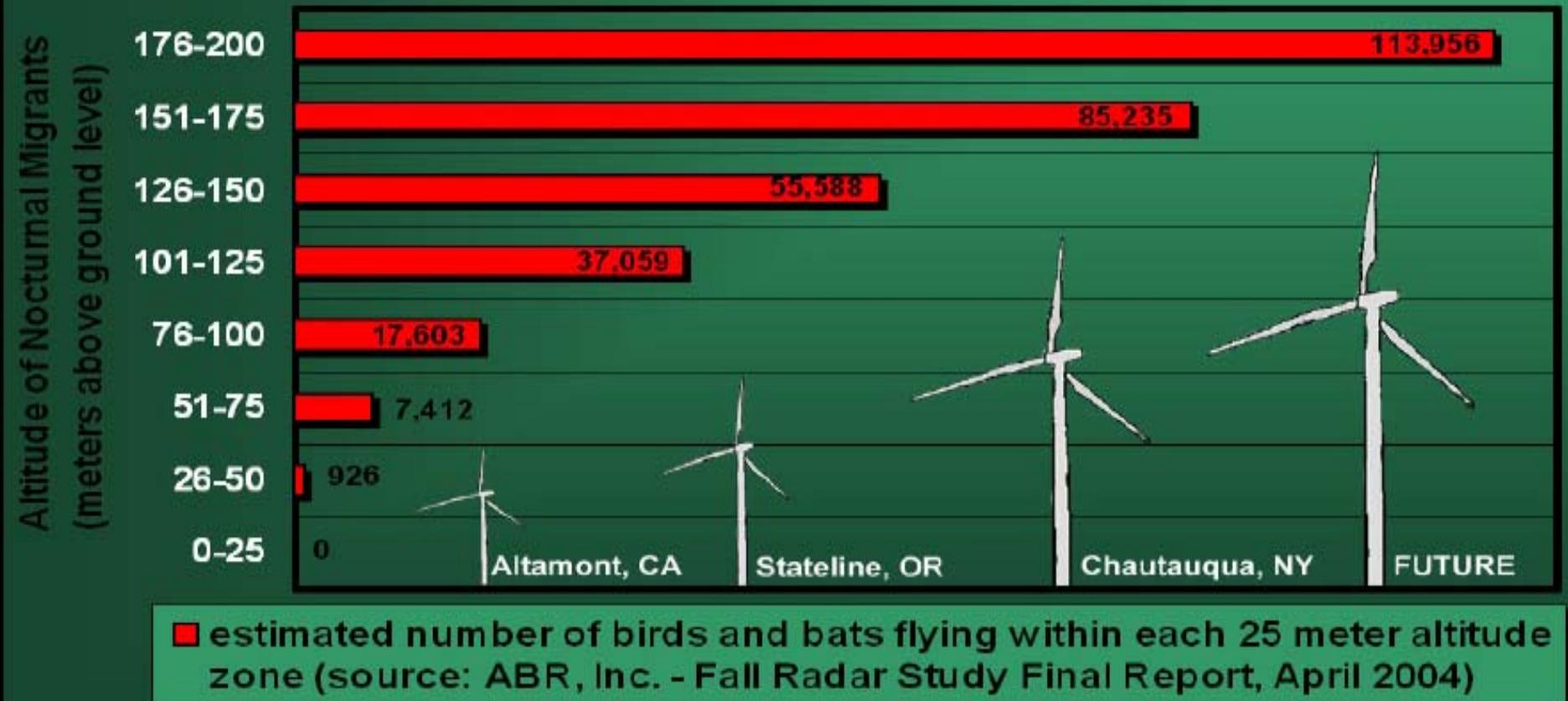


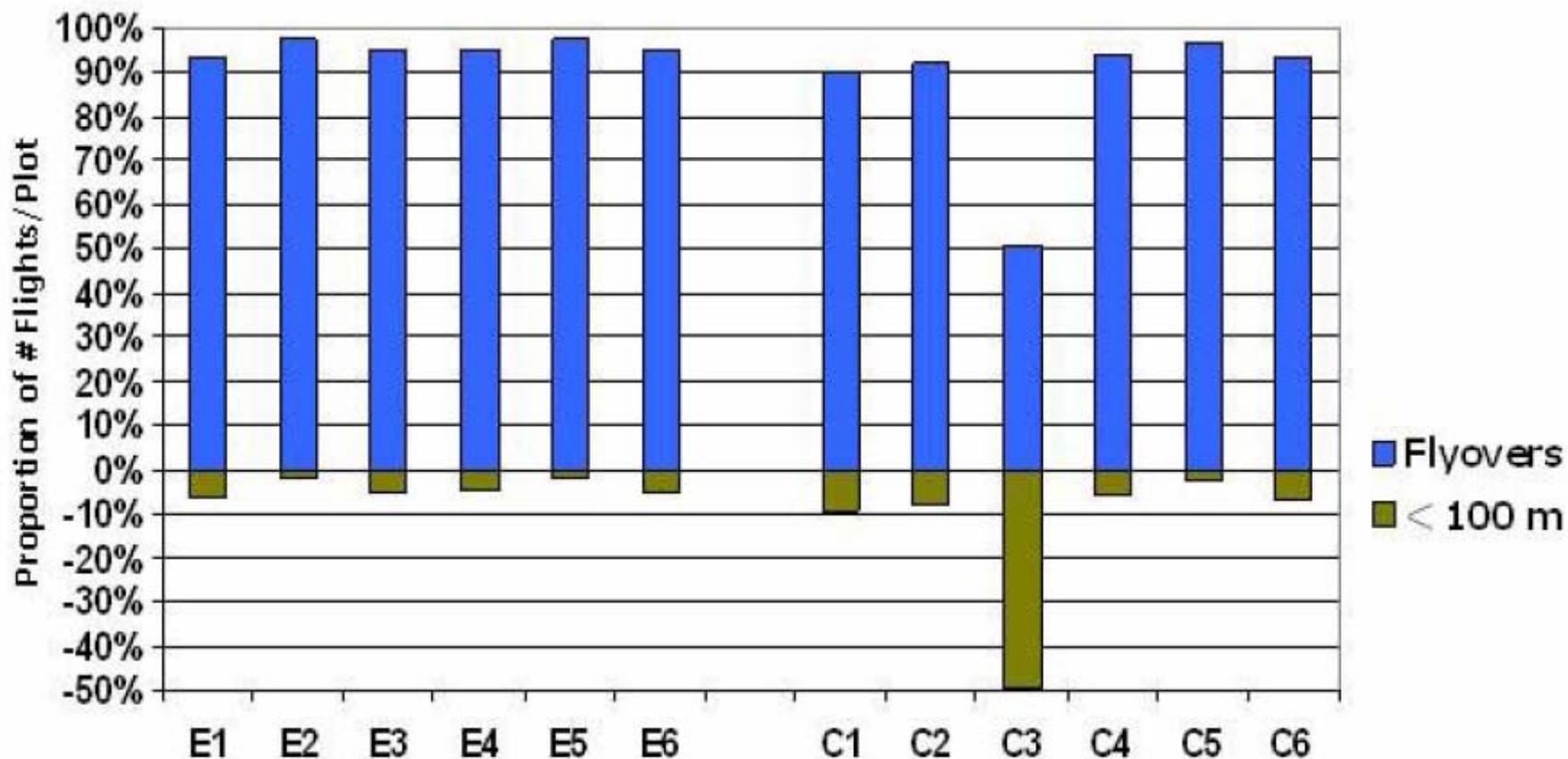
Figure 8. Distribution of nocturnal flight altitudes (actual counts, relative to the height of the sampling station) of targets detected by vertical radar along a 3-km, east-west transect at the Chautauqua Study Area, New York, during fall 2003. The grey zone in the center of the figure is the area where radar sampling was not possible due to ground/insect clutter. The proposed turbine heights extend up to ~121 m above the brown line representing ground level.

# Migrating birds and bats fly high

Numbers of nocturnal migrants determined via radar to fly below 200 meters over proposed Chautauqua, NY windplant - by 25 meter altitude zones (Fall 2003)



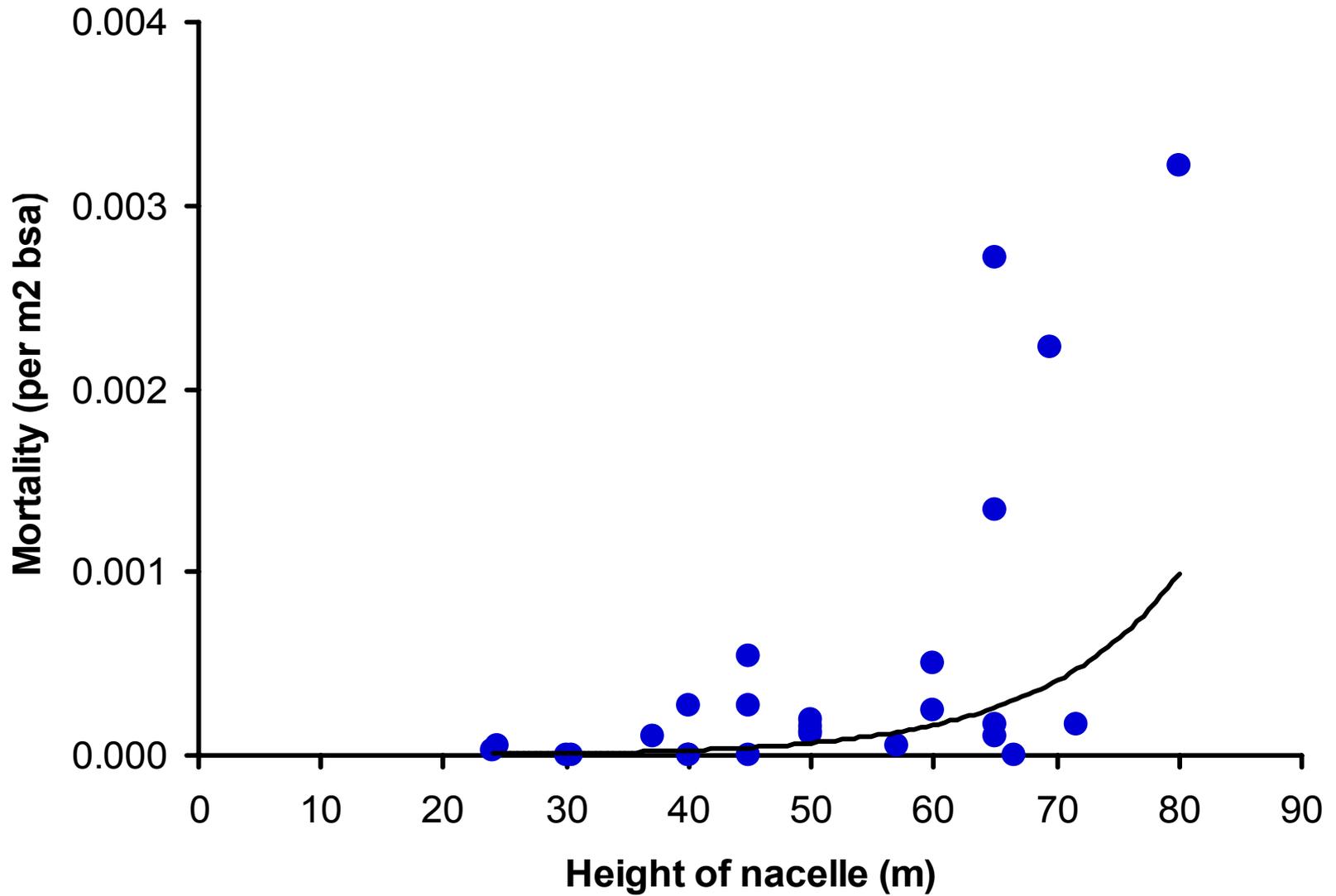
# Canadian bats do too!



**Figure 3. Flyovers on Plots With & Without Turbines**

*The proportion of total flights on a plot that fly above 100 m versus those below 100 m (considered a negative percentage in this figure).*

# Short turbines kill few bats



How does wind  
influence detection?



# Interference



Bat detector at ground level









