

Bioacoustic Absorption Spectroscopy (BAS): Instruments, Measurement Strategies and Results of Recent Experiments.

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Abstract: Length and depth distributions and number densities of fish may be inferred from transmission loss measurements made with a fixed omnidirectional, broadband source and a fixed, densely populated vertical array of receivers. Preliminary results of an experiment, BAS II, which employed a recently developed autonomous ultra-broadband source and vertical receiving array, will be described. The source was programmed to transmit a sequence of 66 closely spaced, five sec long CW tones at frequencies between 250 Hz and 10 kHz. Its source level is so low, 170 dB re 1 mPa (independent of frequency); that this method of monitoring fish may

be considered “non-invasive”. During this experiment the source was deployed at multiple depths over a relatively short periods of time (< 4 hours), and the vertical array spanned most of the water column. This measurement strategy permitted investigation of the sensitivity of bioacoustic absorption losses to source / receiver depths relative to biological layer depths, and resulted in unambiguous identification of resonance frequencies with layer depths. Echo sounder data confirmed inferred layer depths; trawls confirmed inferred fish lengths. The implications of this experiment for the design of practical instruments and sampling strategies will be discussed.