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Interoperability and performance of the new Open Protocol for acoustic tracking: results from field tests in European waters

Innovation in fish telemetry
Spain

Interoperability and performance of the new Open Protocol for acoustic tracking: results from field tests in European waters

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The lack of compatibility between equipment from different manufacturers has been a pri- mary obstacle to consolidating large collaborative acoustic telemetry networks. Especially, undisclosed encrypted signal coding protocols used by some companies hamper detections and collab- oration between research groups with equipment from different manufacturers. This seriously limits the potential of acoustic telemetry to study animal movements over large spatial and transboundary scales, reduces competition among manufacturers, and stifles innovation. The European Tracking Network, in collaboration with some acoustic telemetry manufacturers, has worked to develop a new protocol for acoustic tracking. The result is an energy-efficient trans- mission protocol, open and accessible to all researchers and manufacturers, where ID allocation relies on an industry-independent third party (the Flanders Marine Institute, Belgium). Today, the Open Protocol (OP) is already available to manufacturers agreeing to a memorandum of understanding, and the first transmitters and receivers implementing it are already available on the market. The main objective of this study was to conduct the first extensive field tests of the OP to confirm the compatibility between devices, characterise the acoustic range of each transmitter-receiver manufacturer combination, compare the detection efficiency to the stan- dard code set used at present, and assess its robustness against spurious detections. A large international collaborative effort was made to conduct long-term (˜2 weeks) range tests in four main aquatic habitats: a river, a coastal lagoon, nearshore habitat, and the open sea. At each location, sets of receivers and transmitters from different manufacturers were deployed at increasing distances between them using the same experimental design. The decay of detection probability with distance was modelled for each transmitter-receiver manufacturer combination by applying logistic regression using a Bayesian approach. Moreover, we made a direct field comparison between smolts groups tagged with OP tags and R64K tags, respectively, tracking their migration to the sea. Our results confirmed full compatibility between the tested devices. We observed negligible differences in the measured acoustic ranges between manufacturers, with habitat type being the main cause of variability. The OP was also found to be robust against spurious detections, and the field comparison between OP and R64K showed equal performance. We hope that our novel insights will encourage international research groups to foster OP-based studies to ensure compatibility and maximise the benefits of acoustic telemetry networks.

Keywords: open protocol, coding systems, acoustic range, compatibility, European Tracking Network