Sounds of shorebirds: opportunities for amateurs and an update of published information

Edward H. Miller

Miller, E.H. 1995. Sounds of shorebirds: opportunities for amateurs and a review of published information. *Wader Study Group Bull.* 78: 18-22.

Edward H. Miller, Biology Department, Memorial University of Newfoundland, St. John's, NF A1B 3X9 Canada.

Several years ago I published a report about sound signals of shorebirds (mainly vocalisations; Miller 1992)[1]. The purpose of that report was to assemble, summarise, organise, and review published information about shorebird sounds, and to suggest where recording efforts were needed. I hoped that the report would serve as a bibliographic resource and would spur investigations to increase information, improve understanding, and contribute to conservation or management. The purpose of this communication is to stress again the need for studies of certain problems, to emphasise the invaluable role that amateurs can play, and to provide some information about where technical information or advice about sound recording can be found (Appendix I). As well, I update the earlier compendium of published information about shorebird sounds (Appendix II).

Valuable sound recordings of shorebirds can be gathered very effectively by amateurs, who often have good opportunities for sound recording, are skilled at identifying shorebirds, and possess an intimate understanding of shorebird behaviour and habits. In other bird groups, some amateur recordists collaborate with scientists who have specialised technical information and access to analysing equipment; others perform their own analyses on personal computers, using an increasing number of affordable and "user-friendly" programs for analysing and displaying bird sounds[2]; while yet others make recordings then donate them to a natural-sounds archive (Kroodsma *et al.* 1995; see Appendix I). Whatever an individual's inclination, the need for amateur involvement in bird-sound recording (indeed, in wildlife recording generally) has never been greater (Kroodsma *et al.* 1995).

Sound recordings are like other biological specimens in the kinds of information they contain. In environmental impact assessments, biological surveys, and water-quality studies, it is routine to preserve samples for reference or independent evaluation. Plants or animals preserved in such studies as "voucher specimens" are valuable in many ways. They provide physical evidence about distribution or seasonal occurrence. If questions arise about the accuracy of identification, then specimens can be re-examined. If taxonomic changes render past identifications obsolete, then specimens can be re-identified in light of the changes. Sound recordings offer the same advantages of physical evidence that can be re-examined, re-analysed, or studied further[3].

Tape recordings of bird sounds thus are similar to other "specimens" in providing physical evidence about the occurrence of birds in space and time, and in permitting further study if a question about identification is raised, or if further analysis or research is desired. They have some distinct advantages over other forms of biological specimens for documenting occurrence because they can be obtained so efficiently, and do not cause a loss of life. In the tropics, tape recordings of bird sounds have proven to be invaluable where firm documentation about species present in threatened areas is needed, and where the documentation needs to be obtained quickly, efficiently, and cheaply--as in biological surveys of threatened areas (Kroodsma *et al.* 1995).

It would be straightforward to use tape recordings of shorebird sounds to document the occurrence or relative abundance of shy, unidentifiable, or nocturnal species. In some parts of the world, basic information about distribution is needed simply as a starting point for conservation efforts, and sound recordings may be the best way to get such information (*e.g.* most woodcock species). Another area where sound recordings can almost certainly be informative is in documenting the presence or seasonal occurrence of migrating or wintering shorebirds, or nocturnally migrating species (can different races of Red Knot *Calidris canutus* be distinguished by their calls during migration or wintering?). Almost all analyses to date have been on breeding sounds, so the basic groundwork for studies of migrating or wintering species needs to be laid. We need to start by making tape recordings of known species (ideally, age and sex should be known too), in different seasons, and in different circumstances, such as: undisturbed flock

[1] Copies of that report can be obtained from me.

[2] Perhaps the "friendliest" (and certainly the most affordable) is Canary for the Macintosh, which costs US$ 200, but a single copy of it may be shared among 12 computers (obtainable from the Library of Natural Sounds at Cornell University; see Appendix I).

[3] Scientific specimens in general (mainly in museums) contain vastly more information than just this, as they are the fundamental material upon which our knowledge of biological diversity is based, and they are rich in information about anatomy, life history, sexual dimorphism, ecology, evolution, and even pollution and genetics (Miller 1985, 1992). However, one of their basic values lies in documenting where and when species occur (or formerly occurrred)--information that can be provided as readily by sound recordings, but more efficiently and cheaply.

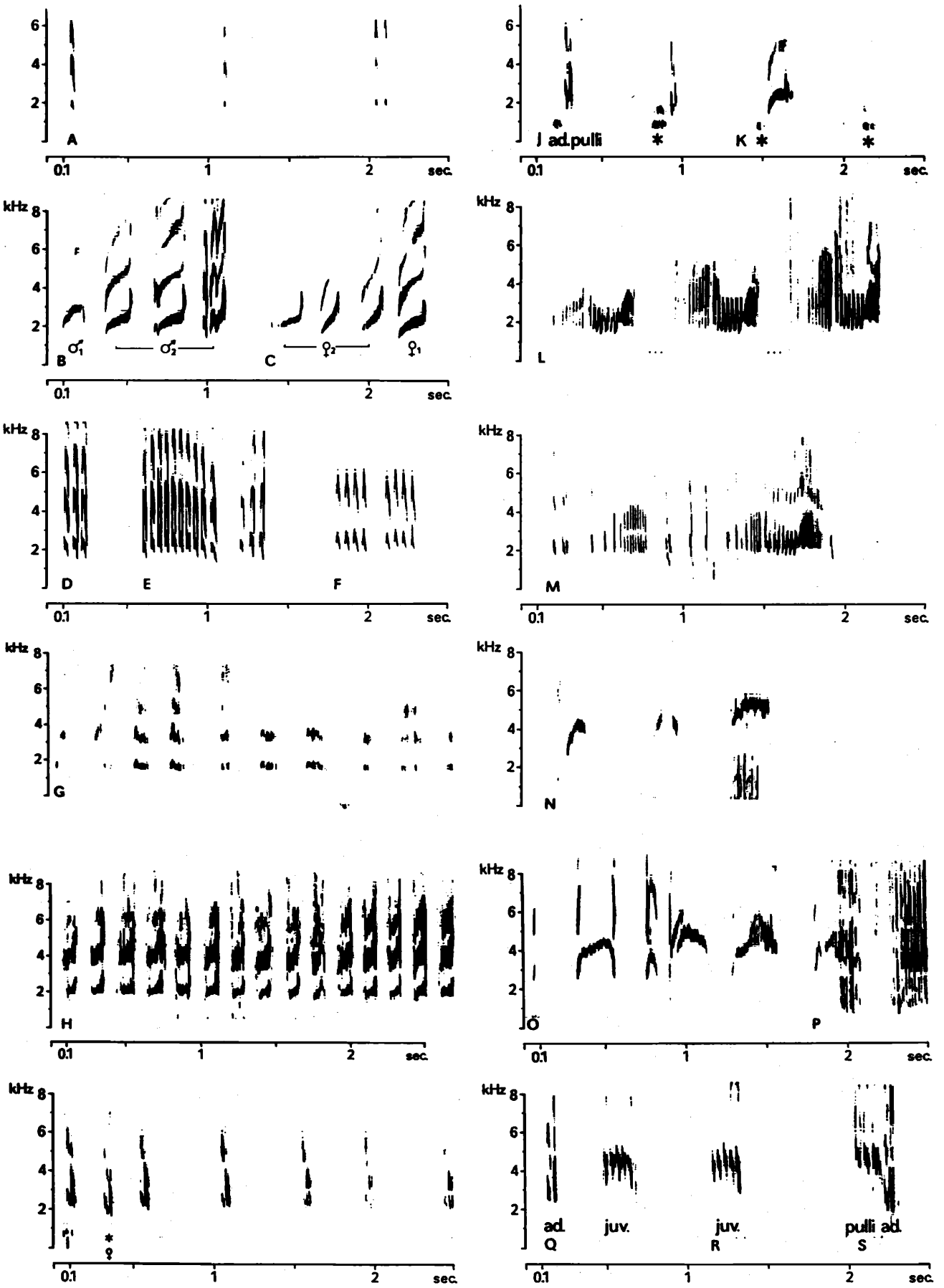

Figure 1. An example of broad coverage of a species' vocalisations, with good sonagraphic representation that can be used as reference by other workers (Mongolian Plover *Charadrius mongolus*). The text includes written descriptions of the vocalisations and their uses (from Gebauer & Nadler 1992). Few of the world's shorebird species have had their vocal repertoires described as fully.

feeding; calls as a flock detects a potential predator, flies up in response to one, or flies away afterwards; flight calls from undisturbed lone birds and from undisturbed flocks; pre-landing calls of birds on feeding grounds or roosts; and so on.

Good sonagraphic analyses and illustrations are the next step (Figure 1), with reference recordings deposited in a sound archive (see Appendix I). Some recommendations for analysis and graphical presentation of shorebird sounds are in my previous paper (for common-sense advice on recording, see Kroodsma *et al.* 1995).

Opportunities and rewards for amateur involvement in recording shorebird sounds are great, and single individuals as well as teams of people can make great contributions. Expertise and advice (and sometimes loans of equipment) are available from animal-sound archives (some of which are listed in Appendix I) and from university specialists.

APPENDIX I: ADDRESSES OF SOME NATURAL-SOUNDS ARCHIVES

Arquivo Sonoro Neotropical, Departamento Zoologia UNICAMP, CP 6109, 13081 Campinas, SP, Brasil.

Australian National Collection of Bird Sound Recordings, National Film and Sound Archive, P. O. Box 1781, Canberra, ACT 2601, Australia.

Bioacoustics Laboratory and Archives, Florida Museum of Natural History, University of Florida, Gainesville, Florida 32611, U.S.A.

Borror Laboratory of Bioacoustics, The Ohio State University, 1735 Neil Avenue, Columbus, Ohio 43210, U.S.A.

CSIRO Collection of Wildlife Sounds, Division of Wildlife and Rangelands Research, P. O. Box 84, Lyneham, ACT 2602, Australia.

Department of Ornithology and Mammalogy, California Academy of Sciences, Golden Gate Park, San Francisco, California, 94118, U.S.A.

Wildlife Section, National Sound Archive, 29 Exhibition Road, London SW7 2AS, U.K.

Fitzpatrick Bird Communication Library, Bird Department, Transvaal Museum, P. O. Box 413, Pretoria 0001, South Africa.

Fonoteca Zoologia, Museo de Zoologia, Apartat de Correos 593, 08003 Barcelona, Spain.

Laboratorio de Sonidos Naturales, Museo Argentino de Ciencias Naturales "Bernardino Rivadavia," Av. Angel Gallardo 470, 1905 Buenos Aires, Argentina.

Laboratory of Natural Sounds, Museum of Vertebrate Zoology, 3101 Valley Life Sciences Building, University of California, Berkeley, California 94720-3160, U.S.A.

Library of Natural Sounds, Laboratory of Ornithology, 159 Sapsucker Woods Road, Cornell University, Ithaca, New York 14853, U.S.A.

New Zealand Wildlife Service Sound Library, Department of Conservation, Private Bag, Wellington, New Zealand.

Phonotek of Animal Voices, Department of Vertebrate Zoology, Biological Science Faculty, Lomonosov State University, 119899 Moscow, Russia.

Sound Library, Australian National Wildlife Collection, CSIRO Division of Wildlife and Ecology, P. O. Box 84, Lyneham, A.C.T. 2602, Australia.

Texas Bird Sound Library, Division of Life Sciences, Sam Houston State University, Huntsville, Texas 77341, U.S.A.

Tierstimmenarchiv, Humboldt-University, Institute of Biology, Invalidenstrasse 43, D-10115, Berlin, Germany.

APPENDIX II: RECENTLY PUBLISHED ANALYSES OF SHOREBIRD SOUNDS

The list below shows that there has been a modest increase in documentation of shorebird sounds since my 1992 review (mainly vocalisations, of course). Most of the increase is due to the publication of Volume 2 of the *Handbook of Australian, New Zealand and Antarctic Birds* (Marchant & Higgins, 1993) (HANZAB), which features sonagrams for 27 shorebird species, about half of which have never been reported upon previously (two stone curlews, seven plovers, two oystercatchers, a jacana, a stilt, an avocet, and the unique Banded Stilt). The other main source for new information is the American initiative, Bibliographies of North American Birds (BNA), which is providing separately published accounts of all bird species in North and Middle America.

Errors in and additions to Miller (1992) follow, including analyses presented there but not included in its taxonomic listing. Species that are now known by analyses (mainly spectrographic) of at least five kinds of sounds are marked by single asterisks. "New" means that the first sonagrams for the species have been published since Miller (1992). References that provide analyses of at least five sound types are indicated by two asterisks; other references, which document sound classes not in the major references, or which provide other important information (*e.g.* on individuality), are marked with single asterisks. BNA accounts up to No. 144 are included. As In Miller (1992), a few of the analyses referred to below are re-publications of previously published sonagrams.

ERRORS IN MILLER (1992)

- Under *Calidris temminckii* (p. 27) change the first entry to "*Bergmann and Helb (1982) (see also footnote 8, p. 26)".

- Under *Calidris temminckii* (p. 27) change the seventh entry to "Tikhonov and Fokin (1981a) (see also footnote 9, p. 26)".

ADDITIONS TO MILLER (1992)

Burhinidae

Burhinus giganteus (new)
Marchant & Higgins (1993)
Burhinus grallarius (new)
Marchant & Higgins (1993)
Burhinus senegalensis
Miller (1992)

Charadriidae

**Anarhynchus frontalis*
Marchant & Higgins (1993)
**Charadrius bicinctus*
*Marchant & Higgins (1993)
Charadrius hiaticula
Miller (1995)
**Charadrius leschenaultii*
*Marchant & Higgins (1993)
**Charadrius mongolus*
**Gebauer & Nadler (1992); *Marchant & Higgins (1993)
Charadrius obscurus
*Marchant & Higgins (1993)
Charadrius rubricollis (new)
Marchant & Higgins (1993)
Charadrius ruficapillus (new)
Marchant & Higgins (1993)
Charadrius semipalmatus
Miller (1995)
Charadrius veredus (new)
Marchant & Higgins (1993)
Charadrius vociferus
Miller (1992)
Elseyornis melanops (new)
Marchant & Higgins (1993)
Erythrogonys cinctus (new)
Marchant & Higgins (1993)
**Pluvialis apricaria*
*Miller (1995)
**Pluvialis dominica*
*Miller (1994, 1995)
**Pluvialis fulva*
*Marchant & Higgins (1993); *Miller (1995)
Pluvialis squatarola
*Marchant & Higgins (1993); *Miller (1995)
**Thinornis novaeseelandiae*
Marchant & Higgins (1993)
Vanellus miles (new)
Marchant & Higgins (1993)
Vanellus tricolor (new)
Marchant & Higgins (1993)

Haematopodidae

Haematopus fuliginosus (new)
Marchant & Higgins (1993)
Haematopus longirostris (new)
Marchant & Higgins (1993)
Haematopus finschia[4]
*Marchant & Higgins (1993)
**Haematopus palliatus*
Miller (1992); *Nol & Humphrey (1994)
Haematopus unicolor[5]
*Marchant & Higgins (1993)

Jacanidae

Irediparra gallinacea (new)
Marchant & Higgins (1993)

Pedionomidae

Pedionomus torquatus
Marchant & Higgins (1993)

Recurvirostridae

Cladorhynchus leucocephalus (new)
Marchant & Higgins (1993)
Himantopus himantopus
Marchant & Higgins (1993)
Himantopus novaezelandiae (new)
Marchant & Higgins (1993)
Recurvirostra avosetta
Miller (1992)
Recurvirostra novaehollandiae (new)
Marchant & Higgins (1993)

Scolopacidae

**Calidris alpina*
Miller (1992, 1994, 1995)
Calidris ferruginea
*Parmelee (1992)
Calidris maritima
Miller (1995)
Calidris mauri
*Wilson (1994)
**Calidris minutilla*
Cooper (1994); Miller (1992, 1994, 1995)
Calidris ptilocnemis
Miller (1995)
**Calidris pusilla*
Miller (1992)
**Calidris temminckii*
Miller (1992)
**Gallinago gallinago*
Jellis (1977); Miller (1995)
Gallinago media
Saether (1994)
Limicola falcinellus
Miller (1992)
Limnodromus griseus
Miller (1992, 1995)
**Scolopax minor*

[4] *H. finschi* was treated as a subspecies of *H. ostralegus* by Baker (1974).
[5] *H. chathamensis* was subsumed within *H. unicolor* by Sibley & Monroe (1990), but treated as a separate species by Baker (1974) and Marchant & Higgins (1993).

Miller (1992, 1994); **Keppie & Whiting (1994)

Steganopus tricolor

*Colwell & Jehl (1994)

Tringa ochropus

Miller (1992)

Tringa solitaria

Miller (1992)

Tryngites subruficollis

*Lanctot & Laredo (1994)

REFERENCES

Colwell, M.A. & Jehl, J.R., Jr. 1994. Wilson's Phalarope. *In: The Birds of North America,* No. 83 (Poole, A. & Gill, F., Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Cooper, J.M. 1994. Least Sandpiper. *In: The Birds of North America,* No. 115 (Poole, A. & Gill, F., Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Cramp, S. (Ed.). 1993. *Handbook of the birds of Europe the Middle East and North Africa. The birds of the western Palearctic.* Vol. 3: Waders to gulls. Oxford: Oxford Univ. Press.

Gebauer, A. & Nadler, T. 1992. Verhalten und Stimme des Mongolregenpfeifers *Charadrius mongolus. Limicola* 6: 105-125.

Jellis, R. 1977. *Bird sounds and their meaning.* Ithaca: Cornell Univ. Press.

Keppie, D.M. & Whiting, R.M., Jr. 1994. American Woodcock. *In: The Birds of North America,* No. 100 (Poole, A. & Gill, F., Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Kroodsma, D.E., Budney, G.F., Grotke, R.W., Vieillard, J., Gaunt, S.L.L., Ranft, R. & Veprintseva, O.D. 1995. Natural sound archives: guidance for recordists and a request for cooperation. *In: Ecology and Evolution of Acoustic Communication in Birds* (Kroodsma, D.E. & Miller, E.H. Eds.). Ithaca: Cornell University Press. (In press).

Kroodsma, D.E., Vieillard, J.M.E. & Stiles, F.G. 1995. Urgency and opportunity in the Neotropics. *In: Ecology and Evolution of Acoustic Communication in Birds.* (Kroodsma, D.E. & Miller, E.H. Eds.). Ithaca: Cornell University Press. (In press).

Lanctot, R.B. & Laredo, C.D. 1994. Buff-breasted Sandpiper. *In: The Birds of North America*, No. 91 (Poole, A. & Gill, F., Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Kettle, R. 1989. Major wildlife sound libraries. Bioacoustics 2: 171-176.

Marchant, S. & Higgins, P.J. (Eds.). 1993. *Handbook of Australian, New Zealand and Antarctic birds.* Vol. 2, raptors to lapwings. Melbourne: Oxford Univ. Press.

Miller, E.H. (Ed.) 1985. *Museum collections: their roles and future in biological research.* Victoria, B.C.: B.C. Provincial Museum, Occasional Papers No. 25.

Miller, E.H. 1992. Acoustic signals of shorebirds. A survey and review of published information. Victoria, B.C.: Royal B.C. Museum Tech. Rep.

Miller, E.H. 1993. Biodiversity research in museums: a return to basics, pp. 141-173. *In: Our living legacy, proceedings of a symposium on biological diversity* (Fenger, M.A., Miller, E.H., Johnson, J.A. & Williams, E.J.R. Eds.). Victoria:, B.C.: Royal B.C. Museum.

Nol, E. & Humphrey, R.C. 1994. American Oystercatcher. *In: The Birds of North America*, No. 82 (Poole, A. & Gill, F., Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Parmelee, D.F. 1992. White-rumped Sandpiper. *In: The Birds of North America*, No. 29 (Poole, A. & Gill, F., Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Saether, S.A. 1994. Vocalizations of female Great Snipe *Gallinago media* at the lek. *Ornis Fennica* 71: 11-16.

Wilson, W.H. 1994. Western Sandpiper. *In: The Birds of North America*, No. 90 (Poole, A. & Gill, F., Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.