

# The Use of the Macaulay Library of Natural Sounds to Supplement Labs and Field Studies

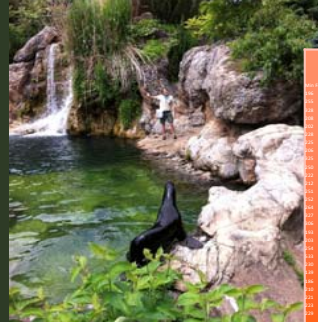
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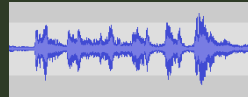
Elephant seals molting in Ano Nuevo



A sea lion vocalizing in the Aquarium at Niagara



A male sea lion at the Queens Zoo



A track of a male sea lion from the Queens Zoo 5/30/14

Raw data from Bronx Zoo, NY (12/15/14)

Sex	Age	Number of vocalizations	# of files in collection
Male	1	14	2
Male	2	14	2
Male	3	14	2
Male	4	14	2
Male	5	14	2
Male	6	14	2
Male	7	14	2
Male	8	14	2
Male	9	14	2
Male	10	14	2
Male	11	14	2
Male	12	14	2
Male	13	14	2
Male	14	14	2
Male	15	14	2
Male	16	14	2
Male	17	14	2
Male	18	14	2
Male	19	14	2
Male	20	14	2
Female	1	2	2
Female	2	2	2
Female	3	2	2
Female	4	2	2
Female	5	2	2
Female	6	2	2
Female	7	2	2
Female	8	2	2
Female	9	2	2
Female	10	2	2
Female	11	2	2
Female	12	2	2
Female	13	2	2
Female	14	2	2
Female	15	2	2
Female	16	2	2
Female	17	2	2
Female	18	2	2
Female	19	2	2
Female	20	2	2

Student record vocalizations and then compare predominantly females assemblages (Bronx Zoo) with all males (Queens Zoo). The average number of barks/vocalization is 5.7 for the males vs. 2.04 for the females.



New-born walrus pup



In captivity after 3 weeks



In captivity after 3 months—not much change

Change of walrus vocalizations over time. ML 120322



Walrus "hammering" ML129697

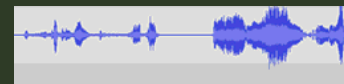


Walrus bell sound ML 120371



Photo by Brian Leung on Flickr (www.flickr.com)

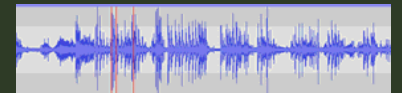
Examples of various types of vocalizations obtained from the Macaulay Library of Natural Sounds and recorded with Audacity. The recordings are then converted to spectrograms for further analysis (see walrus bell sounds above).



Hawaiian monk seal pup answered by its mother ML 117828



1600 x 1200 - commons.wikimedia.org



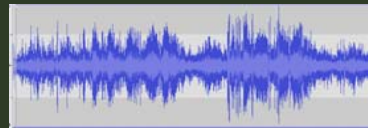
Trumpeting by elephant seal ML 110965



Seal in Maritime Aquarium, CT



A rare vocalization of a harbor seal in Maritime Aquarium elicited by a trainer.



Sea lion in underwater tank hunting for fish. Sounds like rubbing finger across a comb. ML 120316



Juvenile sea lion at the Bronx Zoo.

**Abstract**  
Our students have been playing recordings from the Macaulay Library of Cornell University of natural sounds and videos (macaulaylibrary.org/) while simultaneously recording with the sound recording program Audacity. In this way they can analyze number of vocalizations per a certain time period, the range of frequency of the sounds, as well as other parameters. This data has been used for compare/contrast scenarios in their own live recordings of vocalizations of sea lions from zoos and aquaria. The students have been able to hear recordings of animals (including sea lions) from places such as New Zealand and the Galapagos that are currently inaccessible to them in person.

**Introduction**  
The Macaulay Sound Library, initiated by the Cornell University Lab of Ornithology in 1957 (originally called the Library of Natural Sound or LNS) is a treasure-trove of both audio and video recordings from birds, mammals, amphibian, reptiles, arthropods, and fish. Students can simultaneously record for analysis sounds from this library using the free downloadable software Audacity or Raven Lite or b. add their own recordings to the website. These programs allow you to calculate maximum and minimum frequencies of vocalizations on a spectrogram as well as number and duration of each sound during a defined time period. Patterns emerge that can be recorded and analyzed.

Several biology majors have been recording sea lion vocalizations using the free downloadable program Audacity in an attempt to discern interesting patterns. This interest was initiated by Dr. Biolsi through a travel course that she taught in which she introduced the students to pinnipeds and explained that mothers and pups can recognize each other through vocalizations. In the meantime, we discovered the Macaulay Library of Sounds (ML) organized and sponsored by Cornell University. The ML has, in addition, added a Bioacoustics resource that records large mammals such as elephants and whales, and has creative visuals for the public to view these sounds. We will continue to take students on field trips to various zoos and aquaria in the New York City area and record sea lion vocalizations (sample data given here), as well as add information from these web sites to the curriculum. For example, we plan on using the websites to aid in common bird call recognition.

Order	Common name	Audio	Video
Cetacea	Whales, dolphins, porpoises	2159	312
Sirenia	Manatees, dugongs, sea cows	12	----
Carnivora			
Family			
Ursidae	Includes polar bears	-----	100
Phocidae	seals	1586	172
Otariidae	Sea lions, fur seals	83	294
Odobenidae	walruses	17	----
Mustelidae	Sea otters	3	26



1024 x 768 - antarctica.gov.au



Weddell seal, Antarctica—sounds like a plane taking off plus clicks. ML 123436

**Future ideas**  
With sea lions, are their substantial differences based on species, sex, age, seasonal, or whether or not the animals are captive or free? Can the vocalizations be typed to individuals and/or type of behavior? Do the animals vocalize differently based on whether people, such as trainers or children are present or not? How do vocalizations figure into their interactions with each other? Can we apply the same techniques to birds or other animals?

What other differences, especially in marine mammals, do we note as we search the library? Can we contribute our own sounds to the library? Would we be able to establish a service learning internship using the library with children? With blind people?