

# SATELLITE TELEMETRY PERMITS NEAR REAL-TIME MONITORING OF THE BEHAVIOUR OF MARINE FISH

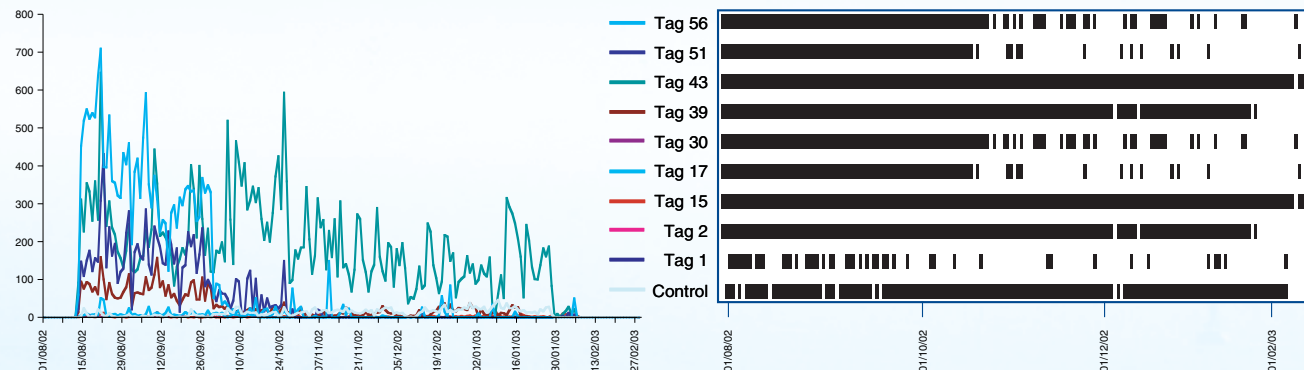
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Field telemetry is ideal for collecting behavioural and biological data of high quality and fine spatio-temporal resolution. However, field telemetry can be an expensive and time-consuming process, particularly when used at sea and especially when data are required from many individuals in more than one location. With this in mind, CEFAS has designed a datalogging Acoustic Telemetry Buoy (ATB) that sends data via a satellite link. Once deployed, this system permits the transmission of near real-time fish behavioural data for long periods at low cost.



Deployment of the ATB in the North Sea

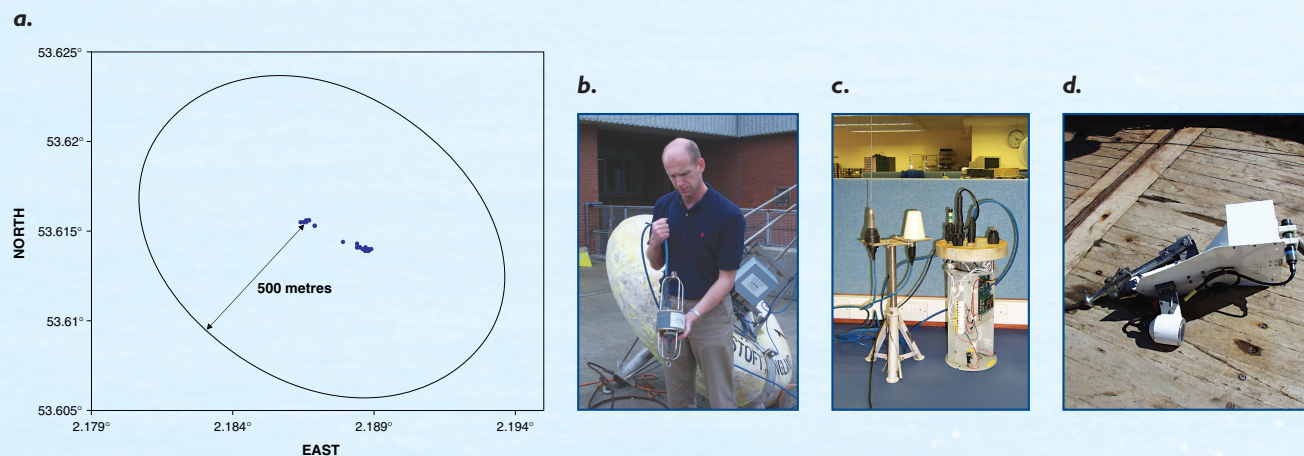
The ATB is based on a hydrophone system that detects coded acoustic pulses originating from bespoke or commercially available acoustic transmitters. The distance at which tags can be detected depends upon local conditions (seabed depth and sea state) and the frequency of the tag (detection distance decreases with increasing frequency). A data-logging system decodes the acoustic pulses and stores the time of each successfully decoded pulse. Each day the ATB transmits a message to a passing satellite detailing GPS position, buoy status, time and date and a summary of the day's data. This message is sent as an email to the CEFAS Laboratory in Lowestoft.



Number of successful decodes per tagged fish per day of a 200 day deployment of the ATB in 2002. Tags were surgically implanted into the peritoneal cavity of Atlantic cod.

The inferred presence (in black) or absence of tagged fish within the buoy detection range for the same ATB deployment.

The complete ATB system consists of a hydrophone, receiver, decoder, logger, radio transmitter, GPS receiver and satellite communicator housed in a pressure housing together with associated battery packs and cabling, and can be deployed on a simple toroid mooring buoy. The ATB, once deployed, is completely automated and requires no maintenance during its battery life (6-8 months) whilst providing 24 hour listening coverage. In addition, a hydrophone with data and GPS-logging capability has been developed to augment the fixed system for periods when vessel time is available. The hydrophone system can be towed behind a vessel (for deep water application), or hull-mounted for applications in shallow water. Ongoing developments in coded tag design at CEFAS will enable communication of environmental and physiological data from many individuals to more than one ATB or towed hydrophone.



(a.) The detection range of the buoy is approximately 500 metres for tags transmitting acoustic pulses at 76kHz. GPS fixes of the position of a moored buoy (blue) show that the detection envelope is an ellipse for a moored system. (b.) First author holding the ATB hydrophone, with toroid mooring in background. (c.) The electronic 'heart' of the ATB. (d.) Towable hydrophone.