Aquatic Mammals 2013, *39*(2), 205-210, DOI 10.1578/AM.39.2.2013.205

Errata

Aquatic Mammals, *39*(1), 2013, pp. 23-53
A Review and Inventory of Fixed Autonomous Recorders for Passive Acoustic Monitoring of Marine Mammals

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Changes from incorrect and/or outdated information are in brackets. Additional information and any deletions from text or tables are indicated below for each page with errata.

p. 23: Abstract, line 9: More than [40] ARs . . . .

pp. 26-28: **Table 1**

Acousonde: **[**Replaced the CAP and the B-Probe].

A-TAG: Add Ichikawa et al., 2011, to references.

AULS: DOSITS reference should be deleted and Rountree et al., 2006; Rountree, 2008, 2011, added to references.

AURAL-M2: Multi-Electronique (MTE) Inc. [Canada]

C-POD: Add Jefferson et al., 2002; Tregenza et al., 2007; Brandt et al., 2011; Elliott et al., 2011; Rayment et al., 2011; Castellote et al., 2012, to references.

HARP: Add S. Wiggins, pers. comm., 16 April 2013, to references.

PAL: Add Miksis-Olds et al., 2007, 2010, 2013; Miksis-Olds & Parks, 2011, to references.

Additional instruments: EA-SDA14, Embedded Acoustic recorder and SYLence, Low-power sound recorder by RTSYS Marine Technologies, France (L. Simon, pers. comm., 17 April 2013); DAULS - Deepwater AULS (Rountree, 2011; Rountree et al., 2012); and Deepwater versions of SM2M Submersible and Ultrasonic by Wildlife Acoustics, Inc., USA (S. Snyder, pers. comm., 12 April 2013).

p. 29: In column 1, 2nd paragraph, line 25: (up to 61 h), uses a [secure digital card (SD)] as storage.

p. 37: In column 2, 2nd paragraph, line 12: [AUSOMS-D, DASAR, and HARP; Wiggins et al., 2012)].

p. 38: In column 1, line 3: Instruments like the [AMAR (J. E. Moloney, pers. comm., 15 April 2013; Table 2) and] the HARP . . .; 2nd paragraph, line 13: et al., 2010) [and from small boats (e.g., 5m RHIB; S. Wiggins, pers. comm., 16 April 2013)].; 3rd paragraph, lines 9-10: downloads to [compact flash]; line 12: requiring access to [compact flash]; lines 14-15: delete sentence "The hard drive runs for 6 s every 3 min when data writing is occurring." In column 2, line 2: little over [175 d]; line 6: battery life to [115 d]; lines 7-9: delete "and the efficiency of shutting down the hard drive between data writing sessions is lost so that it runs continuously to record the data flow,"; lines 9-10: dropping battery life to [100 d (H. Cheyne, pers. comm., 12 April 2013).]; 2nd paragraph, line 1: delete first sentence that refers to Table 3 which does not exist; line 4: The standard pop-up [compact flash stores 128 GB]; lines 7-9: delete sentence "The shift from hard drives to high storage capacity flash cards will take care of this limitation."; line 9: The HARP, which can sample at [320 kHz], has a much larger storage capacity ([5TB with loss-less data compression = 10 TB; Wiggins, pers. comm., 16 April 2013]), than pop-ups; . . . .

p. 39: In column 2, 3rd paragraph, line 8: information [about] the sounds; line 10: delete entire sentence starting with "Nevertheless . . ." and include C-PODs regularly deliver higher resolution information on the frequency for some classes of cetacean click than recording systems achieve. C-PODs operate very wide acceptance criteria as opposed to recording systems which, by virtue of their profligate use of memory, are forced to operate potentially overly narrow criteria of acceptance of sounds (N. Tregenza, pers. comm., 15 April 2013).

p. 40: In column 1, 3rd paragraph, line 8: The [Acousonde]; line 10: that can sample up to [464] kHz, includes [3D compass,] depth . . . .

p. 42: In column 1, lines 6-9: [of] 6,000 m[, although beyond 2,500 m the acoustic release may not work, and the user must rely on a timed release for recovery.]

p. 44: In column 1, 5th paragraph, lines 12-13: applications, [has been successfully deployed in demanding tidal and river environments in JASCO's High-Flow-Low-Noise mooring frame (J. E. Moloney, pers. comm., 15 April 2013),] and also have localization . . . .

p. 48: In column 1, lines 1-5: delete the first complete sentence starting with "Flash storage . . . ." Acknowledgements section states that Christopher W. Clark provided comments on this paper, which is incorrect. Dr. Clark provided comments on an earlier report to JIP (2009), which led to this review.

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Table 2. Only instruments for which there were changes (in brackets) are included. The first entry of Acousonde and for ARP (no longer available) should be omitted. The LARS (HF and LF) and T-POD were superseded by DSG-Ocean and C-POD, respectively.

Instrument	Dimensions	Maximum deployment depth (m)	Maximum deployment time	Sampling frequency (Hz)	Power supply and energy capacity	Data storage	Data format	Microprocessor	Examples of species studied
Acousonde™ 3A (tag) and Acousonde™ 3B (tag)	22.1 × 3.2 cm [without float] [22.4 × 7.9 cm with float]	3.000	14 d	[25 (low-power channel)] [464,000 (high-frequency channel)]	[A-cell lithium battery]	[128 GB in 4 MicroSD storage-card slots] [64 GB in 2 MicroSD storage-card slots]	2 acoustic channels, MT files, depth, tag temperature, 3-D acceleration/ tilt, ambient light level, [3-axis compass]	ARM9 with an ARM vector floating point (VFP) coprocessor (www.arm.com) 208 MHz	[*Balaenoptera musculus, Eschrichtius robustus, Megaptera novaeangliae, Mirounga leonina,* and *Stenella attenuata*]
AMAR G3	132.1 × 40.4 cm; Diameter: 16.5 cm	250 (shallow AMAR) 2,500 (deep AMAR)	1 y dependent on input channel configuration, duty cycle settings, and attached battery packs	[16-bit channel 1- 687.5 Ksps, 8 24-bit channels: 1 to 120 Ksps, standard, fitted M8E hydrophone specified for 1-150,000]	DC power from battery pack (7 to 16 Vdc) or PoE three standard battery packs available (short, medium, and long)	Solid State storage. 256 GB, expandable to 1,796 GB	Acoustic data as WAV formatted files; non-acoustic data as CSV files	NA	[Pinnipeds, baleen and toothed whales, delphinids, porpoises, and manatees]
A-[TAG] (tag)	21 mm diameter and 108 mm length	200	75 d	55,000-235,000	Lithium battery cell	128 MB flash memory	Click intensity, timing, and the difference in time arrival between two hydrophones	CPU (PIC18F6620; Microchip, Detroit, MI, USA)	*Neophocaena phocaenoides asiaeorientalis* [and *Dugong dugon*]
AURAL-M2	With 16 batteries: 14.6 × 90 cm and 20kg; with 64 batteries: 14.6 × 120 cm and 32 kg; with 128 batteries: 14.6 × 178 cm and 49 kg	300	1 y depending on setting parameters	[128-32,768]	Alkaline D cell or battery pack	Compact flash 1GB or more and [640 GB double hard drive kit]	WAV files, temperature, and depth	33 MIPS Dallas DS89C450 Ultra High Speed Flash Microcontroller	Whales in the St. Lawrence River

Instrument	Dimensions	Maximum deployment depth (m)	Maximum deployment time	Sampling frequency (Hz)	Power supply and energy capacity	Data storage	Data format	Microprocessor	Examples of species studied
EAR	10.16 cm diameter by 60 cm long cylinder	[999]	1 y	[2-80,000 (max)]	Alkaline battery pack	[320 GB HDD]	Binary files	Persistor CF2 microprocessor, a 1 GB compact flash card, a Persistor BigIDEA IDE adapter	*Stenella longirostris*, [*M. novaeangliae, Delphinapterus leucas, Balaenoptera physalus, Orcinus orca, Mesoplodon* sp., snapping shrimp, and coral reef fish]
HARP	[Standard seafloor package is 1.5 m × 1.5 m × 1.5 m but can be configured into large trawl-proof subsurface moorings or small moorings deployed by hand from a small boat where the pressure housings (22.9 cm diameter × 81.3 cm long tubes) are fastened to a line connecting the flotation and release/weight]	~ 7,000	[300 d at 200 kHz continuous recording and loss-less data compression]	[10,000-320,000]	Alkaline or lithium battery pack	[16 × 320 GB HDD = 5 TB data storage × 2 compression = 10 TB effective storage]	XWAV time series files	32-bit, 20 MHz microcontroller from Motorola (www.motorola.com)	[All baleen whales, all odontocetes, and fish (i.e., bandwidth from 10 to 160,000 Hz)]
OceanBase	[11 cm diameter × 45 cm]	[500]	[Over 1 y]	[200-96,000]	Batteries	SSD 128 GB expandable to 1 TB or more	[WAV, flat]	[RISC]	Cetaceans, fish, sea state, and vessels
OceanPod	[11 cm diameter × 45 cm]	[2,000]	[0.5 to 1 y depending on sampling rate]	[200-96,000]	[Alkaline or lithium battery]	[Four SD slots of any memory size]	[WAV, flat]	[RISC]	Cetaceans, fish, sea state, and vessels
PAL	76.2 cm long and 15.2 cm in diameter	[2,000]	1 y	[0-100,000]	Alkaline D cells	2 GB flash memory card	Binary restored to time series (sound bites)	Tattletale Model 8	*Orcinus orca*, dolphins [manatees, ribbon seals, bearded seals, walrus, bowhead whales, and right whales]

Instrument	Dimensions	Maximum deployment depth (m)	Maximum deployment time	Sampling frequency (Hz)	Power supply and energy capacity	Data storage	Data format	Microprocessor	Examples of species studied
Pop-up or MARU	[Single sphere: 51 cm high and 58 cm diameter] [Double sphere: 110 cm high and 58 cm diameter]	[2,500 (acoustic release limit); 6,000 (system limit)]	[12-175 d depending on sampling rate; 12-370 d depending on sampling rate]	[2,000-64,000]	[Alkaline D cells, 149 Wh], [Alkaline D cells, 371 Wh]	[128 GB compact flash]	[Binary fault-tolerant format, post processed to AIFF]	[Tattletale Model 8 (Onset Computer Corporation)]	[*Balaenoptera musculus*, *B. physalus, B. bonaerensis, B. brydei, M. novaeangliae, Eubalaena glaciali,* and *Balaena mysticetus*]
RASP [C12]	[9 × 25 cm]	[250]	[Several weeks]	Up to 96,000	[Lithium primary battery]	[32 GB microSD memory]	[WAV and MP3]	[Yamaha C24 recorder, with built-in recording cycle (one slot per 24 h)]	Whales and dolphins
RASP [C12 II]	[9 × 28 cm]	[250]	[Several weeks]	Up to 96,000	[Lithium primary battery]	[32 GB microSD memory]	[WAV and MP3]	[Modified Yamaha W24 or Olympus LS-3, with built-in recording cycle (one slot per 24 h or three slots per 24 h)]	Whales and dolphins
RUDAR™	17.8 cm; 36.4 kg or 45.5 kg with batteries	[500, 1,500, or 3,500]	[Depends on sample rate chosen and number of battery packs]	[Selectable sampling rates from 4 to 750,000]	[Alkaline batteries]	[250 GB to 1.5 TB hard disks]	Up to 4 hydrophone channels, WAV	[Sound Technology ST500_mobile data recorder and sound level monitor]	Cetaceans
µRUDAR™	[1 hydrophone: 29 cm long × 10 cm diameter; 2 hydrophones: 37 cm long × 10 cm diameter]	[250]	Up to 61 h depending on sample rate chosen	[44,100-96,000]	Rechargeable Li-Ion batteries	[64 GB SD flash memory card]	[Up to 2 hydrophone channels, WAV or MP3]	[Zoom H1 digital recorder]	Cetaceans
nRUDAR™	[26 cm long × 8 cm diameter]	[300]	[Up to 26 h depending on sample rate and battery chosen]	[44,100-96,000]	[Single AA alkaline or lithium battery]	[32 GB SD flash memory card]	[1 hydrophone, WAV, or MP3]	[Zoom H1 digital recorder]	[Cetaceans]

Instrument	Dimensions	Maximum deployment depth (m)	Maximum deployment time	Sampling frequency (Hz)	Power supply and energy capacity	Data storage	Data format	Microprocessor	Examples of species studied
SM2M [Submersible]	16.5 cm diameter × 79.4 cm long	150	[104 d continuous recording]	4,000-96,000	LSD NiMH, alkaline, or lithium manganese D-cell batteries	128 GB with SDHC or 512 GB with SDXC	[WAV audio with up to two hydrophone channels, RMS peak and ambient level log, temperature log]	NA	[Marine mammals and fish; noise logging from below sea state 0 up to 240 dB SPL]
SM2M Ultrasonic	16.5 cm diameter × 79.4 cm long	150	[42 d continuous recording]	4,000-384,000	LSD NiMH, alkaline, or lithium manganese D-cell batteries	128 GB with SDHC or 512 GB with SDXC	[WAV audio with up to two hydrophone channels, RMS peak and ambient level log, temperature log]	NA	[Marine mammals and fish; noise logging from below sea state 0 up to 240 dB SPL]
[SM2M Deepwater]	16.5 cm diameter × 148 cm long	1,500	208 d (Submersible) or 84 d (Ultrasonic) for continuous recording	4,000-96,000	LSD NiMH, alkaline, or lithium manganese D-cell batteries	128 GB with SDHC or 512 GB with SDXC	WAV audio with up to two hydrophone channels, RMS peak and ambient level log, temperature log	NA	Marine mammals and fish; noise logging from below sea state 0 up to 240 dB SPL
[EA-SDA14]	12 cm diameter × 32 cm length; 5 kg with batteries	700	Over 1 y depending on setting parameters	39,625-2,5000,000 continuous recording	Different lithium batteries configurations 6 to 18 D cell cases; additional 24 D cells rechargeable external battery packs	2,000 GB on hard drive and/or 128 GB SDHC and/or 600 GB SSD	24 bits raw WAV files on 4 channels with nanoseconds synchronization, celerity, temperature, depth, orientation, GPS time-stamped	32 bits ARM & Digital Signal Processor (DSP)	All odontocetes, including sperm whales (*Physeter macrocephalus*) and porpoises; benthos
[SYLence]	12 cm diameter × 55 cm length; 8 kg with batteries	700	Over 1 y depending on setting parameters	24,000-192,000 continuous recording	Lithium D-cell batteries	2,000 GB on hard drive and/or 128 GB	16 or 24 bits WAV files on 1-2 channels, temperature, pressure, orientation	NA	Odontocetes