

research is required to explore if ANP is influenced by the regulate plasma sodium, since electrolyte imbalances are significant in phocid seals.

ANALOG-DIGITAL ACQUISITION METHODS FOR BANDWIDTH ANALOG-TO-DIGITAL DATA ACQUISITION SYSTEM FOR FULL-BANDWIDTH CETACEAN ACOUSTIC AND LOGICAL EVENTS

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bandwidth analog-to-digital data acquisition system for full-bandwidth cetacean acoustic and logical data was developed. The hardware consists of a computer 50 MHz processor, a 20 gigabyte hard disk and a National Instruments PCI-MIO-16E-1 data acquisition card. A Bruel & Kjaer model 8103 and charge amplifier (model 2635) were used to measure whistles and echolocation clicks. As an example of use, data were collected in a target-recognition task with a bottlenose dolphin (*Tursiops truncatus*), trained to respond to a target with a whistle. Acoustic data came from a Millar pressure catheter and matching software. Before each trial series, the animal allowed placement of one catheter into the nasal cavity through the blowhole. Intranasal pressure increased before echolocation and continued high during whistle observed previously by Ridgway et alia (1980) and by Carder (1988) in the white whale (*Delphinapterus leucas*) during an echolocation task. The software handles measurement, calibration and calibration values taken with pressure catheters and whistles. Acoustic data are taken at half the 1.0 MHz bandwidth of the data acquisition card. Up to a total of seven other channels of data are collected within the remaining bandwidth. A visual representation of the waveform is presented during a 4 second period is presented to the user. System settings and system settings are logged to a text event file. The system provides considerable savings in time over the laborious procedures of the studies cited above.

ACROUSTIC SIGNALING BY FEMALE HARBOR SEALS (*PHOCIDAE*) DURING THE PUP ATTENDANCE

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Communicative behavior of adult female harbor seals has received attention because they do not produce pup attraction calls. The most common signals emitted by female harbor seals are growls and splashes while hauled out. It has been suggested that on land, females signal 'danger' to their pups by slapping the water's surface with their foreflipper, but the evidence for this is scanty. During observation periods between 1997 to 1999, we observed the behavior of harbor seals (*P. v. richardsi*) at Moss Cove, Point Lobos State Natural Reserve, Carmel, California. Continuous aerial and underwater audio and video were recorded near a small haul out area during 417 observations. During this time, individually identified adult females exhibited several distinct communicative behaviors. The behaviors were observed in at least one and up to four individuals: 1) two different females without their pups approached and slapped the water's surface; 2) four individuals sharply slapped the water which attracted the attention of their own pups, who immediately returned to their mothers; 3) in one instance a female that was temporarily separated from her pup emitted an atypical aerial signal (a high pitched 'moan') while swimming through and near the study area; and 4) two females swimming with their pups emitted underwater vocalizations ('growls') when approached by their pups. From these observations we conclude that: 1) signals

having different sonic, tactile, and visual components are used by females to attract the attention of their pups; 2) females exhibit actions that are considered typical of male aquatic displays; and 3) such signaling can be contrasted to highly stereotypic vocal signals produced by otariid females during the period of pup attendance.

GENETIC VARIATION AND POPULATION CHARACTERISTICS BASED ON mtDNA AND MOLECULAR SEXING OF HUMPBACK WHALES FROM ABROLHOS BANK, BRAZIL

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In the southwestern Atlantic Ocean, humpback whales (*Megaptera novaeangliae*) migrate to Abrolhos Bank, Brazil for mating and calving each year during the austral winter. The feeding ground destinations of these whales remains unknown. To date, there have been no photographic matches between individuals from this area and the Antarctic Peninsula. In order to investigate migratory movements of individuals from this area and relationships with other humpback whale populations in the Atlantic Ocean, we analyzed mtDNA control region sequences from forty-three tissue samples obtained from humpback whales in this wintering area over a two year period (1997 and 1998). The sex of these identified individuals was determined using molecular methods; our finding of a skewed sex ratio towards males was similar to those reported from other humpback whale wintering areas. Nucleotide and haplotype diversities from whales of the Abrolhos Bank wintering area were comparable to other humpback whale populations, as a total of 37 variable nucleotide positions defined 25 unique haplotypes. A comparison between these mitochondrial sequence haplotypes with those from the Antarctic Peninsula published in Genbank, revealed that the most common haplotype found in the Abrolhos sample was the same as one of the Antarctic Peninsula samples. This result provides suggestive evidence of a link between these wintering and feeding regions, despite the lack of photographic matches. None of the haplotypes found in the Abrolhos sample matched haplotypes of humpback whales from the western North Atlantic Ocean. The genealogical relationships among haplotypes from North and South Atlantic Ocean populations of humpbacks will help reveal the extent to which gene flow occurs or has occurred, as well as the persistence of ancestral polymorphism. The findings of our study are reviewed in the context of genetic comparisons between Northern and Southern Hemisphere populations of baleen whales.

HUMAN ACTIVITY AND LACTATING ELEPHANT SEAL ACTIVITY

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How can human impact on breeding biology of pinnipeds be quantified? Which measured effects have long-term implications? In southern elephant seals, *Mirounga leonina*, human disturbance may cause undesirable activity levels within breeding harems, thereby affecting energetics of lactating females, weaning mass of pups, and potentially subsequent growth and/or survival of juveniles. On sub-Antarctic Macquarie Island, we studied in 1998 how human activity may affect activity of lactating female elephant seals, and what implications for pup weaning mass resulted. Using a grid system we measured the movement of 48 females in harems on Isthmus East (area of relatively high human activity within 1.2 km of scientific station) and Middle Beach (remote from human activity). For each female, daily rate of movement was