

## LISTENING TO NATURE - A PASSIVE ACOUSTIC APPROACH FOR PROTECTED AREAS MONITORING AND BIODIVERSITY ASSESSMENT

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Passive acoustic monitoring (PAM) involves recording the natural soundscape using automated field recording devices and diverse sound analysis. Acoustic indices that extract specific information from sound recordings makes PAM a good candidate for biodiversity monitoring. These indices are mathematical filters capable of representing how the acoustic energy is distributed across time and frequencies in a sound file. When comparing sites, these indices allow us to identify the frequency range, time of the day and season in which the soundscape differs most.

The soundscape was sampled in The Ark in the Park, a fenced bird community with high level of pest management and in the Fairy Falls, where there was no pest management at the time the sound samples were recorded. Both sites are located in Waitakere Ranges Region, New Zealand. The field work was performed in two seasons, autumn and spring.

Twelve acoustic indices were calculated over the sound recordings. The indices measurements were then divided into 20 panels defined by specific time and frequency ranges. There were significant differences in the acoustic indices values between the Ark in the Park and Fairy Falls, reflecting the differences in the environmental condition. The different ratios among panels allowed us to identify the acoustic region in which the soundscape differs most between sites. This acoustic region can now be targeted for future monitoring.

The panels that differed most between Fairy Falls and Ark in the Park are within the period from 9:00 pm to 11:59 pm (and different frequency ranges). It is possible that the significant differences found are regarding mammal activity. The next step of this research will be to identify the sounds that are generating the soundscape differences and try to understand their ecological meaning.

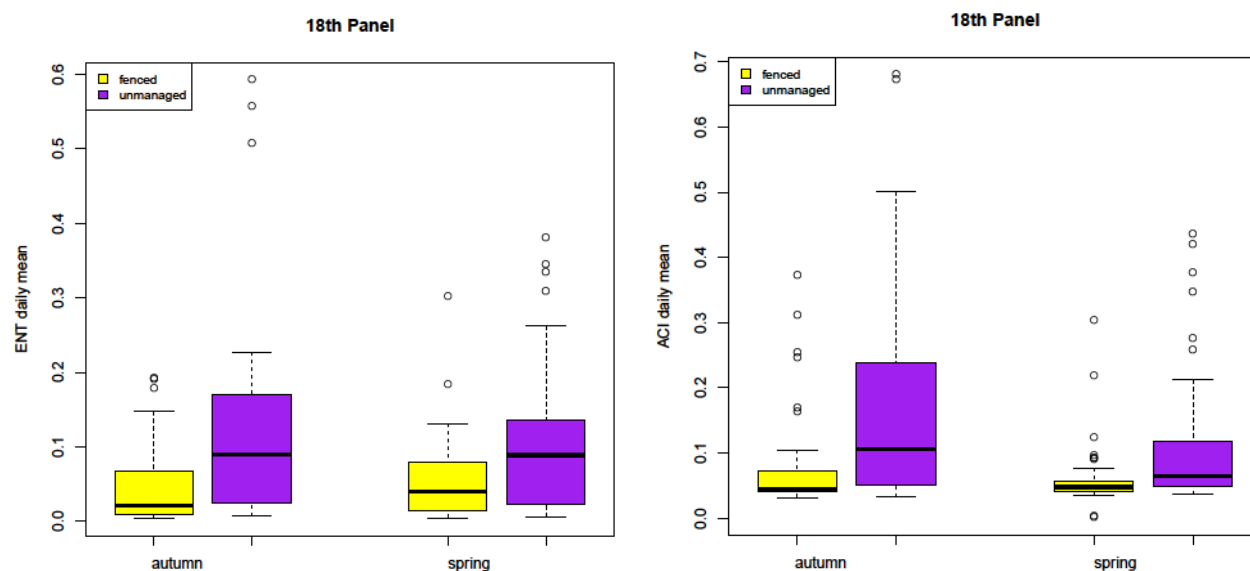


Figure.1: The results of Acoustic Entropy Index - ENT (Sueur, Farina, Gasc, Pieretti, & Pavoine, 2014) and Acoustic Complexity Index- ACI (Pieretti, Farina, & Morri, 2011), within the 18<sup>th</sup> panel (from 9:00pm to 11:59 pm and frequency range from 0.988 kHz to approximately 3.609 kHz). These indices are known to be sensitive to biophony, including sounds produced by animals (e.g. birds, insects, amphibians, etc).