

11:50

2aAA5. There's nothing Majestic about burlesque. Christopher Jaffe and Robin Glosemeyer (Jaffe Holden Acoust., 114A Washington St., Norwalk, CT 06854)

Turn-of-the-century vaudeville and movie palaces initially seem to lend themselves to use as concert halls or multipurpose theatres. Basic features, including existing structure, appropriate location, and desirable seat count, already exist. But, upon further investigation, these palaces

present both acoustical and theatrical limitations. Specifically, shallow stage depth, undersized stage wings, small orchestra pit, deep balcony overhangs, and low ceiling height in stage house and/or audience chamber are common deficiencies which must be addressed in successful conversions. Despite these challenges, converting an existing building is often a viable option for many communities. This paper will investigate several representative palaces which were modified to accommodate modern symphonic and theatrical productions between 1959 and the present.

TUESDAY MORNING, 4 JUNE 2002

LE BATEAU ROOM, 8:00 TO 11:35 A.M.

Session 2aAB

Animal Bioacoustics: Session on Marine Mammal Bioacoustics in Honor of William E. Evans I

Jeanette A. Thomas, Cochair

Laboratory of Sensory Biology, Western Illinois University, 3561 60th Street, Moline, Illinois 61265

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Chair's Introduction—8:00

Invited Papers

8:15

2aAB1. Perception time and movement time in dolphin pulsing and whistling. Sam Ridgway and Donald Carder (SPAWAR Systems Ctr. San Diego, Div. D235, 53560 Hull St., San Diego, CA 92152-5001)

Auditory/vocal response time was separated into perception time (PT) and movement time (MT) in trials with bottlenose dolphins (*Tursiops truncatus*)—two males and one female. Pressure catheters accepted into the nasal cavity by each dolphin recorded the pressure increase that preceded sound production. Time from acoustic stimulus onset to onset of pressure rise was recorded as PT (range 57 to 314 ms) and pressure rise onset to dolphin sound onset was recorded as MT (range 63 to 363 ms). Blindfolded dolphins trained to report a target by whistling often responded before completion of their 200- to 800-ms echolocation click trains. Detection of the target, indicated by whistling, before termination of the animal's own click train, suggests that dolphins do not voluntarily respond to each successive click but rather set a rhythm such that each click is emitted about 20 ms after the target echo arrives.

8:40

2aAB2. Interactions between commercial fishing and walleye pollock aggregations. Sarah Stienessen, Chris D. Wilson, and Anne B. Hallowed (Alaska Fisheries Sci. Ctr., Natl. Ocean. and Atmos. Admin., 7600 Sand Point Way, NE, Seattle, WA 98115, sarah.stienessen@noaa.gov)

Scientists with the Alaska Fisheries Science Center are conducting a multiyear field experiment off the eastern side of Kodiak Island in the Gulf of Alaska to determine whether commercial fishing activities significantly affect the distribution and abundance of walleye pollock (*Theragra chalcogramma*), an important prey species of endangered Steller sea lions (*Eumetopias jubatus*). In support of this activity, spatio-temporal patterns were described for pollock aggregations. Acoustic-trawl surveys were conducted in two adjacent submarine troughs in August 2001. One trough served as a control site where fishing was prohibited and the other as a treatment site where fishing was allowed. Software, which included patch recognition algorithms, was used to extract acoustic data and generate patch size and shape-related variables to analyze fish aggregations. Important patch related descriptors included skewness, kurtosis, length, height, and density. Estimates of patch fractal dimensions, which relate school perimeter to school area, were less for juvenile than for adult aggregations, indicating a more complex school shape for adults. Comparisons of other patch descriptors were made between troughs and in the presence and absence of the fishery to determine whether trends in pollock aggregation dynamics were a result of the fishery or of naturally occurring events.

9:05

2aAB3. Age-related hearing loss in sea lions and their scientists. Ronald J. Schusterman, Brandon Southall, David Kastak, and Colleen Reichmuth Kastak (Long Marine Lab., Univ. of California at Santa Cruz, 100 Shaffer Rd., Santa Cruz, CA 95060)

Interest in the hearing capabilities of California sea lions (*Zalophus californianus*) was first stimulated by the echolocation hypothesis and more recently by rising concern about coastal noise pollution. During a series of audiometric tests, we measured the absolute hearing sensitivity of two sea lions and two of their human investigators. Aerial hearing curves for each subject were obtained with a go/no-go procedure and standard psychophysics. Additionally, underwater hearing curves were obtained for the sea lions using

the same procedures. Underwater, the older sea lion (22–25 years of age) showed hearing losses relative to the younger sea lion (13–16 years) that ranged from 10 dB at lower frequencies to 50 dB near the upper frequency limit. The older sea lions' hearing losses in air were consistent with those measured underwater. The older human (69 years) tested also showed losses relative to the younger human (22 years). These differences ranged from 15 dB at lower frequencies up to 35 dB at the highest frequency tested. The results obtained in this study document age-related hearing losses in sea lions and humans. The findings are consistent with data on presbycusis in other mammalian species, showing that maximum hearing loss occurs at the highest frequencies.

9:30

2aAB4. Interrelationships between intranarial pressure and biosonar clicks in the bottlenose dolphin (*Tursiops truncatus*). Wesley R. Elsberry (Marine Acoust. Lab., Texas A&M Univ., Galveston, TX), Ted W. Cranford (San Diego State Univ., San Diego, CA), Sam H. Ridgway (SPAWAR Syst. Ctr., San Diego, CA), Donald A. Carder, William G. VanBonn (US Navy Marine Mammal Prog., San Diego, CA), Diane J. Blackwood (Marine Acoust. Lab., Texas A&M Univ., Galveston, TX), Jennifer A. Carr (US Navy Marine Mammal Prog., San Diego, CA), and William E. Evans (Texas A&M Univ., Galveston, TX)

Three Atlantic bottlenose dolphins (*Tursiops truncatus*) were given a target recognition biosonar task. During their performance of the task, both acoustic data in the far field and pressure within the bony nasal passages were digitally recorded (Elsberry *et al.*, 1999). Analysis of over 15 000 biosonar clicks provided new insights into odontocete biosonar sound production and is consistent with acoustic and pressure data taken from white whales (*Delphinapterus leucas*) during biosonar (Ridgway and Carder, 1988). Our work provides the first evidence for a minimum intranarial pressure during biosonar click production for any odontocete (11.8 ± 0.5 kPascals over basal pressure). All three subjects exhibited nearly the same minimum intranarial pressure difference during biosonar click production. Clicks produced at or near this minimum intranarial pressure exhibited a wide range of acoustic power values. The acoustic power of a biosonar click was not highly correlated with intranarial pressure ($R^2 = 0.116$). The radiated acoustic energy in biosonar clicks ranged from 1 to 1370 microJoules. Estimates of mechanical work during pressurization events were produced using a piston/cylinder model and intranarial volume data from prepared specimens and computed tomography scans. Mechanical work during pressurization events ranged from 2.74 to 23.0 Joules, with an average of 10.3 Joules.

9:55

2aAB5. Past and present research on gray whale vocalizations. Francisco Ollervides (RARE Ctr. for Tropical Conservation, 1840 Wilson Blvd., Ste. 402, Arlington, VA 22201-3000, follervides@rarecenter.org)

Eberhardt and Evans first recorded vocalizations of gray whales in 1967 in Laguna Ojo de Liebre, Mexico. Three and a half decades of bioacoustic research on gray whales has followed this groundbreaking work. Gray whales appear more vocal while at the southern breeding lagoons off Baja California and are least vocal at the northern feeding areas of the Bering, Chukchi, and Beaufort Seas. Ten different vocalizations have been identified on the breeding grounds, while only six different vocalizations have been recorded on the feeding grounds. Evans also conducted the first recordings of vocalizations of gray whales in captivity with his work on J.J. II in San Diego in 1974. Since then, the database of captive gray whale vocalizations has expanded with research on GiGi in 1997. From this review, an acoustic repertoire of at least 12 different types of vocalizations is suggested. Nevertheless, not all gray whale calls fall into obvious or distinct categories; thus, correlating specific behaviors with each vocalization type merits further study.

10:20–10:30 Break

10:30

2aAB6. Do manatees talk during sex? Caryn Self-Sullivan (Texas A&M Univ., College Station, TX 77843-2258), Tamra Gilbertson (Mote Marine Lab., Sarasota, FL 34236), and William E. Evans (Texas A&M Univ., Galveston, TX 77553-1675)

On January 13, 1999, manatee vocalizations were recorded during a mating herd event in the Orange River, Florida. Although copulation could not be observed, multiple males were observed with exposed penises. During one 25 min sample (1300–1325 h), over 400 manatee signals were recorded. In March 2000, each signal was captured and digitized from the analog tape using a Marantz PMD 501, Ashly equalizer (gain=0, filter=0), MAC 8100, and Canary 1.2.1. In general, signals were 100–200 ms in length, highly harmonic (up to 8 harmonics ranging from 1 to 16 kHz), with little or no frequency modulation. Intervals between signals ranged from less than 1 s to 14 s (mean = 3 s), indicating that manatees do indeed talk (a lot) during sex. Noise from two passing boats was also recorded during the sample period. One abnormally low-frequency signal (0.4 kHz) was recorded during one boat pass. This apparent manatee vocalization could be seen and heard below the boat noise frequency band.

10:55

2aAB7. Echolocation signals of foraging killer whales (*Orcinus orca*). Whitlow W. L. Au (Hawaii Inst. of Marine Biol., Univ. of Hawaii, P.O. Box 1106, Kailua, HI 96734), John K. B. Ford (Pacific Biological Station, DFO Canada, Nanaimo, BC V6B 3X8, Canada), and Kelly A. Allman (The Marine Mammal Ctr., Sausalito, CA 94965)

Fish eating resident killer whales that frequent the coastal waters of Vancouver Island, Canada have a strong preference for chinook salmon. The whales in Johnston Strait often forage along the steep cliffs that extend into the water, echolocating their prey. Echolocation signals were measured with a four hydrophone symmetrical star array and the signals were simultaneous digitized at a sample rate of 500 kHz using a lunch-box PC. A portable VCR recorded the images from an underwater camera located close to the array center. Only signals emanated from close to the beam axis (1185 total) were chosen for a detailed analysis. Killer whales project very broad band echolocation signals (Q 1.3 to 1.5) that tend to have a bimodal frequency structure. Ninety seven percent of the