



Propagation of sound from fireworks and the effects on wildlife

Heath Sturgess (1), Alec Duncan (2) and Christine Erbe (2)

(1) ANV Consultants, Perth, Australia
(2) CMST, Curtin University, Perth, Australia

ABSTRACT

Fireworks displays are a common feature of many celebrations and events due to their captivating visuals and loud, explosive sounds. However, the resulting sound waves may have adverse effects on the hearing of nearby people, as well as terrestrial and marine animals. This paper investigates the propagation of sound waves from fireworks through the air into the water column and assesses their potential impacts on wildlife. The study focused on fireworks events at Shelley Beach and Elizabeth Quay in Western Australia, using both qualitative and quantitative methods. Sound propagation was modelled as a 3-layer environment (i.e. air-water-sediment) representative of conditions at Shelley Beach and Elizabeth Quay. The long-term baseline noise levels were recorded through passive acoustic monitoring (PAM), and the long-term spectral average and power spectral probability density were calculated. These metrics were used to evaluate changes in the soundscape before and after the fireworks event. Additionally, the sound levels were also compared with known hearing and behavioural response thresholds of various animal species to assess potential noise impacts. Overall, there was found to be little impact for marine animals at the distance of the sound recorder besides possible behavioural changes. Birds on the other hand were flushed from their habitats.