

# Use of Ears and Auditory Senses of Animals Living In the Woods of the Vermont Mountains



Photo by Roger Irwin

Fox listening from Den of Old Hard Maple

Compiled by Roger Irwin, Fred Person and Dhyan Nirmegh

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## Introduction

I am Dhyan Nirmegh of Starksboro, Vermont co author of the Booklet, "Impacts of Industrial Wind Development on Wildlife and Ridgeline Habitat". The photos that I am submitting today are taken by Roger Irwin of Maidstone and Shirley Nelson of Lowell, Vermont

Some of last month's sound experts painted a rosy picture of people living with Wind Power sound in Europe. One expert said there was little opposition and alluded to the fact that problems with sound in Europe had been addressed by changing the blades degrees and gear boxes.

It's quite the opposite.

There are many problems.

In a Norway study, Sveinulf Vagene, says that the World Health Organization report entitled "Burden of Disease form Environmental Noise" concluded that Wind turbines noise is not just an annoyance it can cause major health problems. He states people are sick but Norway still has little understanding of how the noise is affecting people.

Germany and Denmark have halted some facilities in order to do further studies.

Germany, France and Canada have major protests taking place. European people have been fighting ailments from which they said are caused by Noise from Wind Turbines.

Under the European Umbrella Organization EPAW (European Platform Against Wind Development) there are 621 subgroups in 24 countries. These groups are desperate people whose lives have been downgraded by Wind Power Noise.

People have been dying of heart attacks, and had a myriad of other ailments.

Vibro Acoustic disease is where low frequency noise causes change in the vascular system. This research is only being studied at the University of Portugal according to the Norwegian study.

What about Wildlife?

Do we just focus on bears?

There are hundreds of species of Birds, Bats, animals and amphibians that are affected. And yet, I have yet to see any detailed studies of animal hearing and the effects of sound, low frequency sound and Infrasound.

If doctors say there is even a slight chance of people getting heart disease, what is it doing to our wildlife?

Some people that have camps near these wind turbines say that the amount of wildlife has diminished, but if animals are actually staying in these areas how are they adapting or how are they coping? I have only heard of one study of wildlife after the turbines are up and that has been done in New Hampshire with the Bicknell's Thrush.

Last session sound experts talked only about sensitive monitoring devices above ground. There are no sound devices that are put into the ground or into seeps, streams or vernal pools.

What happens when the sound and vibrations travel through rock edges, water and ground? I did my own experiment at Lowell. I submerged my head in fresh snow pack and could hear the towers still.

What happens when the snow cover is solid? Animals use the ground for cover, borrowing into, for homes, hibernation, resting and raising young.

Birds and animals have very keen hearing.

- They depend on it to escape predators
- Depend on it to breed and continue the species
- Depend on it to communicate
- They depend on quiet areas to nurture and relax.

Many of the large animals have long cupped ears.

- Full of fine hair, which helps pull in sound vibrations
- Ears are directional on most large animals. They can move to the sides and forward on the head without the head moving
- Example of Owls having large facial disks that funnel sound to their ultrasensitive ears.
- It's not always sound they pick up. It is also frequency and minute vibration these animals are picking up on.

There are very few scientific studies being done on how animals are affected by Wind Turbines noise. Why?

We have capable Universities and Colleges and capable grad students, capable Wildlife programs and we at present already have four Industrial Wind Facilities in the State of Vermont.

Why is it that we can't take the time to do Wildlife studies?

We share this land with Wildlife and are the big pivotal manual in these eco systems. We feel like we need to be in control but we are shirking our responsibility of being stewards of our environment.

The last time the Public Service Board held a hearing on sound, April 13<sup>th</sup>, 2014, we heard from half the people that said the noise of the turbines didn't bother them. They may be right they don't hear it or was not affected by it and maintain that animals aren't bothered. Some people even hunt on Lowell Mountain.

The people that are not affected say they see the wildlife, "the animals are in their yards". Well, if they are not hearing the sound, then why not

The concerns of the people that hear the turbine sound, live it and are real!

Dhyan Nirmegh



Immediate Wildlife Destruction

Photo by Shirley Nelson



Road Construction

Photo by Steve Wright



Wind Tower Construction near the Nelsons Farm, Lowell Mountain Photo by Steve Wright

## Low Frequency Sound and Infrasound

Low frequency noise and Infrasound (such as emitted by wind turbines) are sound waves that are felt by the body rather than heard, probably by the utricle. Depending upon the amplitude or intensity, it produces feelings of extreme discomfort, a feeling that the body is vibrating. Depending upon the frequency and intensity, infrasound can keep you awake, or induce sleep. Therefore, it can cause sleep deprivation.

Infrasound induces stress and causes the body to secrete the hormone Cortisol. This effect is a medically recognized danger of long-term infrasound exposure.

Cortisol, plays a vital role in preparing our body for stressful “fight or flight” episodes. It increases blood pressure and blood sugar levels, and has an immunosuppressive action that provides needed alertness and energy during stressful experiences. However, during long term stress, or if Cortisol production is prolonged, its effects on the human body can become severe. A weakened or suppressed immune system will allow existing health problems to accelerate, and make it easier for new ones to be created.

Exposure to infrasound during early sleep hours can be particularly harmful. This is when the body normally produces the lowest levels of Cortisol. This might explain my 3am awakening and subsequent wakefulness. Artificially stimulating Cortisol production during sleep means that the Cortisol is not used and remains in the body, potentially damaging essential body functions.

A sound wave in air is a sequence of pressure changes. A sound wave in a liquid or solid is more like a vibration. This helps explain how Low Frequency Noise and Infrasound travel great distances and easily pass through solid walls, and can set up vibrations or resonances in rooms and body cavities.

Andrew Vivers (4/14/2014)  
Arniefol, Glamis, Scotland

<https://www.windturbinesyndrome.com/2014/turbine-headache-scotland/>

Infrasound (20Hz or less) can affect the bodies of animals and humans.

### Hearing Ranges

Species	Range (Hz)
Humans	20-23,000
Coyotes	50-46,000
Cats	45-65,000
Frogs	100-3,000
Birds	200-12,000
Rodents	1,000-100,000
Rabbits	360-45,000
Turtles	20-1000
White-tailed Deer	250-12,800
Owl	120-12,000



Photo by Roger Irwin

### Moose Have Excellent Hearing

They have been known to communicate to other moose using a low 'hiccup call (which is imperceptible to humans) over a distance of 2 miles. Their ability to hear is enhanced by the reflective surface of their very large ears (about 67 sq. in.) coupled with the distance between their ears which gives them enhanced stereophony. On top of that, their ears move independently of each other which allow them to enlarge both the angle and the space of perception.

The Ecology of Management of the North American Moose.



Photo by Roger Irwin

### Antlers and Moose's Sharp Hear

Moose's antlers are some of the most extravagant headgear in the animal kingdom.

- Act as elaborate hearing aids that help males to find calling females.
- Antlers' sound-gathering qualities boost hearing by 19%
- Their ears are 20 times larger than humans
- It has been found that bulls with wide antlers have had better results in finding mates.

James Randerson, The Guardian, Thursday, 20 March 2008



White-tailed Fawn listening While Sleeping

Photo by Roger Irwin



White-tailed Buck Listening

Photo by Roger Irwin

### **White-tailed Deer Hearing**

White-tailed deer hearing is its most important sense.

- Hearing range (250 Hz to 12,800Hz)
- Very large ears, along with independently angle and rotation deer are able to pinpoint where the sound is coming from
- Unfamiliar, out of the ordinary sounds of their environment warrants attention.



Black Bear

Photos by Roger Irwin

Young bears ears develop to full size sooner than any other part of their body. It is the black bears first line of defense. In a thick forest, hearing is the most crucial sense the bear can have. The bear often locates sound before using its sense of smell. Like dogs, bears hearing capability exceeds human range and sensitivity.



Photos by Roger Irwin

### Emerging from A Winters Nap

Bobcats hear higher frequency sounds than humans. Their hearing is extremely acute.

- They have 30 different muscles in their ears they can recognize a sound, tone and locate the source of the sound instantly.
- They can independently rotate their ears in a 180 degrees.
- The shape of the ear directs and funnels sound to the center of the cats middle ear.

## Mountain Predators



Eastern Coyote, Red Fox, Weasel and Mink      Photos by Roger Irwin

### These Predators have the Ability to Change Hunting Territories

- The Coyote hearing range is 45 KHz which is 3 times that of humans
- The fox has the hearing range up to 150 yards at 60 KHz.
- There is evidence that the Weasel and Mink's have high hearing ranges similar to the Coyote and Fox.

## Ground Animals



Beaver

Photo by Shirley Nelson

### Beavers Hear Excellently both on Land and Under Water

- The medium of water conducts sound better than the medium of air.
- Beavers spend most of their time in water.
- Ears are small flaps of skin perched high on the sides of their heads.
- Under water a flap of skin covers their inner ear and protects it from water.
- Their high hearing sensitivity is due to the large inner ear organs.
- The Beavers lodge is constructed such that half is below water and half above water.
- The beaver's environment, create wet lands, a hone for other species of animals, amphibians, and plants, while helping to curtail climate change.

## Beaver Pond Community



Otter



Painted Turtle, Frog and Rabbit

Photos by Roger Irwin

## Ground Animals



Snowshoe Hare with Articulating Ears

Photo by Roger Irwin

Rabbits hear much like humans but are able to hear higher pitch sounds than humans. Their ears move forward and backwards. With large erect ears that move independently, rabbits are able to pick up sounds a mile away. Hearing being its most vital sense, a rabbit can be hiding behind objects with their long ears sticking up and are able to hear predators and understand the acoustic landscape surrounding them.

## Ground Animals



Vermont Woodchuck Photo by Roger Irwin



Red Squirrel Photo by Roger Irwin

## Birds



Blue Jay

Photo by Roger Irwin



Nesting Bird

Photo by Roger Irwin

- Birds have a smaller hearing range than humans
- They have strong recognition skill that can sort out the difference of the songs of other birds.
- Their ears located just behind the eyes covered with light feathers called auriculars
- Their calls can be masked with wind turbine noise.



Barred Owl

Photo by Roger Irwin

Large facial disc around eyes covered with fine feathers help funnel sounds to ears slightly offset on the side of their head. This takes the owl less than 100<sup>th</sup> of a second to determine the path of their prey.



IN THE QUIET VERMONT WOODS

Photo by Roger Irwin