Supplementary Material

Table S1. Acoustic metrics (AM) used to discriminate species acoustic presence. AM marked with (5) indicate those that were computed on five bandwidths: 10 –40 Hz; 40 – 100 Hz; 100 - 200 Hz; 200 - 900 Hz; and the full bandwidth 0–1000 Hz.

AM	**Description**
sh	Spectral entropy: obtained by applying the Shannon evenness equation to the average frequency spectrum scaled by is integral.
th	Temporal entropy: obtained by applying the Shannon evenness equation to the amplitude envelope obtained with the Hilbert transform of the signal, scaled by its integral.
H	Acoustic entropy index (Sueur et al., 2008): obtained by the multiplication of Hs and Ht, it integrates both the spectral and temporal components of an acoustic signal. H varies between 0 and 1, where 1 indicates a highly heterogeneous signal.
Ht_hist	Temporal entropy computed on the distribution obtained from a histogram: here we used the Sturges algorithm to define the histogram breaks. Ht_hist will not show a high temporal entropy value for a sustained sound with an almost flat envelope.
ADI (5)	Acoustic diversity index (Pekin et al., 2012): obtained by applying the Shannon diversity equation to the average frequency spectrum.

AEI (5)	Acoustic evenness index (Villanueva-Rivera et al., 2011): obtained by dividing the spectrogram into bins and taking the proportion of the signals in each bin above the threshold (-50dBFS) and applying the Gini index to these bins.
AR	Acoustic richness (Depraetere et al., 2012): obtained through the multiplication of the rank of the M and Ht indices scaled by the squared number of entries in the dataset. AR varies between 0 and 1, where 1 indicates a highly rich signal within that particular dataset.
ACI (5)	Acoustic complexity index (Pieretti et al., 2011): computed as the average absolute fractional change in spectral amplitude for each frequency bin in consecutive spectrums.
BI (5)	Bioacoustic Index (Boelman et al., 2007): calculated as the area under the curve of the mean amplitude spectrum between two frequency limits, is a function of both the sound level and the number of frequency bands.
ENS	Effective number of species (Chase & Knight, 2013): the number of equally-common species required to give a particular value of a diversity index (e.g., Shannon diversity index). We obtained this index by computing the exponential of the acoustic diversity index (ADI).
NP (5)	Number of peaks (Gasc et al., 2013): number of peaks in the frequency spectrum with an amplitude slope parameter = 0.01.

AMP	Amplitude value of the local maximum frequency peak computed on four bandwidths: 0.01–0.03 kHz; 0.03–0.1 kHz; 0.1–0.2 kHz; 0.2–1 kHz; and the full bandwidth 0.01–1 kHz.
M	Median amplitude standardized. M varies between 0 and 1.
SPL	Average amplitude value of the recording, computed as the mean of the amplitude envelope.
NDSI_high	Sum of energy in the high frequency range (100-1000 Hz) of the recording.
NDSI_low	Sum of energy in the low frequency range (10-100 Hz) of the recording.
BL	Background noise level: average intensity from the mode intensity computed for each frequency bin. Computed following the background noise index calculation method (Towsey, 2017).
BP	Background noise level percentile: is the % of values in the amplitude distribution below the noise level value.
RPS	Relative proportion of signal: ratio between the intensity counts above noise level and all sound.

Anisotropy	Anisotropy is a measure used to determine if heterogeneity patterns are more heterogeneous along a particular direction. It characterizes the relative increase in the temporal heterogeneity of the soundscape and it is obtained as the temporal and spectral entropy ratio.
NDSI	Normalized difference soundscape index (Kasten et al. 2012): developed to compare the acoustic signal of soundscapes with different relative contributions of anthrophony and biophony. In this study we computed NDSI as the normalized difference in the absolute amplitude of a high frequency band (100–1000 Hz) minus a low frequency band (10–100 Hz). NDSI varies between -1 and +1, where +1 indicates a signal dominated by high frequency sounds.

Table S2. Results from random forest classification models trained to discriminate between the species richness levels (SR). Slope dataset: average OOB error = 38%; 39 out of 44 AMs were considered important by the Boruta test and included in the model. Shelf dataset: average OOB error = 23%; 40 out of 44 AMs were considered important.

SR level	**Slope: n**	**Slope: Class error**	**Shelf: n**	**Shelf: Class error**
0	234	0.29	98	0.07
1	242	0.43	129	0.18
2	164	0.43	110	0.31
3	55	0.47	52	0.52