

# Sonic Kayaks: Environmental monitoring and experimental music by citizens

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The sonic kayak system in action. Credit: Amber Griffiths

Researchers have rigged kayaks with underwater environmental sensors and speakers to create an environmental monitoring tool suitable for citizen scientists. Instructions for the hardware and open-source software

for making the "Sonic Kayak" are presented in a paper publishing 30 November in the open access journal *PLOS Biology*. The system was conceived by researchers at the transdisciplinary laboratory FoAM Kernow, and the Bicrophonic Research Institute.

The kayaks allow paddlers to hear sonifications (data transformed into sound) of water temperature in real time, as well as sounds from under the water, generating live music from the marine world. Working with marine researchers from the Zoological Society of London and University of Exeter, the technology was developed to record the sensor data along with GPS, time and date. This allows fine scale mapping of water temperatures and [underwater noise](#), providing data that were previously unattainable using standard research equipment. Preliminary data are also provided from the hydrophones (underwater microphones) and digital thermometers, demonstrating the potential for research in marine noise pollution

The Sonic Kayak can be used as a citizen science data collection device, as research equipment for professional scientists, or as a sound-art installation in its own right.

The project was partly developed during open hacklabs (events for anyone interested to design and build together) to attract more diverse skills and facilitate collaboration and learning across disciplines. Since the Sonic Kayak hardware design and software have been made open-source, anyone is able to adapt and improve the system for their own needs. Merging the approaches of biosciences, remote sensing, sound art, coding and sports resulted in a project that is new for all fields and demonstrates the great potential for truly transdisciplinary research.

**More information:** Griffiths AGF, Kemp KM, Matthews K, Garrett JK, Griffiths DJ (2017) Sonic Kayaks: Environmental monitoring and experimental music by citizens. *PLoS Biol* 15(11): e2004044.

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