Title: Do You Hear What I Hear?

Content Standard B (Grades 5-8): Energy is a property of many substances and is associated with heat, light, electricity, mechanical motion, sound, nuclei, and the nature of a chemical.

Standard 3:

Indicator 6.3.22 Demonstrate that vibrations in materials set up wavelike disturbances, such as sound and earthquake waves, that spread away from the source.

Background:

Elephants communicate through various means. They use their senses such as taste, vision, touch, smell and hearing to convey and receive information. Elephants have a large and varied repertoire for acoustic (sound) communication. Some of the sounds elephants emit are snorts, growls, trumpeting, barks and squeals. That elephants communicate with high-pitch and low-pitch sounds is evident, since people can hear these sounds, but it was discovered that elephants can communicate with one another by using infrasound; sound below the level of human hearing. This would explain how elephants can communicate with one another over several kilometers away.

Purpose: To investigate the relationship of an inaudible sound to the vibrations it produces in order to better understand elephants and how they communicate by infrasound.

Materials:

- Tuning forks (available in Indianapolis Zoo's Elephant Resource Kit)
- Sound meter (available in Indianapolis Zoo's Elephant Resource Kit)

Activity:

1. Strike a tuning fork and listen for sound.
2. Place the tuning fork close to a student's ear. (Do not touch the ear with the tuning fork). The student should respond when they hear a sound coming from the tuning fork.
3. Strike the tuning fork again and place it near the microphone of the sound meter.
4. Record the reading of the sound meter. (The units are in decibels; which is a unit of intensity for sound).
5. Record the frequency of the tuning fork. This number is on the tuning fork. (Frequency is the number of vibrations per a unit of time. One cycle per second is a Hertz [Hz], a unit of measurement for frequency).
6. Repeat the activity with the other tuning forks. (#3-5).
7. Graph the results of the data and compare the data.
8. Discuss the advantages that elephants might have by having sound produced at these low range levels.

Extensions:

1. Strike a tuning fork and place it in a cup of water and observe the waves that are formed in the water. Discuss how vibrations carry energy and can travel over distances.
2. Wet your finger and rub it across the rim of a stemmed glass that contains water. (A glass that has a thin rim works better). Discuss how a person hears sound.
3. Investigate how elephants make sound and compare these findings to the "singing glass". (in #2)
4. Research the work on infrasound by Joyce Poole and Katy Payne.
5. Refer to the website www.birds.cornell.edu/BRP/soundsEleRumble.html to view a spectrogram of elephants greeting one another.
6. Refer to website (listed in #5) to find information of Elephant Listening Project (ELP) for information on elephant communication research.
7. Try a dog whistle (which would be on the ultra or high range of sound) with the sound meter and see if the meter will pick up any of the sounds.

Assessment:

1. Graph of frequency of tuning fork with measurement found on the sound meter

Resources/teacher notes:

1. Practice with the sound meter to get the correct setting (range) on the sound meter. (70 -90 Db seems to pick up sounds the best.)
2. Go to http://elephant.elehost.com/ for more information on elephant communication and to view a graph of a comparison of animals and their range of hearing.
3. Go to About Elephants then to senses and to infrasound.
4. Go to www.birds.cornell.edu/BRP/SoundsEleRumble.html for information on elephant vocalizations and a sound spectrogram.